CHURN CREEK TERRESTRIAL ECOSYSTEM MAPPING WITH WILDLIFE INTERPRETATIONS FOR MAPSHEETS 92O.028, 92O.029, 92O.038, 92O.039, 92O.048, 92O.049

VOLUME I

BIOTERRAIN AND ECOSYSTEM MAPPING PROJECT REPORT

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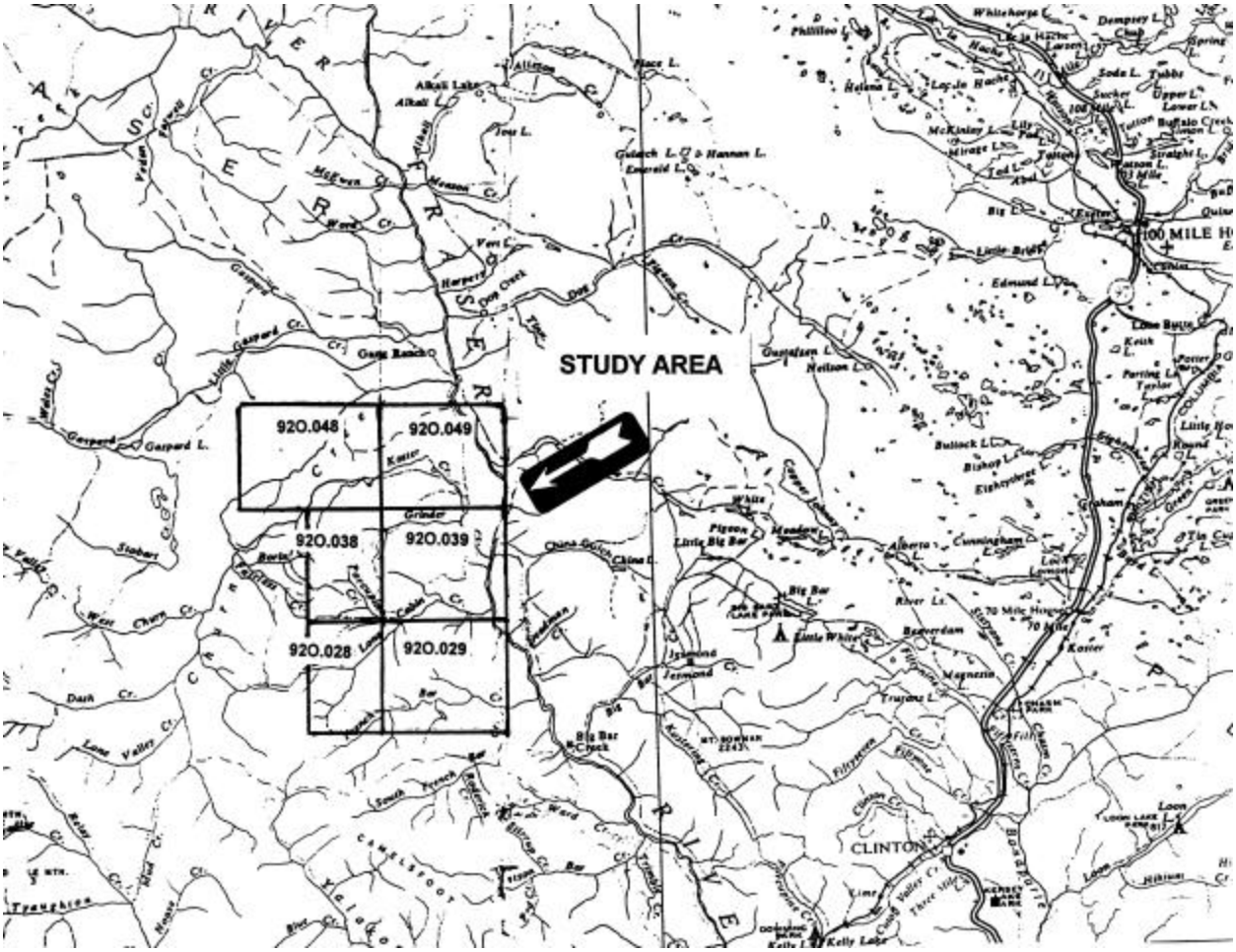
Plate 1 Overview of the Fraser River Valley, Empire Valley Ranch

Map 1 Provincial Location of Churn Creek Study Area

Map 2 Churn Creek Study Area Boundary - 1 : 20,000 Mapsheets



1.0 INTRODUCTION

In 1998 the British Columbia Ministry of Environment, Lands and Parks, Cariboo Region, in agreement with Lignum Limited of Williams Lake B.C. issued a contract for Terrestrial Ecosystem Mapping (TEM) with Wildlife Habitat Capability/Suitability interpretations at 1:20,000 scale for the Churn Creek Study Area. (see Map 2) TEM facilitates the development of thematic map overlays and digital wildlife habitat capability/suitability tables to assist resource managers and protected area planners in wildlife habitat, grassland and forest management in the Churn Creek study area. This scale of terrestrial ecosystem mapping allows for accurate evaluation and spatial representation of sensitive and endangered habitats, as well as inventory of Site Series/Ecosystem Units. For 27 assigned wildlife species, habitat use models were developed and suitability ratings generated for use with the Ecosystem Units found in the Churn Creek Study Area.

Previous related studies include the *Regional Mule Deer Winter Range Strategy for the Cariboo-Chilcotin Land Use Plan*, (Mule Deer Winter Range Strategy Committee 1996) and *Churn Creek Bighorn Sheep Study* (Keystone Wildlife Research 1998). *Forest Cover Maps* (B.C. Ministry of Forests Inventory Branch 1996) at 1: 20,000 scale exist for all the mapsheets representing the study area. Adjacent areas with Terrestrial Ecosystem Mapping are Dog Creek (Clement 1995) to the north on mapsheets 92O.059, 92O.069 at 1:20,000 scale.

Field sampling for this report was accomplished in June, July and August of 1998. The study utilizes bioterrain pretyping done by Evan McKenzie, Janet Riddell, and Grant Burns (JMJ Holdings Ltd.) and Terrestrial Ecosystem Mapping and Wildlife Habitat Capability/Suitability Tables produced by Bruce A. Sinclair, Ursula Lowrey, and Rayanne McKay (JMJ Holdings Ltd., Nelson).

1.1 LOCATION

The Churn Creek Study Area is about 100 kilometers northwest of Clinton, B.C. along the Fraser River from Churn Creek to French Bar Creek (Map 1). It includes all of the 1:20,000 mapsheets 92O.029, 92O.039, 92O.048, 92O.049 and the eastern halves of mapsheets 92O.028 and 92O.038 (Map 2). These are T.R.I.M. (Terrain Resource Information Management) maps produced by the B.C. Ministry of Crown Lands, Surveys and Resource Mapping Branch, Victoria.

The Churn Creek Study Area includes the recently created Churn Creek Protected Area, which includes the former Empire Valley Ranch. The nearest services are in the village of Dog Creek, 25 km. to the northeast where there is a store, gasoline, a pay phone, and a first aid station.

1.2 BIOPHYSICAL SETTING

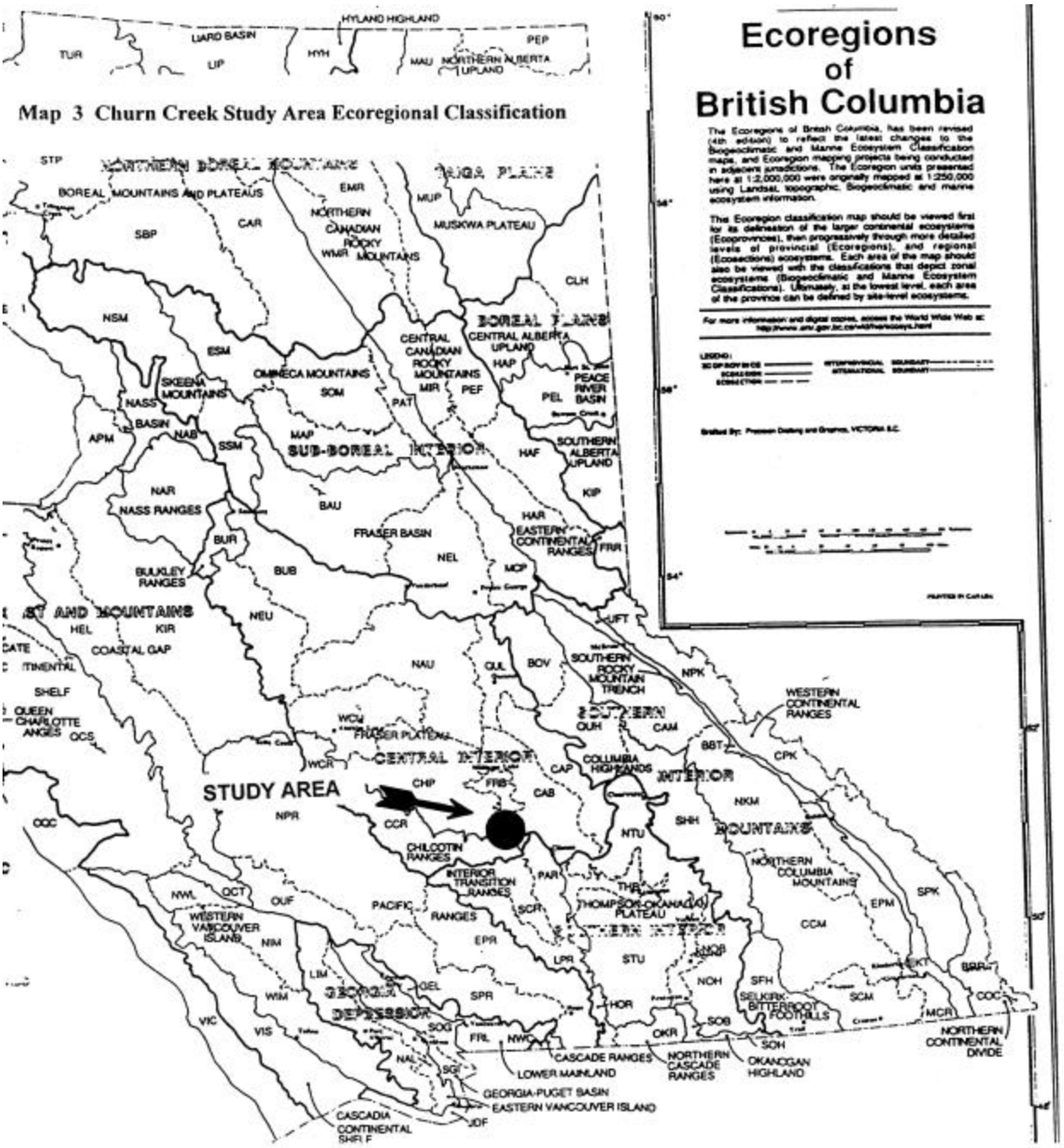
1.2.1 ECOREGIONAL CLASSIFICATION

The Ecoregional Classification is an hierarchical system based on climatic processes and landforms. It was developed to describe ecological relationships, bring into focus the extent of critical wildlife habitats, their relationship with adjacent areas, and provide a framework for recognizing small scale ecosystems in British Columbia. The Ecoregion Classification stratifies the province's complexity into discrete geographical units at five different levels; Ecodomains and Ecodivisions, which place British Columbia globally, and Ecoprovinces, Ecoregions, and Ecosections, which are progressively more detailed and relate areas of similar climate, physiography, oceanography, hydrology, vegetation and wildlife potential within the province to one another (Demarchi, 1996).

Using this classification, the Churn Creek Study Area is located in the Central Interior Ecoprovince. The north and east part of the study area occurs in the Fraser River Plateau Ecoregion, Fraser River Basin (FRB)and Chilcotin Plateau (CHP) Ecosections. The south and western portion of the study area is in the Chilcotin Ranges Ecoregion, Central Chilcotin Ranges (CCR) Ecosection. (Map 3).

The Central Interior Ecoprovince "has a typical continental climate: cold winters, warm summers, and a precipitation maximum in late spring or early summer. However, the moderating influences of Pacific air occur throughout the year, as is the case for most of the province south of 57 N. The area lies in a rain shadow leeward of the coast mountains. In summer there is intense surface heating and convective showers, and in winter there are frequent outbreaks of Arctic air (these are less frequent than in the area to the north). The Fraser River Plateau Ecoregion is a broad, rolling plateau that includes several shield volcanoes. The Fraser River Basin (FRB) Ecosection is the dissected portion of the Chilcotin and Cariboo plateaus and the Fraser 'badlands' that lies between them. It has the warmest and driest climate in the Ecoregion. The Chilcotin Plateau (CHP) Ecosection is a flat upland area, with a rainshadow climate. The Chilcotin Ranges Ecoregion is an area of high, somewhat rounded mountains, located in the rainshadow of the Pacific Ranges. The Central Chilcotin Ranges (CCR) Ecosection is a dry, rounded mountain area located leeward of the Pacific Ranges. " (Demarchi, 1996 pg. 19 & 20)

Map 3 Churn Creek Study Area Ecoregional Classification



1.2.2 GLACIAL HISTORY AND TERRAIN

TERRAIN AND SURFICIAL GEOLOGY

Physiographically, the Churn Creek study area encompasses a portion of the Fraser Plateau, a subdivision of the Interior Plateau region of British Columbia (Lavkulich and Valentine, 1978). The Fraser River bisects the project area from north to south along the eastern edge of the study area. In addition to the Fraser, there are several major creeks that have incised their way through post-glacial deposits down to the Fraser River. These include, Churn, Koster, Grinder, Porcupine, Lone Cabin, and French Bar Creeks. The elevation of the study area ranges from a low of 300 m, along the Fraser River, up to a height of 2255 m, on the top of Black Dome Mountain in the Camelsfoot Range to the west. At the height of the Fraser Glaciation, the Cordillerian Ice Sheet was approximately 2000 m thick over the montane areas to 1000 m. along major valleys and 600 m. over the plateau (Huntely and Broster, 1997).

FRASER PLATEAU

The Fraser Plateau extends to the west and east of the Fraser River; however, the West Fraser Plateau, and its associated foothills, constitute the majority of the project area. The rounded ridges and summits of the rolling plateau topography suggest that the Cordilleran Ice-Sheet covered all but the highest peak in the study area, Black Dome Mountain (Huntely and Broster, 1997). Meltwater channels dissect the plateau and long sinuous esker ridges also are evident on the landscape. A compact matrix-supported till, that has an undulating or hummocky surface expression, comprises a large portion of the plateau surficial material. On the plateau, lacustrine and organic veneer and blanket deposits typically occur in depressional sites often associated with shrinking stagnant waterbodies or seasonal ponds (Plate 2). In fact, at localized sites, organic veneers overlie lacustrine or fluvial blanket deposits. This is the case in the vicinity around Schraeder Lake, located south of French Bar Creek. Similar deposits can also be found along the length of Koster Creek, as it has a gentle gradient.

Glaciolacustrine deposits were found on the side slopes of minor valleys within the plateau. These deposits can be linked to post-glacial lakes that formed, in tributary valleys, due to blockage by ice-dams and glaciers in the more significant valleys. Upon down-wasting of the ice, these deposits were down-cut by creeks striving to achieve a new equilibrium with creeks at lower elevations. Thus, narrow glaciolaustrine terraces have been left along some valley side slopes in the project area. Some areas of the plateau have salt precipitates that indicate saline soils and have been classified as a subtype of lacustrine deposits for the purposes of bioterrain mapping (L1).

Isolated grassland pockets occur amongst forested areas throughout the Fraser Plateau. The undulating till deposits in these areas are usually capped with eolian veneers from less than 10 cm thick along convex knolls to greater than 20 cm thick in gentle swales and along forest edges **(**Plate 2).

RIVER AND CREEK VALLEYS

Surficial deposits become increasingly complex in the river and creek valleys of the project area, when compared with those deposits of the plateau. Multiple episodes of glaciation (large and small) and subsequent down cutting action by rivers and creeks have resulted in the layering of deposits. These layers combined with ongoing geomorphic activity in these valleys, only adds to the complexity of the deposits.

The upper slopes of the Fraser River and tributary valleys are steep with complex terraced topography below. The surficial deposits are a mixture of colluvial cones and fans, kame terraces, deltas, meltwater

channels, glaciofluvial and glaciolacustrine terraces, and till deposits (Plate 1). These deposits are often accompanied with a capping of windblown silts (eolian) (Lord and Valentine, 1979). Moderate to very steeply sloping terrain including terraces and gullies and is underlain by gravelly, coarse loamy till deposits and sandy-skeletal mixed fluvial, glaciofluvial and till material. The steeply sloping terrain also includes outcrops of columnar flood basalts and other volcanic origin rocks.
Sandy-skeletal glaciofluvial material occurs on level to moderately sloping terraces that support grassland ecosystems on valley sides and bottoms. These deposits have an eolian capping that ranges in depth from 20 to approximately 50 cm and has a loamy texture (Plate 3). There has been evidence to suggest that the Fraser River was once blocked, and thus, the occurrence of glaciolaustrine terraces and hummocks can be found along the Fraser River within the Churn Creek study area (Huntely and Broster, 1997). These deposits may or may not have an eolian capping and are silty in texture.

1.2.3 GEOLOGY

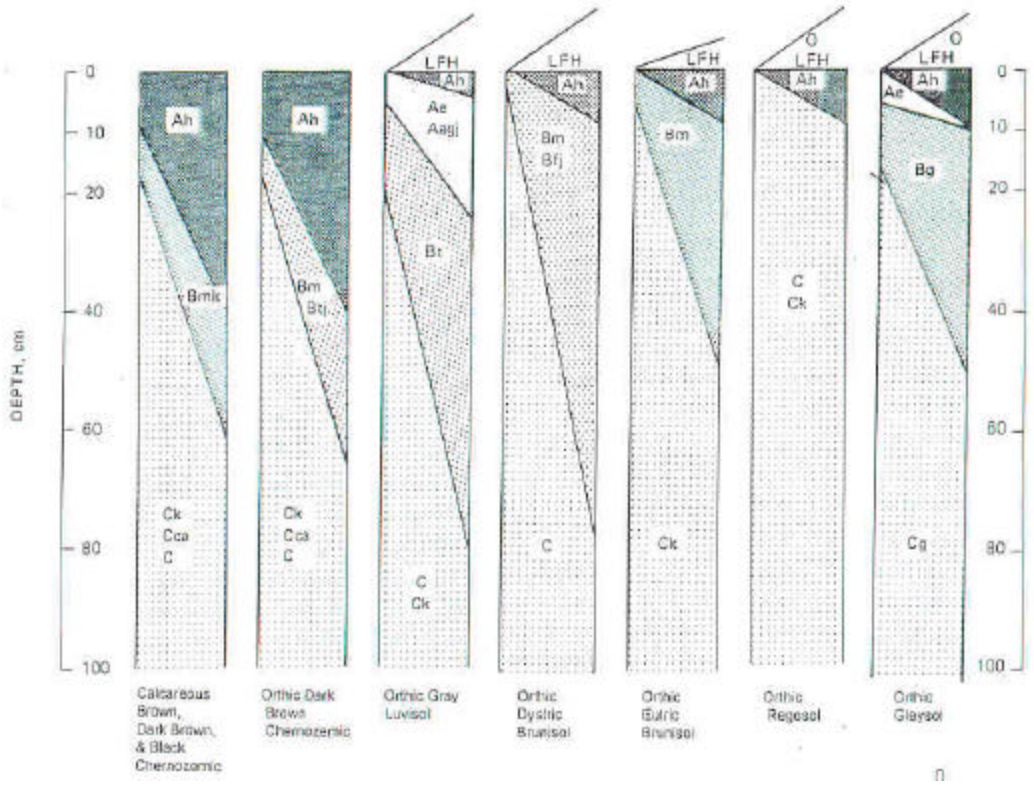
The major geological feature of the study area is the Fraser Fault, a right-lateral strike-slip fault that juxtaposes Mississippian to Jurassic rocks of the Cache Creek Terrane on the east, against the younger Cretaceous to Eocene rocks of the Methow Terrane on the west. In the southern portion of the study area segments of the Hungry Valley thrust-fault system are present, and generally have an east-west orientation (i.e., strike). South of this fault, in the vicinity of Swan Lake, a pie-shaped portion of rock of Lower Cretaceous age occurs. This rock is part of the Jackass Mountain Group and contains argillite, greywacke, conglomerate and sandstone.

Downcutting in the main Churn Creek valley has exposed outcrops of Late Cretaceous volcanic and sedimentary rocks. Furthermore, older mid-Cretaceous volcanics, yet unnamed, have been correlated with the Spences Bridge Group, which occurs on the east side of the Fraser Fault. Miocene flood basalts belonging to the Chilcotin Group also cover much of the area, and their resulting columnar jointing can be seen along the steep upper slopes of the Fraser River. Normally, these flows are not more than 100 m. thick. They are horizontal, or nearly so, and control the location of the flatlands that typify the Chilcotin ranch country. As an added note, the Fraser Fault cuts the mid-Eocene volcanics, but not the Miocene Chilcotin Group flood basalts or later Eocene plutons, so that constrains movement on the fault to about 45-35 million years ago (pers. com. Mustard).

Localized pockets of Upper Mesozoic and Middle Cenozoic age rocks occur, and reflect sedimentary and volcanic origins respectively. Pleistocene and Recent deposits can be found along the lower terraces of the Fraser River and on the Fraser Plateau south of Churn Creek. These deposits include unconsolidated alluvial, fluvial and glacial deposits. Only a small portion of the project area lies to the east of the Fraser Fault. The Triassic rocks that occur here belong to the Pavilon Group, which contain chert, argillite, tuff, greywacke, limestone, standstone, and volcanic flows. The flood basalts of the Miocene Chilcotin Group also occur east of the fault (Tipper, 1978).

Plate 2 The undulating grassland-forest mosaic of the West Fraser Plateau near Koster Lake

Figure 1 Common soil profiles in the Churn Creek study area. (Agriculture Canada Expert Committee on Soil Survey. 1987)



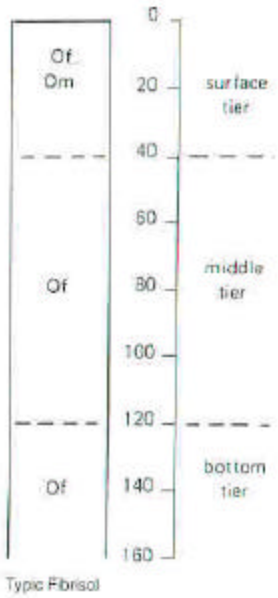


Plate 3 The upper portion of the eolian capping, that overlies glaciofluvial material here, is typically an Orthic Brown Chernozem.

1.2.4 SOILS

Soils of the Churn Creek study area have formed under relatively arid conditions that exist on the lee side of the coast mountain range. The majority of the study area is dominated by coniferous forests that overlie a medium to fine textured till material. Lower valley slopes and bottoms within the plateau are comprised of dry forest stands, and have soil textures that range from fine to coarse. The larger tributaries of the plateau, such as Churn and Lone Cabin Creeks support grassland ecosystems, and parent materials associated with these areas have soil textures that range from coarse to fine. The area surrounding Schraeder Lake has extensive Organic soils, generally fibric in texture, that overlie fine to coarse textured lacustrine and fluvial parent materials. Subalpine parkland makes up the smallest portion of the study area, and can be characterized by dwarf shrubby vegetation that overlies rock and coarse textured till material.

Soils belonging to the Chernozemic order are associated with grassland and forb vegetation and a climate that ranges from subarid to subhumid (Lavkulich and Valentine, 1978). Complex terrain found along the steep slopes and terraces of the Fraser River, Churn, Lone Cabin and the lower reach of French Bar Creeks support soils of this order. Chernozemic soils, within the project area, are recognizable by their diagnostic Ah horizon that ranges from 15 to 25 cm thick, and typically has a columnar soil structure (Figure 1). This Ah horizon develops from the decomposition of leaves and roots of grasses and forbs that cover the ground. On the steep to terraced terrain of the mid to lower slopes of the aforementioned valleys, soils are typically rapidly-drained Brown Chernozems (Plate 3). These same soils will also be found on upper slopes of warm aspects. However, on cooler aspects soils are typically well-drained Dark Brown Chernozems. This second subgroup also extends onto the undulating grassland-forest transition zone of the plateau (Valentine et al., 1987). Calcareous Chernozems of the above subgroups also occur within the study area, particularly in the Bunchgrass Subzones.

Luvisolic soils are dominant under the coniferous forest stands that make up a large portion of the plateau. However, in small grassland patches that occur within the forest-grassland mosaic Luvisolic soils often occur that are overlain with thin eolian veneers. Orthic Gray is the most common subgroup and forms over moderately well-drained gravelly loamy to clay loam till material. These soils are characterized by eluviated Ae horizons that are light gray, found overlying enriched B horizons that are gray to graybown in colour and have pronounced soil structure. The Bt horizon is clay enriched due to the leaching of clay particles from the A to B horizon and is the diagnostic horizon of these soils (Figure 1). Some isolated saline soils were also found associated with Luvisols, as with Chernozems, in shallow depressions. At higher elevations Brunisolic Gray Luvisols occur (Valentine *et al.*, 1987).

Where soils have had less time to form, they show poor to very poor horizon development and are classified as Regosols and Brunisols **(**Figure1). These occur in young materials such as river gravels, fresh colluvium and recently deglaciated soils, or in disturbed materials subject to flooding or slope processes. Furthermore, both of these soil types are common at higher elevations under cool, dry climatic conditions which limit the development of the soil from the original parent material. Brunisols can be distinguished from Regosols based on their diagnostic Bm horizon. This horizon exhibits the development of soil structure and removal, by leaching, of soluble salts and carbonates from the A horizon. In the field it is recognizable by its browner to redder colour when compared with the underlying parent material (Lavkulich and Valentine, 1978). Brunisols are commonly found complexed with Luvisols where the plateau gives way to the montane foothills of the Camelsfoot Range. On these moderate to steep slopes, Dystric Brunisols typically form over well-drained gravelly loamy to coarser than loam till deposits. However, on the very steep slopes these same soils develop over both sandy-skeletal colluvial and gravelly loamy till deposits. Poorly developed Regosolic soils occur on the more recent, imperfect to poorly-drained

floodplain deposits along Koster Creek and support productive riparian ecosystems (Valentine *et al.*, 1987).

Where drainage is imperfect to very poor, Organic and Gleysolic soils have developed. These soils are found at mid-elevations along floodplains where periodic to prolonged saturation occurs. The surface horizons of Organic soils tend to have a fibric texture. Gleysol soils only constitute a small portion of the project area and occur mainly in the vicinity of Schraeder Lake. Isolated pockets of Gleysols also occur at in depressional sites and at toe slopes which receive significant amounts of runoff from the slope above **(**Figure 1).

1.2.5 BIOGEOCLIMATIC SETTING

"The climatic or zonal classification identifies areas (termed biogeoclimatic units) that have a relatively uniform climate (inferred from vegetation, soils, and topography)". (Steen & Coupe´, 1997, pg 2-2) Biogeoclimatic subzones are the basic units, with variants describing geographically homogeneous areas. These have been determined by observing climax vegetation on *zonal* sites. *Zonal* sites have deep, medium-textured soils, mesic moisture regimes, and occur on gentle midslope positions. The zonal climax vegetation is believed to best reflect the regional climatic conditions of the subzone. *Site Series* "include all sites within a biogeoclimatic subzone that are capable of producing the same climax vegetation unit (plant association)." (ibid, pg. 2-7)

Ten biogeoclimatic subzones/variants are represented in the study area. They are described in *A Field Guide to Forest Site Identification for the Cariboo Forest Region Part 1,* (Steen & Coupe´, 1997) and *A Guide to Site Identification for the Kamloops Forest Region Part 2.,* (Lloyd et al, 1990 B.C. Ministry of Forests). They are:

1) **BGxh3** - The **Bunchgrass Very Dry Hot Subzone Fraser Variant** is located in the hottest part of the bunchgrass zone from the Fraser River at 320 meters along the lower slopes of the Fraser River valley to approximately 680 meters elevation below the BGxw2. Zonal sites are dominated by bluebunch wheatgrass and big sagebrush, depending on the frequency of burning and/or grazing.

2) **BGxw2** - The **Bunchgrass Very Dry Warm Subzone Alkali Variant** occurs between the BGxh3 and the IDFxm in the Fraser River and Churn Creek valleys from approximately 680 meters to 850 meters elevation on the valley slopes. Zonal sites are dominated by bluebunch wheatgrass and needle-and-thread grass; however, in the southern half of the study area, big sagebrush becomes increasingly dominant near the BGxh3 transition.

3) **IDFxm** - The **Interior Douglas-fir Very Dry Mild Subzone** occurs above the BGxw2 from approximately 850 meters to around 1200 meters below the IDFdk4 in most of the study area and below the IDFdk3 at the south end near French Bar Creek. Zonal sites are dominated by moderately closed forests of Douglas-fir with a sparse to moderate shrub layer and a well-developed grass/herb layer. However, grasslands are quite common on the level to gently sloping mesic plateaus; these "zonal" grasslands are usually dominated by bluebunch wheatgrass and diverse forbs. Short-awned porcupinegrass and spreading needlegrass grassland types, while present, are much less common in the Churn Creek Study Area than farther north.

4) **IDFdk3 -** The **Interior Douglas-fir Dry Cool Subzone Fraser Variant** occurs at similar elevations as the IDFdk4 in the southern part of the study area, occurring between the IDFxm and the MSxv or

MSxk from 1200 meters to 1500 meters elevation. Only a small section of IDFdk3 occurs in the southeast corner of the Churn Creek study area.
Climax zonal sites of multi-aged Douglas-fir forests are common, with even-aged lodgepole pine dominating younger forests. Grasslands of bluebunch wheatgrass are infrequent, occurring only on steep warm aspects.

5) **IDFdk4 -** The **Interior Douglas-fir Dry Cool Subzone Chilcotin Variant** occupies the Fraser Plateau above the IDFxm at about 1150 meters to the MSxk at 1700 meters. In the northwestern corner of the Churn Creek study area, the IDFdk4 occurs below the SBPSxc. Zonal sites of multi-aged Douglas-fir forests are common, with even-aged lodgepole pine dominating younger forests. Grasslands of bluebunch wheatgrass occur occasionally on some warm aspects and gentle slopes.

6) **SBPSxc -** The **Sub-boreal Pine - Spruce Very Dry Cold Subzone** is limited to the northwestern corner of the Churn Creek study area. It forms a narrow zone above the IDFdk4 at 1400 meters and below the MSxv or MSxk at approximately 1500 meters (1600 meters on warm aspects). Zonal sites are dominated by even-aged lodgepole pine stands occurring in a patchwork of age classes and densities, depending on fire history. Wetlands such as fens and shrub carrs are quite common along glaciofluvial channels with cold air accumulation. Grasslands occur only rarely on steep warm aspects.

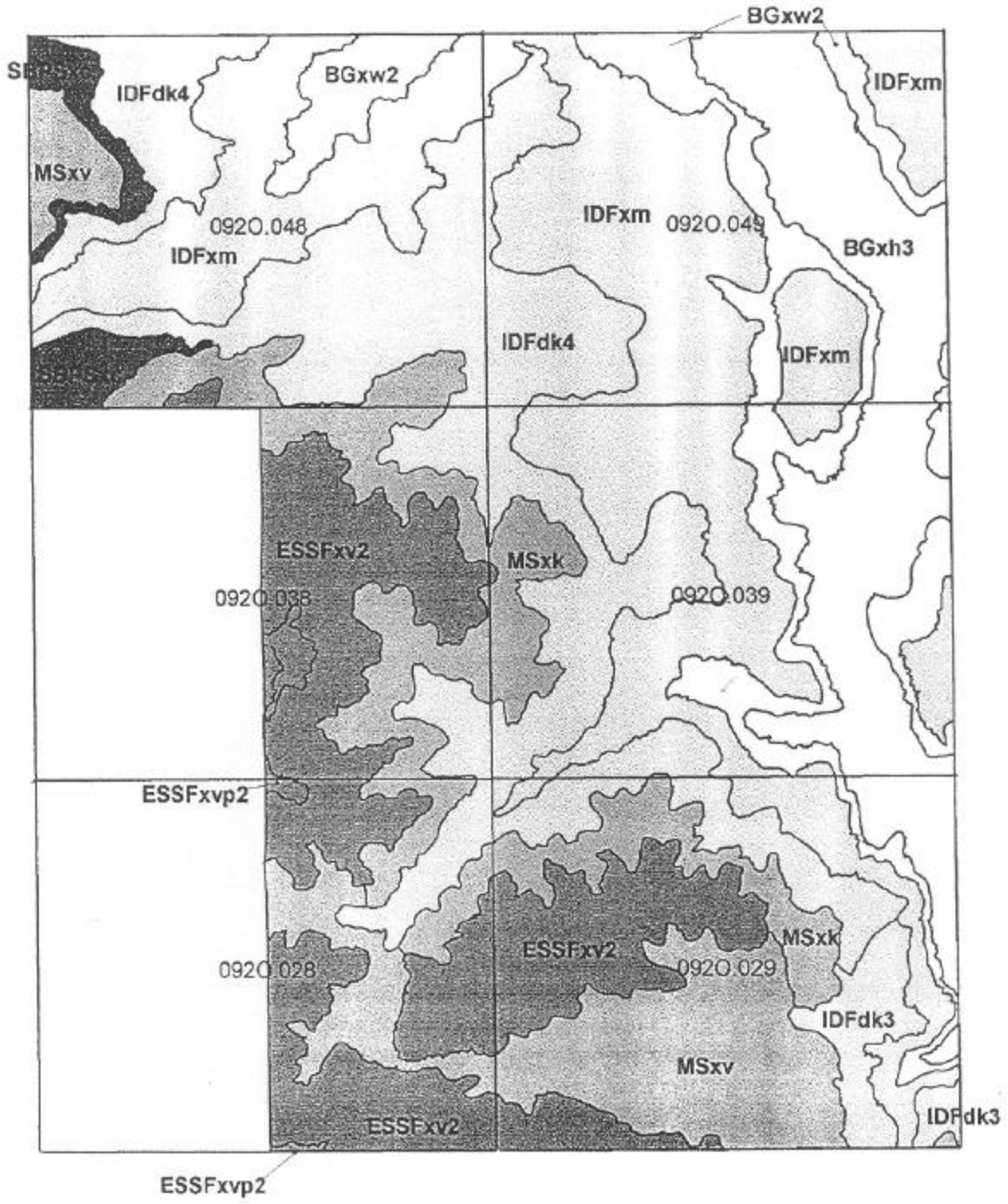
7) **MSxk -** The **Montane Spruce Very Dry Cool Subzone** occurs above the IDFdk4 from 1500 meters to the ESSFxv2 at 1700 meters. Zonal sites are dominated by even-aged lodgepole pine, with scattered hybrid white spruce and subalpine fir in more mature stands.

8) **MSxv -** The **Montane Spruce Very Dry Very Cold Subzone** occurs above the IDFdk3 from 1400 meters and below the ESSFxv2 at 1700 meters in the southern part of the Churn Creek study area. A small section occurs in the northwestern corner of the study area above the SBPSxc at 1500 meters elevation (1600 meters on warm aspects). Zonal sites are dominated by even-aged lodgepole pine, with scattered hybrid white spruce and subalpine fir in more mature stands.

9) **ESSFxv2 -** The **Engelmann Spruce - Subalpine Fir Very Dry Very Cold Subzone Big Creek Variant** occurs above the MSxk or MSxv from 1700 meters elevation to approximately 2100 meters elevation where it becomes parkland, the ESSFxv2p. In the Churn Creek study area, it forms a broad zone on Blackdome Mountain in the west and at higher elevations of the Central Chilcotin Ranges in the southern section. Zonal sites are characterized by closed stands of even-aged lodgepole pine, with sparse subalpine fir and Engelmann spruce.

10) **ESSFxv2p -** The **Engelmann Spruce - Subalpine Fir Very Dry Very Cold Parkland Subzone Big Creek Variant** occurs at the highest elevations on Blackdome Mountain and Red Mountain above the ESSFxv2 from 2100 meters up. It is characterized by a mosaic of clumps or individuals of stunted subalpine fir or Engelmann spruce and tundra meadows.

Map 4 Biogeoclimatic Subzones of the Churn Creek Study Area



2.0 OBJECTIVES

Using regular consultation from the appropriate technical experts, the objectives of this study are as follows:

1) to prestratify the landscape into bioterrain units on 1:20,000 scale air photos using the methods of Howes and Kenk (1997) according to standards set out by the Resource Inventory Committee (1998).

2) to sample to survey intensity level 4 (15 - 25% of polygons are checked in the study area) and to photograph and collect site, vegetation, soil, wildlife and some mensuration data at representative sites using the methods of Luttmerding et al (1990). These plots will be used to describe important habitats, serality, and variability within and between each subzone variant and ecosystems. Inspection ratios of Full Plots : Ground Inspections : Visual Checks will be 5 : 20 : 75.

3) to produce a working legend and an abbreviated map legend describing the relationship between terrain, soils, humus forms, directional exposure, and the occurrence of ecosystem units within the landscape in the subzone variants in a format suggested by the R.I.C. TEM Mapping Standards (May 1998).

4) to map ecosystem polygons which are congruent with bioterrain polygon boundaries digitized from air photographs and registered to 1:20,000 T.R.I.M. map bases using 1998 R.I.C. methodology and nomenclature

5) to produce an EXCEL and ARC INFO database of bioterrain, ecosystem, and spatial data using the R.I.C. TEM Mapping Standards (May 1998) methodology for digital data capture.

6) to produce wildlife capability and suitability assumption models and look-up tables by subzone variant, ecosystem unit, and structural stage in conjunction with the Wildlife Correlator and Regional Wildlife personnel for 27 assigned wildlife species: Common Garter Snake, Barrow's Goldeneye, Blue Grouse, Bobolink, Eared Grebe, Flammulated Owl, Great Blue Heron, Green-winged Teal, Lewis' Woodpecker, Long-billed Curlew, Prairie Falcon, Rough-legged Hawk, Sandhill Crane, Sharp-tailed Grouse, Short-eared Owl, White-throated Swift, Black Bear, Bobcat, California Bighorn Sheep, Fisher, Marten, Montane Vole, Moose, Mule Deer, Rocky Mountain Elk, Spotted Bat, and Townsend's Big-eared Bat.

7) to produce a reliability map, showing numbered plot locations.

8) to produce a report describing the study area, objectives, methods, and each ecosystem unit in terms of vegetation, structural stages, topography, surficial materials and important site/soil characteristics in an Expanded Legend and a Map Legend in both hard copy and on disk in a Microsoft WORD 6.0 format.

3.0 METHODS

3.1 PRESTRATIFICATION OF BIOTERRAIN

"Bioterrain mapping is based on primary terrain and soil mapping standards. It includes any ecologically significant feature which is thought to influence the function on an ecosystem. The bioterrain map forms the primary base for an ecological map." (R.I.C. 1998)

Terrain was mapped according to the *Terrain Classification System for British Columbia* (Howes and Kenk, 1997) and *Guidelines and Standards for Terrain Mapping in British Columbia* (Ryder, 1994). These surficial units are subdivided by features such as directional exposure, depth to water table, depth

and form of surficial material, vegetated rock and very thin rubble surfaces, talus, cliffs, and significant changes in bedrock. The features considered important for this study area were agreed upon during the pre-work meeting of technical experts and the consultant's team.

These bioterrain units are mapped as solid lines (dashed or dotted in cases of uncertainty) in ink on air photos using a number 2 size pen. They were then approved by the appropriate technical expert (Larry Lacelle, Wildlife Inventory Section).

3.2 SAMPLING

A sampling strategy was developed that would cover the variability within each subzone variant by seral stage, directional exposure, bioterrain, disturbance history, and importance to wildlife. It was based on the pre-typed bioterrain polygons on air photos, the distribution of biogeoclimatic subzones, existing vegetation data, and the limitations of access. Sampling was emphasized in ecosystems such as ESSFxv2 lacking correlated site series classification.

The equivalent of 5 full 1:20,000 mapsheets were mapped at survey intensity level "4" (R.I.C. 1998) with 15 % total polygon inspections. Inspection ratios of Full Plots : Ground Inspections : Visual Checks were 7 : 31 : 62.

Ecosystem data was collected for vegetation, site, soil, and wildlife according to standards set forth in Luttmerding et al. (1990) , and *Field Manual for Describing Terrestrial Ecosystems* (B.C. Ministry of Forests and B.C. Ministry of Environment, 1998). In Full Plots, all trees, shrubs, herbs, mosses and lichens were tallied by layer and given a percentage rating for cover. Additional field data collection included information on arboreal lichen loading (Armleder et al 1992), wildlife trees, coarse woody debris, tree ages/fire history, and mensuration data in the Douglas-fir forests of the IDFxm and BG subzones. Plots were allocated to appropriate MoF site series (Steen and Coupe´ 1997, Lloyd et al 1990, Iverson and Coupe´ 1996) based on floristics and features of terrain, site and soils. In Ground Inspections, percentage cover was estimated for leading species of vegetation by layer, as well as site, soil, and wildlife data collected. Visual checks were made to confirm terrain or ecosystem labels or for wildlife observations in polygons where Full or Ground Inspection Plots were not required, or time and/or access were limited.

3.3 LEGEND DEVELOPMENT

A Working Legend (Appendix 1) was developed to insure that most of the variability found was sampled. It forms the basis of the map legend and expanded legend. Subzone boundaries, grassland and forested ecosystems, and subalpine parkland boundaries were correlated with published boundaries and reviewed by Kristi Iverson, Project Ecologist and Ray Coupe´, Regional Ecologist. Ecosystems not described in the Cariboo or Kamloops Forest Region Guides to site classification such as grasslands, riparian areas, wetlands, subalpine parkland, alpine, etc. were characterized from our data and approved by the Regional Ecologists and Project Ecologist.

Sample plots were used to develop the Expanded Legend (see Volume II) which describes the site series and terrestrial ecosystem units found in the study area. Typical plant species found in each ecosystem unit are listed by structural stage and, where applicable, by seral association. Dominants are those species with greater than or equal to 10% cover in greater than or equal to 60% of the plots. Associates have 1-9% cover in greater than or equal to 60% of the plots. Bear forage lists all vegetation greater than 1%. Vegetation of structural stages not sampled was extrapolated based on known seral sequences and plot information from other studies in similar ecosystems: Dog Creek (Clements,1995), Becher's Prairie (Lowrey et al, 1996), and Chilcotin River Grasslands (Lowrey et al, 1997). These species lists are guidelines only, for wildlife interpretations, and are specific to this study area. Some ecosystem units are

variable or are not yet well understood. Plant species, especially associates, may vary between different locations, and seasons.

3.4 DATA ANALYSIS

Each plot was allocated to an existing site series based on descriptions in the Cariboo and Kamloops Forest Region Guide to Site Series. New site series and ecosystem units were proposed and approved by the Ministry of Forests Regional Ecologists, the Project Ecologist, and Ministry of Environment correlators.

Full Plot site, soil, vegetation, wildlife, and coarse woody debris data were entered into the VENUS format and environment and vegetation summaries were generated (see Appendix 7). The data from Ground Inspection Plots and Visual Checks was entered into a GRAVITI database. These were used to sort plots into groupings with similar physical attributes and ecosystem classifications. The range of environmental conditions, terrain units, and vegetation over which ecosystem units were distributed was obtained from these databases.

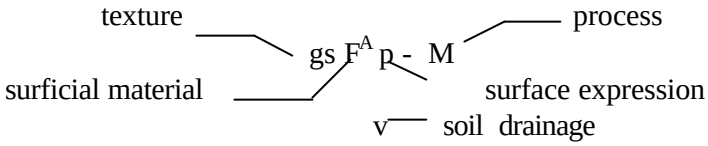
3.5 PLANT IDENTIFICATION

Unknown vascular plants, bryophytes and lichens were collected, pressed and labeled in the field. Identification was undertaken in the office by Catherine Littlewood B.Sc. Nomenclature follows *Vascular Plants of British Columbia Parts 1-4* (Douglas, Straley, and Meidinger 1989, 1990, 1991 and 1994) and the Ministry of Forests Provincial Species List ftp site (B.C. Ministry of Forests, 1998). A complete list of plant species observed and/or collected can be found in Appendix 2.

3.6 TERRAIN UNIT MAPPING

Terrain units were prestratified on 1:20,000 Air Photos following the standards set forth by the Resource Inventory Committee (1998) and verified in the field sampling (see sections 3.1 Prestratification of Bioterrain and 3.2 Sampling). Symbology follows the system of Howes and Kenk (1997). Terrain descriptions for all polygons mapped can be found in Appendix 8.

Simple Terrain Units: eg.



This polygon label would read:
gravelly sandy terrain texture, active Fluvial plain surficial material, with Meandering channels geomorphological process, and very rapid soil drainage.

Two or three letters may be used to describe multiple characteristics, other than surficial material, or letters may be omitted if information is lacking (eg. texture).

Complex Terrain Units:
Complex polygons can have up to three terrain units within a single polygon. Percentage distribution of terrain units is represented by deciles from 1 through 10 (1=10%....10=100%).

eg: 6 srCbv 4Mbj
w,m
This polygon label would be read as:
60% sandy, rubbly Colluvial blanket-veneer and 40% Morainal blanket, gently sloping with separate soil drainage classes of well-drained, and moderately well drained

Stratigraphic Units: eg: Mv indicates that Morainal veneer overlies
Rr ridged Rock

Groups of letters are arranged one above the other, where one or more kinds of surficial material overlie a different material or bedrock.

3.6.1 BIOTERRAIN UNIT LETTER NOTATION

Table 1 Bioterrain Unit Letter Notation (from Howes and Kenk, 1997)

TEXTURE	SURFICIAL MATERIAL	SURFACE EXPRESSION	GEOLOGICAL PROCESS
a=blocks b=boulders c=clay d=mixed fragments f=fines g=gravel k=cobbles m=mud p=pebbles s=sand r=rubble x=angular fragments z=silt ORGANIC e-fibric u=mesic h=humic	A=anthropogenic materials C=colluvium D=weathered bedrock E=eolian sediments F=fluvial material F1=saline fluvial (salt precipitation) F^A=active fluvial materials F^G=glaciofluvial materials L=lacustrine sediments L1=saline lacustrine (salt precipitation) L^G=glaciolacustrine sediments M=morainal materials (till) N=not mapped (water bodies) O=organic material R=bedrock U=undifferentiated material	a=moderate slope b=blanket c=cone d=depression(s) f=fan h=hummocky j=gentle slope k=moderately steep slope m=rolling p=plain r=ridges s=steep slope(s) t=terrace(s) u=undulating v=veneer w=mantle of variable thickness x=thin veneer	A=avalanches B=braiding channel C=cryoturbation D=deflation E=glacial meltwater channels F=failing (slow mass movement) H=kettled I=irregular channel J=anastamosing channel K=karst processes L=surface seepage M=meandering channel N=nivation P=piping R=rapid mass movement S=solifluction U=inundation V=gully erosion W=washing X=permafrost Z=periglacial processes

QUALIFIER CODES

A	Active
I	Inactive

SOIL DRAINAGE CLASSES

x	very rapidly drained
r	rapidly drained
w	well drained
m	moderately well drained

i	imperfectly drained
p	poorly drained
v	very poorly drained

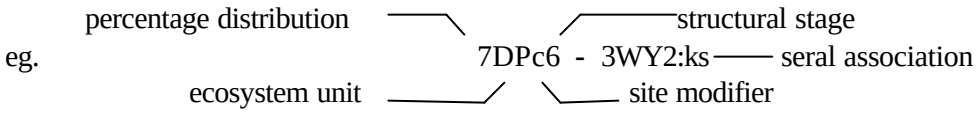
3.7 SITE SERIES (ECOSYSTEM UNIT) MAPPING

Site series (ecosystem units) were mapped according to the standards set forth in *Standard for Terrestrial Ecosystem Mapping in British Columbia* (Ecosystem Working Group 1998). Ecosystem units were mapped within the boundaries of the bioterrain polygons using a two letter code (see Section 3.8 for correlation of Ecosystem Units to Site Series). These polygons were split when vegetation indicated two strongly contrasting seral stages, aspects, or other significant ecosystem attributes. Bioterrain polygons were also subdivided by Ecosection or Biogeoclimatic boundaries. Consequently there are more ecosystem polygons indicated on the map than bioterrain polygons originally inked on the air photos during the prestratification phase.

Sample plots were keyed out to site series using the keys and other identification tools in *A Field Guide to Forest Site Identification and Interpretation for the Cariboo Forest Region* (Steen and Coupe´, 1997), *Draft Progress Report for Grassland Site Series for BGxh3, BGxw2, and IDFxm* (B.C. Ministry of Forests, 1996) and *A Guide to Site Identification for the Kamloops Forest Region Part 2* (Lloyd et al, 1990). Site Series were identified for each polygon based on the terrain unit, sample plots that occurred within the polygon, air photo interpretation, and age class information from forest cover maps. Where the ecosystem was not described in the Field Guides (wetland, riparian, grassland, parkland, and alpine types), new units were developed in coordination with the regional ecologists, project ecologist, and MoE correlator (see Section 3.8).

Site modifying codes were used with each ecosystem designation to help improve the accuracy of ecosystem descriptions. (see Section 3.7.1) Up to two site modifiers may be present (in lower case) that represent different site conditions from the typical defined for the site series. "Typical" ecosystem units have no modifiers. These are defined in *Provincial Site Series Mapping Codes and Typical Environmental Conditions* (Resources Inventory Committee 1997). Two letter codes are followed by structural stage designations 1 (non-vegetated) through to 7 (old forest) (see Section 3.7.2). When specific features of the site in a particular structural stage or modified unit altered the nature of the floristics significantly, that portion of the ecosystem unit received a separate description in the expanded legend.

Up to three ecosystems and/or structural stages were noted for each polygon. Percentage distribution of habitat units was represented by deciles from 1 to 10 (1=10% ... 10=100%). See Appendix 8 for the Ecosystem Database structure.



This polygon label would read:
70% Douglas-fir - Pinegrass - Feathermoss; coarse-textured soil ecosystem unit; mature forest (structural stage 6)
30% Bluebunch wheatgrass - Yarrow; typic ecosystem unit; herb climax (structural stage 2) : Kentucky bluegrass - Salsify seral association

3.7.1 SITE MODIFIERS

Table 2 Site Modifiers

a	active floodplain
c	coarse-textured soils (Sand and loamy sand with 0+ coarse fragments. Sandy loam, loam, and sandy clay loam matrix with >70% coarse fragments)
d	deep soil (>100 cm to bedrock)
f	fine-textured soil (Silty loam and silt with < 20% coarse fragments. Clay, silty clay, silty clay loam, clay loam, sandy clay, heavy clay with <35% coarse fragments)
g	gullying occurring
h	hummocky terrain
j	gentle to moderate slope (<25%)
k	cool, northerly or easterly aspect (25% - 100% slope, 285^{o} - 135^{o} aspect)
m	medium-textured soils (Sandy loam, loam, and sandy clay loam with <70% coarse fragments. Silt and silt loam with >20% coarse fragments. Clay, silty clay, silty clay loam, clay loam, sandy clay, heavy clay with >35% coarse fragments)
n	fan (glaciofluvial, fluvial, or colluvial fans) or cone
p	peaty material
q	very steep cool aspect (>100% slope, 285^{o} - 135^{o})
r	ridged
s	shallow soil (20 - 100cm to bedrock)
t	terrace
v	very shallow soil (<20 cm. to bedrock)
w	warm,southerly or westerly aspect (>25% slope, 135^{o} - 285^{o})
y	wetter than average (used primarily for ecosystems receiving runoff from adjacent irrigated areas)
z	very steep warm aspect (>100% slope, 135^{o} - 285^{o})

3.7.2 STRUCTURAL STAGES

(from Field Manual for Describing Terrestrial Ecosystems 1998)

Table 3 Structural Stages

Structural Stage		**Definition**	**Age Criteria**[a]
1	Non-vegetated/ sparsely vegetated	Initial stages in primary or secondary succession. Little or no residual vegetation except for bryophytes and lichens. <10% cover of vascular plants. Not normally used for forested ecosytems.	<20 yrs. for normal forest succession. May be >100 yrs. for rocky, bouldery, and other severe non-foresteed sites sites.
2	Herb [d]	Early successional stage, or climax / disclimax communities (eg. grasslands, wetlands, alpine meadows) dominated by herbaceous vegetation. Tree cover <10%, shrub cover <20%, herbaceous cover >20% or ≥33% of total cover. Not normally used for forested ecosytems.	<20 yrs. for normal forest succession. Climax / disclimax communities, up to 100+ yrs. or much older.
2a	Forb-dominated	dominated by non-graminoid herbs and ferns	
2b	Graminoid - dominated	dominated by grasses , sedges, reed and rushes	
2c	Aquatic	dominated by floating or submerged vegetation	
2d	Dwarf shrub -	dominated by dwarf woody species	

Structural Stage		Definition	Age Criteria[a]
	dominated		
3	Shrub/Herb	Early successional stage of forested types dominated by shrubby vegetation <10 m. tall. Tree cover <10%, shrub cover >20% or ≥ 33% of total cover.	<20 yrs. for normal forest succession.
3a	Low Shrub	Climax / disclimax communities dominated by shrubby vegetation < 2 m. tall. Tree cover <10 %, shrub cover >20% or ≥ 33% of total cover	
3b	Tall Shrub	Climax / disclimax communities dominated by shrubby vegetation > 2 m. but < 10 m. tall. Tree cover <10 %, shrub cover >20% or ≥ 33 % of total cover	
4	Pole/Sapling	Trees > 10 m. tall, have overtopped shrub and herb layers. Stands are typically dense and vigorous. Persists until self-thinning and canopy differentiation becomes evident.	20 - 40 yrs. for normal forest succession. Up to 100+ yrs. for dense (>5000 stems/ha) stagnant stands
5	Young Forest	Self-thinning has become evident with canopy differentiation begun into distinct layers (dominant, co-dominant, and suppressed). Vigorous growth and more open stand than pole-sapling stage.	40 - 80 yrs.
6	Mature Forest	Trees that were established after the last disturbance have matured and a second cycle of shade tolerant trees may be established. Understories become well developed as the canopy opens up.	80 - 140 yrs. for Subzones in Group A[b] 80 - 250 yrs. for Subzones in Group B[c]
7	Old Forest	Old, structurally complex stands comprised mainly of climax tree species, although older seral remnants may still be present in the upper canopy. Standing snags & rotting logs on the ground are typical & understories patchy.	> 140 yrs. for Subzones in Group A[b] > 250 yrs. for Subzones in Group B[c]

Age only applies to ecosystem units that will succeed to trees with "normal" rates of succession. Stand structure is emphasized rather than stand age. Deciduous stands will generally be younger than coniferous stands in the same structural stage. Stages 2 and 3a or 3b may represent permanent climax/disclimax communities (grasslands, shrubby grasslands (big sagebrush), wetlands, riparian, tundra) or stunted forests on extreme edaphic conditions . Stages 3-6 are successional forest communities; structural stage 7 is climax forest. (R.I.C. 1998) In the Bunchgrass zones, tree growth may be considerably slower and stands may not develop the structure typical of old and mature forests.

[b]Group A in this study includes MSxk, MSxv, and SBPSxc.

[c]Group B for this study includes all other subzones.

[d] Grasslands and wetlands in the herb structural stage are generally graminoid-dominated; hence "2b" structural stage should be assumed. Occasionally over-grazed pastures may be forb-dominated ("2a"), but these may be difficult to distinguish on air photos.

3.7.3 MODIFIERS FOR STAND COMPOSITION

(Structural stages 3-7 only)

Table 4 Modifiers for Stand Composition

C	coniferous (> 75% total tree cover)
B	broadleaf (>75% total tree cover)
M	mixed (neither coniferous nor broadleaf account for >75% of total tree cover

3.7.4 MODIFIERS FOR STAND STRUCTURE

(Structural Stages 4 -7 only)

Table 5 Modifiers for Stand Structure

s	single-storied	closed forest stand dominated by overstory crown class; intermediate and suppressed trees <20% all crown classes
t	two-storied	Closed forest stands co-dominated by distinct overstory and intermediate crown classes; suppressed trees <20% all crown classes
m	multistoried	closed forest stand with all crown classes well-represented; each of intermediate and suppressed classes >20% all crown classes combined
i	irregular*	very open overstory and intermediate crown classes (<30% cover); well developed suppressed crown class
h	shelterwood	very open overstory (<20% cover) with well-developed suppressed crown class. Intermediate crown class generally absent

* Irregular stand structure is also used in the dry open Douglas-fir forests of the Bunchgrass and Interior Douglas-fir zones where the suppressed crown class may be sparse or lacking.

3.7.5 SERAL ASSOCIATIONS

Seral Associations are represented following the Structural Stage of the Ecosystem Unit by a small case two letter code beginning with a colon (eg. :kb).

"Seral Associations are non-climax plant associations, differentiated using a diagnostic combination of species, and belonging to the successional sequence of ecosystems within one or more site series." (Ecosystems Working Group 1995)

In the Churn Creek Ecosystem Mapping Project, Seral Associations are used to designate two types of plant communities:

1) Grazed grasslands where livestock has significantly altered vegetation composition and covers. The introduction of Kentucky bluegrass on moister grassland site series creates distinctive plant associations which may or may not be permanent. Eg. WY2:kb, NR2:bb

2) Where there has been recent tree invasion onto established grassland ecosystems. These are always Structural Stage 3 of the forested ecosystem unit (usually the zonal site series). The young trees may be up to 10 meters tall and should exhibit over 10% cover. The Seral Association has the same name and two letter code (small case) as the grassland ecosystem which the forest is replacing. Eg. DP3:wy

3.8 ECOSYSTEM UNITS AND MINISTRY OF FORESTS SITE SERIES CORRELATION

"Within each biogeoclimatic subzone or variant, a recurring pattern of sites reflects the variation in soil and physiographic properties. **Site series**... include all sites within a biogeoclimatic subzone that are capable

of producing the same climax vegetation unit (plant association)." (Steen & Coupe´ 1997) Each forested site series within a subzone/variant is given a two digit numeric code by the Ministry of Forests, with '01' being the zonal or mesic site and the rest ranked from the driest '02' to the wettest (eg. 08+).

Site phase is represented with a small letter following the site series number. It differentiates sites that are in the same site series, but with site or soil properties different enough to have management implications. (*ibid* pg. 2-7) Different site phases are represented with different two letter codes for the ecosystem unit.

"The **ecosystem unit** incorporates **site series, site modifiers,** and **structural stage** (and **seral association**). . . An ecosystem map unit should have a limited range of characteristics that allow it to be interpreted and treated uniformly**" (**Resources Inventory Committee. 1996 pg. 13, pg. 10). The site series is represented in the ecosystem unit with a two letter symbol unique for that subzone/variant. The name of the site series, based on common names of leading species, remains the same. Letters are used for ecosystem map units to avoid confusion with structural stage numbers and percentage distribution deciles.

The list of Ecosystem Units with corresponding Site Series found in the Churn Creek Study Area is in Section 4.3 of this report.

In the Expanded Legend (Volume II), the two letter code is separated from the corresponding site series number with a slash (eg. DP /01). Ecosystem units that have no site series number because they are new or undescribed are assigned '00' for a site series. Non-vegetated and anthropogenic units are represented with two letter codes, but have no site series numbers.

4.0 RESULTS

4.1 PLOT DATABASE

Databases describing the attributes of each sample plot were developed in VENUS for Full Plots and in GRAVITI for Ground Inspections and Visual Checks. VENUS provides Biogeoclimatic Unit (BEC Subzone/Variant) summaries and vegetation lists for all Full Plots (see Appendix 7).

4.2 VEGETATION LIST

A list of all plants observed in the study area is provided in Appendix 2.

4.3 WILDLIFE LIST

A list of all vertebrate wildlife species that were actually observed, or for which sign (sound, tracks, feeding sign, excrement, etc.) was detected, may be found in Appendix 4.

4.4 LIST OF SITE SERIES AND MAP ECOSYSTEM UNITS

Table 6 List of Site Series and Map Ecosystem Units

Subzone	Map Code	Site Series #	Ecosystem Unit Name	Assumed Modifiers	Typical Conditions	Moisture Regime	Mapped Modifiers
BGxh3	BR	53	Water birch - Prairie Rose	d, g, m	riparian gullies, deep medium-textured soil	subhygric - hygric	k
BGxh3	BU	00	Great Bulrush Marsh	d, f, j	permanently inundated deep marsh, depression, deep fine-textured soil	hydric	
BGxh3	CM	00	Common Spike-rush Marsh	d, f, j	permanently inundated shallow or deep marsh, depression, deep fine-textured soil	hydric	
BGxh3	CW	06	Black cottonwood - Sandbar willow - Dogbane	a, c, d, j	very active floodplains, deep coarse-textured soil	subhygric - hygric	
BGxh3	DJ	02	Big sagebrush - Prickly pear cactus	d, k, m	significant slope, cool aspect, deep medium-textured soil	subhygric	c, cg, g, gs, j, t
BGxh3	DM	04	Fd - Wood Rose - Saskatoon	d, j, m	lower gentle slope recieving moisture, deep medium-textured soil	subhygric	a, g
BGxh3	DR	84	Sand dropseed - Indian ricegrass	c, d, j	gentle slope, deep coarse-textured soil, dune deposits	submesic	k
BGxh3	JR	00	Rocky Mtn. juniper - Rabbitbrush	k, m	significant slope, cool aspect, medium-textured calcareous soil, eroding surface	subxeric - submesic	g, gs, w
BGxh3	NC	85	Needle-and-threadgrass - Cladonia cariosa	c, d, j	gentle slope, deep coarse-textured soil, eolian deposits	submesic - mesic	g, gt, ht, r, t
BGxh3	PP	88	Short-awned porcupinegrass - Small-flowered penstemon	j, m	depressions, deep medium-textured soils	subhygric	
BGxh3	RS	51	Prairie Rose - Snowberry	j, m	broad shallow basins, gentle slope, deep medium-textured soil	subhygric	
BGxh3	SC	80	Big Sagebrush - Prickly pear cactus	j, s	gentle slope, shallow soils over bedrock	very xeric - subxeric	g, h, k, q, r, w, z
BGxh3	SDk	81a	Saskatoon - Fd; cool phase	c	significant slope, talus, coarse-textured soil	xeric - subxeric	k
BGxh3	SDw	81b	Saskatoon - Fd; warm phase	c	significant slope, talus, coarse-textured soil	xeric - subxeric	w
BGxh3	SJ	86	Snowberry - Juniper	d, m	lower slope, recieving position, deep medium-textured soil	mesic - subhygric	c, g
BGxh3	SS	82	Big sagebrush - Sand dropseed	c, w	significant slope, warm aspect, eroding surface, coarse-textured soil	xeric - subxeric	g, gj, gy, j, m, n, s, y, z

Subzone	Map Code	Site Series #	Ecosystem Unit Name	Assumed Modifiers	Typical Conditions	Moisture Regime	Mapped Modifiers
BGxh3	SW	01	Bluebunch wheatgrass - Big sagebrush	d, j, m	gentle slope, deep medium-textured soil	mesic	c, ck, cn, ct, g, gn, gt, h, ht, k, n, nt, q, r, rs, rt, s, t, w, y
BGxh3	SW:ns	01	Bluebunch wheatgrass - Big sagebrush: Needlegrass - Sand dropseed seral association	d, j, m	gentle slope, deep medium-textured soil	mesic	r, t
BGxh3	WA	87	Bluebunch wheatgrass - Round-leaved alumroot	d, k, m	significant slope, cool aspect, deep medium-textured soil	mesic - subhygric	c, g, n
BGxh3	WD	83b	Bluebunch wheatgrass - Pasture sage; eroded phase	c, w	significant slope, warm aspect, coarse-textured eroding soils	subxeric - submesic	g, gm, m
BGxh3	WS	83a	Bluebunch wheatgrass - Pasture sage; stable phase	c, w	significant slope, warm aspect, coarse-textured stable soils	subxeric - submesic	g, m, r
BGxh3	WW	50	Wolf-willow - Giant wildrye	m	significant slope, deep medium-textured soil, seepage and erosion	subhygric	w
BGxw2	AM	32	Awned sedge Marsh	d, f, j	seasonally or permanently inundated, depression, deep fine-textured soil	hygric - hydric	
BGxw2	AR	00	At - Rose - Sarsaparilla	d, j, m	moisture recieving sites adjacent to intermittant streams, deep medium-textured soil	subhygric	
BGxw2	AS	06	At - Snowberry	d, j, m	gentle slopes to depressions, moisture recieving sites, deep medium-textured soil	subhygric - hygric	
BGxw2	CR	07	Ac - Wild rose - Snowberry	a, c, d, j	moderately active floodplains, deep coarse-textured soil	subhygric	
BGxw2	CW	00	Ac - Sandbar willow - Dogbane	a, c, d, j	very active floodplains, deep coarse-textured soil	subhygric	
BGxw2	DB	00	Red-osier dogwood Common burdock Riparian	d, j, m	occasionally flooded riparian, deep medium-textured soil	subhygric - hygric	
BGxw2	DG	02	Fd - Spike-like goldenrod - Pelt lichen	d, k, m	significant slope, cool aspect, deep medium-textured soil	submesic - mesic	c, g, gj, gs, h, j, jt, n, qs, s, t, w

Subzone	Map Code	Site Series #	Ecosystem Unit Name	Assumed Modifiers	Typical Conditions	Moisture Regime	Mapped Modifiers
BGxw2	DG:wn	02	Fd - Spike-like goldenrod - Pelt lichen:Bluebunch wheatgrass - Needle-and-threadgrass Seral Assoc.	d, k, m	significant slope, cool aspect, deep medium-textured soil	submesic - mesic	j, w
BGxw2	DJ	03	Fd - Rocky Mtn. juniper - Bluebunch wheatgrass	d, k, m	significant slope, cool aspect, deep medium-textured soil	subhygric	c, cg, g, gs, j, v
BGxw2	DM	05	Fd - At - Douglas maple	d, j, m	gentle slopes, moisture recieving sites along permanent or intermittant streams, deep medium-textured soil	subhygric	g
BGxw2	NB	88a	Spreading needlegrass - Northern bedstraw	d, j, m	gentle lower slope to depression, deep medium-textured soil	subhygric	
BGxw2	NB:kb	88b	Spreading needlegrass - Northern bedstraw: Kentucky bluegrass - N. bedstraw Seral Assoc.	d, j, m	gentle lower slope to depression, deep medium-textured soil	subhygric	
BGxw2	ND	84	Needle-and-threadgrass - Sand dropseed	d, m, w	significant slope, warm aspect, deep medium-textured soil	subxeric - submesic	g
BGxw2	PL	87	Short-awned porcupinegrass - Lemonweed	d, j, m	lower slope to depression, miosture recieving sites, deep medium-textured soil	mesic - subhygric	
BGxw2	PW	83	Pasture sage - Bluebunch wheatgrass	w	significant slope, warm aspect, deep medium-textured eroding soil	xeric - subxeric	g, h, j, k, ks, n, q, r, s, y, z
BGxw2	RF	61	Baltic Rush - Field Sedge Moist Meadow	d, j, m	moist meadow rarely inundated, lower toe slope, deep medium-textured soil	subhygric - hygric	
BGxw2	RL	82	Small-flowered ricegrass - Lichen		sparsely vegetated talus slopes	subxeric - submesic	nw
BGxw2	RM	30	Baltic rush Marsh	d, f, j	inundated most of year, depression, deep fine-textured soil	subhydric - hydric	
BGxw2	SP	81	Big sagebrush - Pasture sage	s, w	significant slope, warm aspect, shallow soil over bedrock	xeric	g, k, q, v, z
BGxw2	SS	80	Saskatoon - Pasture sage	v	significant slope, very shallow soil	very xeric - xeric	g, k, q, z
BGxw2	TS	50	Tall willow - Kentucky bluegrass	d, j, m	soils saturated, deep medium-textured soil	hygric to hydric	

Subzone	Map Code	Site Series #	Ecosystem Unit Name	Assumed Modifiers	Typical Conditions	Moisture Regime	Mapped Modifiers
BGxw2	WN	01	Bluebunch wheatgrass - Needle-and-threadgrass	d, j, m	gentle slope, deep medium-textured soil	mesic	c, cg, g, gh, gt, h, hr, ht, k, ks, n, nt, ny, r, rt, t, tw, w, y
BGxw2	WN:pp	01	Bluebunch wheatgrass - Needle-and-threadgrass: Prickly pear cactus - Pussytoes Seral Association	d, j, m	gentle slope, deep medium-textured soil	mesic	ht
BGxw2	WN:sd	01	Bluebunch wheatgrass - Needle-and-threadgrass: Pasture sage - Sand dropseed Seral Association	d, j, m	gentle slope, deep medium-textured soil	mesic	gh
BGxw2	WO	86	Bluebunch wheatgrass - Nodding onion	d, k, m	significant slope, cool aspect, deep medium-textured soil	mesic - subhygric	c, g, gs, h, n, r, s
IDFxm	AM	00	Trembling aspen - Douglas maple	d, j, m	gentle slopes in moist draws and deep cool gullies along permanent or intermittent streams, deep medium-textured soil	mesic - subhygric	k,w
IDFxm	AR	00	At - Prickly rose	d, j, m	moist recieving depressions, deep medium-textured soil	subhygric	g
IDFxm	BU	00	Great Bulrush Marsh	d, f, j	permanently inundated, depression, deep fine-textured soil	hydric	
IDFxm	CM	00	Common Spike-rush Marsh	d, f, j	inundated most of year, depression, deep fine-textured soil	hydric	
IDFxm	CR	00	Black Cottonwood - Prairie Rose - Mountain Alder	a, c, d, j	moderately active floodplain, deep coarse-textured soil	subhygric	
IDFxm	CT	00	Cattail Marsh	d, f, j	permanently inundated, depression, deep fine-textured soil	hydric	
IDFxm	DJ	03	Fd - Juniper - Cladonia	c, d, j	gentle slope, deep coarse-textured soil	subxeric - submesic	r
IDFxm	DM	05	Fd - Feathermoss - Stepmoss	d, k, m	significant slope, cool aspect, deep medium-textured soil	submesic - mesic	c, cq, cs, g, gs, h, q, qs, qv, r, rs, s, t

Subzone	Map Code	Site Series #	Ecosystem Unit Name	Assumed Modifiers	Typical Conditions	Moisture Regime	Mapped Modifiers
IDFxm	DP	01	Fd - Pinegrass - Feather moss	d, j, m	gentle slope, deep medium-textured soil	mesic - submesic	c, ck, cn, f, g, gs, gt, h, ht, k, ks, n, r, rs, s, t, w
IDFxm	DP:na	01	Fd - Pinegrass - Feather moss : Spreading needlegrass - Cut-leaved anemone Seral Association	d, j, m	gentle slope, deep medium-textured soil	mesic - submesic	
IDFxm	DP:np	01	Fd - Pinegrass - Feather moss : Spreading needlegrass - Pussytoes Seral Association	d, j, m	gentle slope, deep medium-textured soil	mesic - submesic	
IDFxm	DP:pp	01	Fd - Pinegrass - Feather moss : Short-awned Porcupinegrass - Pussytoes Seral Association	d, j, m	gentle slope, deep medium-textured soil	mesic - submesic	k
IDFxm	DP:wy	01	Fd - Pinegrass - Feather moss : Bluebunch Wheatgrass - Yarrow Seral Association	d, j, m	gentle slope, deep medium-textured soil	mesic - submesic	g, h, k, n, t, w
IDFxm	DR	06	Fd - Ricegrass - Feathermoss	d, m	lower slope and depressions, deep medium-textured soil	subhygric	c, g
IDFxm	DS	04	Douglas-fir - Bluebunch wheatgrass - Pasture sage	d, m, w	significant slope, warm aspect, deep medium-textured soil	subxeric - submesic	c, ck, cs, g, h, j, k, n, q, r, s, t, z
IDFxm	DW	02	Douglas-fir - Bluebunch wheatgrass - Penstemon	s,w	significant slope, warm aspect, shallow medium-textured soil	xeric - subxeric	c, g, gk, h, j, k, q, qv, r, rv, v, vz, z
IDFxm	NA	36	Spreading Needlegrass - Cut-leaved Anemone	d, k, m	significant slope, cool aspect, deep medium-textured soil	subhygric - mesic	g
IDFxm	NM	00	Northern Mannagrass Marsh	d, f, j	inundated most of year, depression, deep fine-textured soil	hydric	
IDFxm	NP	35	Spreading Needlegrass - Pussytoes	d, j, m	gentle slopes, lee aspects deep medium-textured soil	mesic	
IDFxm	NR	38	Spreading Needlegrass - Baltic Rush	d, j, m	gentle slopes, depressions, moisture recieving sites, deep medium-textured soil	subhygric	

Subzone	Map Code	Site Series #	Ecosystem Unit Name	Assumed Modifiers	Typical Conditions	Moisture Regime	Mapped Modifiers
IDFxm	NR:bb	38a	Spreading Needlegrass - Baltic Rush : Kentucky Bluegrass Seral Association	d, j, m	gentle slopes, depressions, moisture recieving sites, deep medium-textured soil	subhygric	
IDFxm	PP	34	Short-awned Porcupinegrass - Pussytoes	d, j, m	level to gentle slopes, deep medium-textured soil	mesic - submesic	h, t
IDFxm	PP:ks	34	Short-awned Porcupinegrass - Pussytoes : Kentucky Bluegrass - Short-awned Porcupinegrass Seral Association	d, j, m	level to gentle slopes, deep medium-textured soil	mesic - submesic	
IDFxm	PP:sj	34	Short-awned Porcupinegrass - Pussytoes : Short-awned Porcupinegrass - Junegrass Seral Association	d, j, m	level to gentle slopes, deep medium-textured soil	mesic - submesic	
IDFxm	RF	00	Baltic Rush - Field Sedge Moist Meadow	d, j, m	moist meadow rarely inundated, lower toe slope and depression, deep medium-textured soil	subhygric - hygric	
IDFxm	RM	00	Baltic Rush Marsh	d, f, j	shallow marsh inundated most of year, depression, deep fine-textured soil	subhydric - hydric	
IDFxm	RS	07	Douglas-fir - Prickly rose - Sarsaparilla	d, m	lower slope and depressions, deep medium-textured soil	subhygric	ac, g, k, w
IDFxm	SH	09	Hybrid white spruce - Horsetail - Glowmoss	d, f, j	lower slope and depressions, deep fine-textured soil	hygric	
IDFxm	SM	00	Beaked Sedge - Water Sedge Marsh	d, f, j	seasonally inundated shallow marsh, deep fine-textured soil	subhydric - hydric	
IDFxm	SS	08	Hybrid white spruce - Snowberry - Prickly Rose	d, j, m	lower slope, toe near intermittant or permanent streams, deep medium-textured soil	subhygric - hygric	g
IDFxm	TS	00	Tall Willow - Sedge Swamp	d, j, m	shrub swamps with subsurface water flow, deep medium-textured soil	hygric - subhydric	
IDFxm	WP	32	Bluebunch Wheatgrass - Pasture Sage	c, w	significant slope, warm aspect, eroding coarse-textured soil	subxeric - xeric	g, k, m, n, nt, r, s, z

Subzone	Map Code	Site Series #	Ecosystem Unit Name	Assumed Modifiers	Typical Conditions	Moisture Regime	Mapped Modifiers
IDFxm	WT	31	Bluebunch Wheatgrass - Pussytoes	j, s	gentle slope, shallow soil over bedrock	subxeric - xeric	g, h, k, q, qv, r, v, w, z
IDFxm	WY	33	Bluebunch Wheatgrass - Yarrow	j, m	gentle slope, deep medium-textured soil	submesic - mesic	g, gh, h, ht, k, ky, n, nt, r, rt, t, w, y
IDFxm	WY:ks	33	Bluebunch Wheatgrass - Yarrow : Kentucky Bluegrass - Salsify Seral Association	j, m	gentle slope, deep medium-textured soil	submesic - mesic	
IDFxm	WY:pj	33	Bluebunch Wheatgrass - Yarrow : Pussytoes - Junegrass Seral Association	j, m	gentle slope, deep medium-textured soil	submesic - mesic	g, h, w
IDFdk3	DJ	03	Douglas-fir - Common Juniper - Peltigera	r, s	crest , shallow soil over bedrock	xeric	v, vw, vz
IDFdk3	DK	02	Fd - Juniper - Kinnikinnick	c, d, w	significant slope, warm aspect, deep coarse-textured soil	xeric	
IDFdk3	DM	05	Douglas-fir - Feathermoss - Stepmoss	d, k, m	significant slope, cool aspect, deep medium-textured soil	subxeric - submesic	s, rs
IDFdk3	DP	06	Douglas-fir - Pinegrass - Aster	d, m. w	significant slope, warm aspect, deep medium-textured soil	submesic	s
IDFdk3	DW	04	Douglas-fir - Bluebunch Wheatgrass - Needlegrass	d, m, w	significant slope, warm aspect, deep medium-textured soil	subxeric - submesic	c, s
IDFdk3	LP	01	Fd Pl - Pinegrass - Feathermoss	d, j, m	gentle slope, deep medium-textured soil	mesic	ch, k, ks, s, w
IDFdk3	NR	00	Spreading Needlegrass - Baltic Rush	d, j, m	depressions, toe moisture recieving sites	subhygric	
IDFdk3	NR:bb	00	Spreading Needlegrass - Baltic Rush : Kentucky Bluegrass Seral Association	d, j, m	depressions, toe moisture recieving sites	subhygric	
IDFdk3	RS	00	Baltic Rush - Field Sedge Moist Meadow	d, j, m	seasonally wet, lower toe slope and depression, deep medium-textured soil	subhygric - hygric	
IDFdk3	SH	09	Hybrid white spruce - Horsetail - Glowmoss	d, m	level, deep medium-textured soil, high water table	hygric	a
IDFdk3	SR	07	Hybrid white spruce - Douglas-fir - Prickly Rose - Sedge	d, j, m	gentle lower slope, receiving sites, deep medium-textured soil	subhygric	

Subzone	Map Code	Site Series #	Ecosystem Unit Name	Assumed Modifiers	Typical Conditions	Moisture Regime	Mapped Modifiers
IDFdk3	SS	08	Hybrid white spruce - Douglas-fir - Prickly Rose - Sarsaparilla	d, j, m	gentle lower slope, recieving sites, deep medium-textured soil	subhygric	
IDFdk3	WY	00	Bluebunch Wheatgrass - Yarrow	j, m	gentle warm slopes, deep medium-textured soil	mesic - submesic	s, w
IDFdk4	AF	00	Nuttall's Alkaligrass - Foxtail Barley Wet Meadow	d, j, m	saline wet meadow, deep medium-textured soil	subhygric	
IDFdk4	AR	00	Trembling aspen - Prairie rose	d, j, m	gentle slopes, moisture recieving sites, deep medium-textured soil	subhygric	a, f, t
IDFdk4	BU	00	Great Bulrush Marsh	d, f, j	deep marsh permanently inundated, deep fine-textured soil	hydric	
IDFdk4	CM	00	Common Spike-rush Marsh	d, f, j	inundated most of year, deep fine-textured soil	hydric	
IDFdk4	DJ	03	Douglas-fir - Juniper - Saskatoon	c, d, w	significant slope, warm aspect, deep coarse-textured soil	xeric	s
IDFdk4	DM	07	Douglas-fir - Feathermoss - Stepmoss	d, k, m	significant slope, cool aspect, deep medium-textured soil	submesic	c, cs, g, hs, j, qs, r, s, v
IDFdk4	DS	04	Douglas-fir - Juniper - Pasture Sage	d, m, w	significant slope, warm aspect, deep medium-textured soil	subxeric	c, g, j, js, ks, s, v
IDFdk4	DW	05	Douglas-fir - Bluebunch Wheatgrass - Pinegrass	d, m, w	significant slope, warm aspect, deep medium-textured soil	submesic - subxeric	c, g, h, hs, j, js, r, s
IDFdk4	DW:wb	05	Douglas-fir - Bluebunch Wheatgrass - Pinegrass : Bluebunch Wheatgrass - Balsamroot Seral Assoc.	d, m, w	significant slope, warm aspect, deep medium-textured soil	submesic - subxeric	j, s
IDFdk4	JP	02	Douglas-fir - Juniper - Peltigera	j, r, s	gentle slope, crest, shallow soil over bedrock	xeric	v, vw, w, z
IDFdk4	LC	06	Lodgepole Pine - Kinnikinnick - Cladonia	c, d, j	gentle slope to level, deep coarse-textured soil	submesic	t
IDFdk4	LP	01	Douglas-fir - Lodgepole Pine - Pinegrass - Feathermoss	d, j, m	gentle slope, deep medium-textured soil	mesic	a, c, ct, f, g, h, hs, k, ks, n, nw, s, t, w

Subzone	Map Code	Site Series #	Ecosystem Unit Name	Assumed Modifiers	Typical Conditions	Moisture Regime	Mapped Modifiers
IDFdk4	LP:wb	01	Douglas-fir - Lodgepole Pine - Pinegrass - Feathermoss : Bluebunch Wheatgrass - Balsamroot Seral Association	d, j, m	gentle slope, deep medium-textured soil	mesic	s
IDFdk4	NM	00	Northern Mannagrass Marsh	d, f, j	freshwater marsh inundated most of year, deep fine-textured soil	hydric	
IDFdk4	NR	00	Spreading Needlegrass - Baltic Rush	d, j, m	depressions, toe slopes, moisture recieving sites, deep medium-textured soil	subhygric	
IDFdk4	NR:bb	00	Spreading Needlegrass - Baltic Rush : Kentucky Bluegrass Seral Association	d, j, m	depressions, toe slopes, moisture recieving sites, deep medium-textured soil	subhygric	f
IDFdk4	PP	00	Short-awned Porcupinegrass - Pussytoes	d, j, m	gentle slopes, deep medium-textured soil	mesic - submesic	
IDFdk4	PP:pj	00	Short-awned Porcupinegrass - Pussytoes : Pussytoes - Junegrass Seral Association	d, j, m	gentle slopes, deep medium-textured soil	mesic - submesic	
IDFdk4	RF	00	Baltic Rush - Field Sedge Moist Meadow	d, j, m	moist meadow rarely inundated, deep medium-textured soil	subhygric - hygric	
IDFdk4	SF	09	Hybrid white spruce - Feathermoss - Brachythecium	c, d	lower and toe slopes bordering streams, deep coarse-textured soil	subhygric	a, g, k, t, w
IDFdk4	SH	10	Hybrid white spruce - Horsetail - Glowmoss	d, j, m	toe slopes and depressions, deep medium-textured soil	hygric - subhydric	a
IDFdk4	SM	00	Beaked sedge - Water sedge Fen	p	seasonally inundated, organic soils	subhydric - hydric	a
IDFdk4	SS	08	Hybrid White Spruce - Scrub Birch - Feathermoss	c, d	lower and toe slopes, deep coarse-textured soil	subhygric	a, f, k
IDFdk4	TS	00	Tall Willow - Sedge Swamp	d, j, m	riparian, deep medium-textured soil	hygric - hydric	a, p
IDFdk4	WB	00	Bluebunch Wheatgrass - Balsamroot	d, j, m	gentle slopes, deep medium-textured soil	mesic - submesic	cs, f, h, s, v
IDFdk4	WB:pj	00	Bluebunch Wheatgrass - Balsamroot : Pussytoes - Junegrass Seral Association	d, j, m	gentle slopes, deep medium-textured soil	mesic - submesic	f, s

Subzone	Map Code	Site Series #	Ecosystem Unit Name	Assumed Modifiers	Typical Conditions	Moisture Regime	Mapped Modifiers
IDFdk4	WP	00	Bluebunch Wheatgrass - Pasture Sage	d, m, w	significant slope, warm aspect, deep medium-textured soil	subxeric - xeric	c, hs, s, v
IDFdk4	WT	00	Bluebunch Wheatgrass - Pussytoes	j, s	gentle slope, shallow soil over bedrock	subxeric - xeric	v, vw, w
SBPSxc	BS	00	Sedge - Grass Fen	j, p	graminoid wetland, organic soil	subhydric - hydric	
SBPSxc	LC	02	Lodgepole Pine - Kinnikinnick - Cladonia	c, d, j	gentle slope, deep coarse-textured soils	submesic - subxeric	ks, ms, s, sw, t, v, vw, vz, w
SBPSxc	LK	01	Lodgepole Pine - Kinnikinnick - Feathermoss	d, j, m	gentle slope, deep medium-textured soils	mesic	g, gs, h, k, ks, s, sw, w
SBPSxc	SB	03	Hybrid White Spruce - Scrub Birch - Fen Moss	d, j, m	gentle slope,lower slope receiving sites, deep medium-textured soils	subhygric	
SBPSxc	SF	04	Hybrid White Spruce - Scrub Birch - Feathermoss	j, m	gentle slope, lower slope receiving sites, deep medium-textured soils	subhygric	
SBPSxc	SH	05	Hybrid White Spruce - Horsetail - Glow Moss	j, m	gentle slope, lower slope receiving sites, deep medium-textured soils	subhygric - hygric	p
SBPSxc	SM	06	Hybrid White Spruce - Horsetail - Meadowrue	d, j, m	gentle slope, adjacent to stream channels, deep medium-textured soils	hygric - subhygric	g
SBPSxc	WB	00	Shrub Carr	d, j, m	shrub carr, deep medium-textured soil	subhygric	
SBPSxc	WP	00	Bluebunch Wheatgrass - Pasture Sage	d, c, w	significant slope, warm aspect, deep eroding coarse-textured soil	subxeric - xeric	s
SBPSxc	WT	00	Willow - Sedge Fen	d, j, p	shrubby wetland, deep organic soil	subhydric - hydric	
MSxk	DA	05	Douglas-fir - Lodgepole Pine - Pinegrass - Arnica	d, m, w	significant slope, warm aspect, deep medium-textured soil	submesic - mesic	c, hs, hv, j, js, k, ks, rs, s, v
MSxk	DJ	02	Douglas-fir - Juniper - Grouseberry	s, w	significant slope, warm aspect, shallow soil	very xeric - subxeric	k, r, v
MSxk	JK	00	Juniper - Kinnikinnick	d, m, w	significant slope, warm aspect, deep medium-textured soil	subxeric - xeric	hs, ks, rs, s, v
MSxk	LL	01	Lodgepole Pine - Pinegrass - Lupine	d, j, m	gentle slope, deep medium-textured soil	mesic	c, ch, h, hs, k, ks, s, sw, t, w
MSxk	SG	08	Hybrid White Spruce - Gooseberry - Grouseberry	j, m	gentle lower slope receiving moisture, deep medium-textured soil	subhygric - hygric	a, g, gk, k, ks, s
MSxk	SH	09	Hybrid White Spruce - Horsetail - Leafy Moss	m	lower slope to flat receiving sites, medium-textured soil	hygric	a, p

Subzone	Map Code	Site Series #	Ecosystem Unit Name	Assumed Modifiers	Typical Conditions	Moisture Regime	Mapped Modifiers
MSxk	SM	00	Sedge - Glow Moss Fen	d, j, p	graminoid wetland, deep organic soil	subhydric - hydric	a
MSxk	WB	00	Willow - Scrub Birch - Sedge Fen	d, j, p	shrubby wetland, deep organic soil	subhydric - hydric	a, ks, m
MSxk	WJ	03	Bluebunch Wheatgrass - Junegrass	d, j, m, r	gentle slope, crests, deep medium-textured soil	xeric - subxeric	ks, s, sw, v, vw, w
MSxv	BS	00	Sedge - Grass Fen	d, j, p	graminiod wetland, organic soil	subhydric - hydric	
MSxv	GK	04	Lodgepole Pine - Grouseberry - Kinnikinnick	d, j, m	gentle slope, deep medium-textured soil	submesic	gs, k, s, sw, s, w
MSxv	JK	00	Juniper - Kinnikinnick	d, m, w	significant slope, warm aspect, deep medium-textured soil	subxeric - xeric	hs, ks, r, s, t, v
MSxv	LG	01	Lodgepole Pine - Grouseberry - Feathermoss	d, j, m	gentle slope, deep medium-textured soil	mesic	c, cw, gk, h, hs, ht, k, ks, n, s, sw, t, w
MSxv	LK	03	Lodgepole Pine - Kinnikinnick - Cladonia	j, m, r, s	gentle slope, crests, shallow soil over bedrock	xeric - subxeric	k, v, vw, w
MSxv	PK	00	Lodgepole Pine - Pinegrass - Kinnikinnick	d, j, m	gentle slope, deep medium-textured soil	submesic	h, hs, ht, k, ks, kv, s, sw, t, vw, w
MSxv	SC	06	Hybrid White Spruce - Crowberry - Knight's Plume	d, j, m	gentle lower slope, receiving position, deep medium-textured soil	subhygric	a, g, k, t
MSxv	SG	07	Hybrid White Spruce - Crowberry - Glow Moss	j	gentle lower or toe slopes and depressions, deep medium-textured soil with persistant seepage	subhygric	a, k
MSxv	SH	08	Hybrid White Spruce - Horsetail - Crowberry	d, m	toe slope or depression around wetland, deep medium-textured soil, high water table	hygric - subhydric	a, t
MSxv	SW	00	Hybrid White Spruce - Willow - Scrub Birch	d, j, p	gentle lower slope or depression, organic soil	hygric - subhydric	a, t
MSxv	WJ	00	Bluebunch Wheatgrass - Junegrass	d, j, m, r	gentle slope, crests, deep medium-textured soil	xeric - subxeric	sw, v, vw, w
MSxv	WS	00	Willow - Scrub Birch - Sedge Fen	d, j, p	shrubby wetland, deep organic soil	subhydric - hydric	a, f
ESSFxv2	FA	01	Subalpine Fir - Arnica - Cladonia	d, j, m	gentle slope, deep medium-textured soil	mesic - submesic	a, c, ch, ct, h, hs, k, ks, s, sh, sw, w
ESSFxv2	FH	00	Subalpine Fir - Horsetail	d, f, j	level or depression, deep fine-textured soil	hygric	a, k

Subzone	Map Code	Site Series #	Ecosystem Unit Name	Assumed Modifiers	Typical Conditions	Moisture Regime	Mapped Modifiers
ESSFxv2	FL	00	Subalpine Fir - Bracted Lousewort - Glowmoss	d, j, m	gentle mid to lower slopes, deep medium-textured soil	subhygric	g, k, w
ESSFxv2	FP	00	Subalpine Fir - Brachythecium - Peltigera	c, d, k	significant slope, cool aspects above 1800 m., deep coarse-textured soil	submesic - subxeric	h, hs, j, js, jv, m, q, s
ESSFxv2	FR	00	Subalpine Fir - White-flowered Rhododendron - Restem Feathermoss	d, m, k	significant slope, cool aspects below 1800 m., deep medium-textured soil	submesic - mesic	h, hs, j, js, q, s, v
ESSFxv2	JK	00	Juniper - Kinnikinnick	d, m, w	significant slope, warm aspect, deep medium-textured soil	subxeric - xeric	hs, hv, js, jv, ks, rv, s, v
ESSFxv2	LJ	00	Lodgepole Pine - Juniper - Cladonia	j, s	gentle slopes on crests, shallow soil over bedrock	very xeric - subxeric	cw, h, hv, k, kv, rv, v, vw, w
ESSFxv2	LP	00	Lodgepole Pine - Pinegrass - Kinnikinnick	c, d, w	significant slope, warm aspect, deep coarse-textured soil	subxeric - submesic	hs, hv, j, js, jv, k, ks, kv, r, rs, s, t, v
ESSFxv2	SG	00	Sedge - Glow Moss	d, j, p	moist depressions, organic soil	subhydric - hydric	m
ESSFxv2	SW	00	Englemann Spruce - Willow - Scrub Birch	d, j, p	gentle seepage tracks, level or depression, high water table, organic soil	hygric - subhydric	a, m, w
ESSFxv2	WB	00	Willow - Scrub Birch Fen	d, j, p	shrubby wetland, level and depression, organic soil	subhydric - hydric	a, c, km, m
ESSFxv2	WP	00	Old Man's Whiskers - Small-flowered Penstemon	d, f, j	toe slopes and level, cold air accumulation sites, deep fine-textured soil	subhygric	m
ESSFxvp2	AH	00	Mountain Avens - Heather	j, v	dry meadow on gentle slope, very shallow soil	very xeric - xeric	h, k, w
ESSFxvp2	FL	00	Lodgepole Pine - Subalpine Fir - Arctic Lupine	s	significant slope, shallow soil, forested sites	submesic - subxeric	d, k, v
ESSFxvp2	KC	00	Kinnikinnick - Cladonia	s, w	significant slope, warm aspect, shallow soil, dwarf shrub-dominated tundra	subxeric	dj, h, j, jv, k, v
ALL	BF		Blockfields		moderate to large angular boulders resulting from weathering in place	xeric	k
ALL	CF		Cultivated Field		gentle slope, nonforested open areas subject to human agricultural practices	variable	n, t

Subzone	Map Code	Site Series #	Ecosystem Unit Name	Assumed Modifiers	Typical Conditions	Moisture Regime	Mapped Modifiers
ALL	CL		Cliff		steep, vertical, or overhanging rock face	variable	g, q, v
ALL	DU		Dune		non-vegetated active sand dunes	subxeric - xeric	
ALL	ES		Exposed Soil		exposed soil in areas of recent disturbance	variable	g, k, q, r, w, z
ALL	GB		Gravel Bar		primarily non-vegetated, coarse-textured fluvial material on active floodplains	variable	
ALL	LA		Lake		lake > 2 m. deep, > 50 ha.	n/a	
ALL	MI		Mine		nonvegetated area used for mineral extraction	variable	
ALL	MS		Rubbly Mine Spoils		discarded overburden or waste rock from a mining operation	variable	w
ALL	OW		Shallow Open Water		permanent shallow open water < 2 m. deep, lacking extensive emergent plant cover	n/a	
ALL	PD		Pond		pond > 2 m. deep, <50 ha.	n/a	
ALL	RI		River		a watercourse flowing perennially or intermittantly between continuous, definable banks	n/a	
ALL	RM		Reclaimed Mine		a revegetated, formerly mined area	variable	w
ALL	RO		Rock Outcrop		primarily nonvegetated bedrock, gentle slope	variable	h, k, w
ALL	RP		Road Surface		non-vegetated roads	variable	
ALL	RR		Rural		nonurban residences and human development (farms and ranches)	variable	
ALL	RU		Rubble		unsorted weathered rock fragments	variable	k, w
ALL	TA		Talus		angular rock fragments accumulating due to successive rock falls (colluvium)	variable	k, kn, nq, q, w

4.5 RARE ELEMENTS

The B.C. Conservation Data Centre maintains Tracking Lists for rare vascular plants, plant communities and vertebrates for all Forest Districts in the province. The Tracking Lists for the Williams Lake and Lillooet Forest Districts, in which the Churn Creek study area is located, may be found in Appendix 5a. The B.C. Conservation Data Centre Rare Element Occurrences Report for the Churn Creek Study Area may also be found in Appendix 5b.

Rare Vertebrates

Rare vertebrates which have been previously observed in the Churn Creek Study Area are detailed in the B.C. Conservation Data Centre Rare Element Occurrences Report for the Churn Creek Study Area, which may be found in Appendix 5c.

Rare vertebrate observations made in the course of the Churn Creek TEM Study are detailed in Appendix 5d.

Rare Vascular Plants

Rare vascular plants which have been previously observed in the Churn Creek Study Area are detailed in the B.C. Conservation Data Centre Rare Element Occurrences Report for the Churn Creek Study Area, which may be found in Appendix 5e.

Rare vascular plant observations made in the course of the Churn Creek TEM Study are detailed in Appendix 5f.

Rare Plant Communities

There are no previous observations of rare plant communities on record with the B.C. Conservation Data Centre.

Rare plant communities observed in the course of the Churn Creek TEM study are detailed in Appendix 5g.

4.6 MENSURATION

In order to better understand the uneven-aged Douglas-fir stands, mensuration data was collected for forested Full Plots in Douglas-fir stands in the IDF and BG zones. All living and dead trees over 10 cm. were tallied by 10 cm. diameter classes. The average height by canopy layer, and age, height and diameter of four "top height trees" ie. best trees was measured (see DEIF 1998 for actual criteria for top height trees). A prism sweep (with prism number chosen to get a minimum of 8 trees per plot) with species, mortality, and diameter were recorded and basal area was determined from this data for the stand. A summary of the mensuration data collected can be found in Appendix 3.

4.7 WILDLIFE HABITAT SUITABILITY/CAPABILITY RATINGS TABLES

Wildlife habitat suitability was rated for the following 27 assigned species of wildlife, for the listed seasons and life requisites.

B.C. Wildlife Branch Status
red = endangered and/or threatened
blue = sensitive and/or vulnerable
yellow = actively managed by the Wildlife Branch

Life Requisites
FD = feeding
SH = security cover
ST = security/thermal cover
TH = thermal cover
CO = courtship/mating
DE = denning/roosting

LI = living
MS = migrating seasonally
RB - reproducing (birthing)
RE = reproducing (eggs)

Table 7 Rating Criteria by Species for Churn Creek Study Area

Species	Status	Seasons	Life Requisites
Common Garter Snake	yellow	winter, growing	HI, LI
Barrow's Goldeneye	yellow	growing	LI, RE
Blue Grouse	yellow	winter, growing	LI, RE
Bobolink	blue	growing	LI, RE
Eared Grebe	yellow	all	LI, RE
Flammulated Owl	blue	growing	LI, RE
Great Blue Heron	blue	all	LI, RE
Green-winged Teal	yellow	growing	LI, RE
Lewis' Woodpecker	blue	growing	LI, RE
Long-billed Curlew	blue	growing	LI, RE
Prairie Falcon	red	all	LI, RE
Rough-legged Hawk	yellow	winter	LI
Sandhill Crane	blue	growing	LI, RE
Sharp-tailed Grouse	blue	winter, growing	LI, RE
Short-eared Owl	blue	all	LI, RE
White-throated Swift	blue	growing	LI, RE
Black Bear	yellow	winter, spring, summer, fall	HI, FD, ST
Bobcat	yellow	winter, growing	FD, ST, RB
California Bighorn Sheep	blue	winter, spring, summer, fall	FD, ST, RB
Fisher	blue	winter, growing	FD, ST, RB
Marten	yellow	winter, growing	FD, ST, RB
Montane Vole	yellow	all	LI
Moose	yellow	winter, spring, summer, fall	FD, ST
Mule Deer	yellow	winter, spring, summer, fall	FD, ST
Rocky Mountain Elk	yellow	winter, spring, summer, fall	FD, ST
Spotted Bat	blue	winter, growing	DE, FD, RB
Townsend's Big-eared Bat	blue	winter, growing	DE, FD, RB

4.7.1 WILDLIFE HABITAT MODELS AND ASSUMPTIONS

Wildlife habitat models and assumptions were developed in order to assign suitability ratings to the ecosystem units in the study area for each of the 27 assigned wildlife species. These can be found in Appendix 6.

Based on the assumptions in these models, algorithms were formulated in Microsoft EXCEL 5.0 using the Visual BASIC programming language for the complete range at existing and all potential structural stages occurring in the study area. The algorithms establish suitability ratings for each ecosystem unit for that species' life requisites (activities) for the applicable seasons. Habitat capability can be inferred from the highest suitability rating, ie. when optimal conditions for that species that exists in that particular

ecosystem. The wildlife habitat models and assumptions for the 27 assigned species, the ratings tables, as well as an explanation on how to use the algorithms, are found as "look-up tables" in digital format.

Because of the sheer volume of ecosystem units, related modifiers, and their compliment of structural stages, computer based programs were developed to aid in the evaluation of wildlife habitat. Using the assumptions outlined in the models, computer based algorithms (macros) were formulated in Microsoft EXCEL 5.0 using the Visual BASIC programming language. The algorithms establish suitability ratings for each ecosystem unit for a specific species' life requisites (activities) for the applicable season(s). The following table is an sample portion of the Microsoft EXCEL worksheet used in assigning suitability to wildlife habitat (The complete table would contain a list of all of the ecosystem units in the study area, their modifiers, and all associated structural stages).

Table 8 Example of Wildlife Suitability Ratings Table used in this study.

Spotted Bat: MEUMA

ECO_SEC	BGC_ZONE	BGC_SUBZO	BGC_VRT	BGC_PHASE	SITE_S	SITEMC_S	SITE_MA	SITE_MB	STRCT_S	STRCT_M	SERAL	MEUMA_DE	MEUMA_FDG	MEUMA_RB		
FRB	BG	xh	3		53	BR			3	a		N	M	N		
FRB	BG	xh	3		53	BR			3	b		N	M	N		
FRB	BG	xh	3		53	BR	k		3	a		N	M	N		
FRB	BG	xh	3		53	BR	k		3	b		N	M	N		
FRB	BG	xh	3		00	BU			2			N	L	N		
FRB	BG	xh	3			CF			2			N	L	N		
FRB	BG	xh	3			CF	t		2			N	L	N		
FRB	BG	xh	3			CL	q		1			H	L	L		
FRB	BG	xh	3			CL	z		1			H	L	H		
FRB	BG	xh	3		00	CM			2			N	L	N		
FRB	BG	xh	3		06	CW			2			N	L	N		
FRB	BG	xh	3		06	CW			3			N	M	N		
FRB	BG	xh	3		06	CW			4			N	H	N		
FRB	BG	xh	3		06	CW			5			N	H	N		
FRB	BG	xh	3		06	CW			6			N	H	N		
FRB	BG	xh	3		06	CW			7			N	H	N		

This worksheet is in a format consistent with the *Standards for Wildlife Habitat Capability/Suitability Ratings in British Columbia- Review Draft revised May 28, 1997* (Wildlife Interpretations Subcommittee, Ecosystems Working Group, Terrestrial Ecosystems Task Force, R.I.C. 1997) with the ecological information running down the left columns and the activities and seasons to be rated running across the top row. The VISUAL BASIC algorithms uses the Ecosection, Biogeoclimatic Zone and Subzone, Ecosystem Unit, site modifiers, and structural stage information to evaluate each ecosystem unit as potential habitat for each specific season and activity; assigning a suitability rating to it. The codes and rational behind the suitability ratings, activities and seasons are explained in the following sections.

Rating Scheme

(From B.C. Wildlife Habitat Ratings standards Review Draft April 1998, *Wildlife Interpretations Subcommittee, Resource Inventory Committee*)

Since our ability to assign capability and suitability ratings accurately is dependent on knowledge, and because our knowledge of species' habitat use varies dramatically between species, more than one rating scheme is required. Differences in the level of detail that ecosystem classes are shown on maps of various scales may also limit the detail in which habitat use values can be interpreted and rated.

Three rating schemes have been developed to reflect these knowledge levels of habitat use (see following Table). The appropriate rating scheme is the one that reflects our knowledge of a given species' habitat use and the scale at which that knowledge is applied. The highest provincial rating is assigned to habitats of greatest concentration or importance to each species, based on previous measures or estimates in benchmark areas. All other habitats are evaluated in comparison to these benchmark habitats.

Habitat capability and suitability rating schemes for three levels of knowledge about a species' use of habitat. Ratings are based on the habitat's potential under optimal conditions to support a particular species and reflect the animal's use of the best habitat in the province. Species use is evaluated as the expected use of a habitat and is based on the measure of the number of animals that may use the habitat during a specified time period for a specified area of habitat (# animals/unit time/unit area).

Table 9 Habitat capability and suitability rating schemes

% of Provincial Best	Substantial Knowledge of Habitat Use (6-class)		Intermediate Knowledge of Habitat Use (4-class)		Limited Knowledge of Habitat Use (2-class)	
	Rating	Code	Rating	Code	Rating	Code
100 - 76%	High	1	High	H	Habitat Useable	U
75 - 51%	Moderately High	2	Moderate	M		
50 - 26%	Moderate	3				
25 - 6%	Low	4	Low	L		
5 - 1%	Very Low	5			Likely No Value	X
0%	Nil	6	Nil	N		

Six-Class Scheme -- Detailed Knowledge of Species' Habitat Use

This scheme uses ratings of high (1), moderately high (2), moderate (3), low (4), very low (5) and nil (6) for defined seasons and habitat uses. This rating system is most useful at medium map scales (1:50,000 - 1:100,000) where seasonal habitat use can be readily depicted, and at large map scales (1:5,000 - 1:20,000) for many species where specific habitat uses can be identified.

Four-Class Scheme -- Intermediate Knowledge of Species' Habitat Use

This scheme employs high (H), moderate (M), low (L) and nil (N) ratings for defined seasons and habitat uses. The four-class approach is most effective at medium (1:50,000 - 1:100,000) to small (1:250,000 - 1:500,000) map scales where seasonal information is available.

Two-Class Scheme -- Limited Knowledge of Species' Habitat Use

The two-class scheme is used for species for which there is little information. Species in this category are assigned capability or suitability ratings of "habitat useable" (U) or "likely no value" (X). This scheme can be applied in most areas for almost any species even with very limited information on habitat attributes, although the range of values is so broad that it is of limited value for species that we can map at greater detail.

Seasons

(From B.C. Wildlife Habitat Ratings Standards Review Draft April 1998, *Wildlife Interpretations Subcommittee, Resource Inventory Committee*)

How an animal uses habitat is closely associated with the season or time of year and the specific activity or life requisite. Habitats providing food and cover in the winter season may be quite different from habitats used for food and cover in the spring, summer or fall (or growing season). Habitats used for reproductive activities may be important in the fall (courting/ mating), spring (e.g. birthing), or summer

(rearing). Often the "season" required for each seasonal activity will vary from one species to another, from low to high elevations, and from southern to northern parts of the province

Seasons can be described at three levels of detail (see following table): one-season, two-season, four-season and five-season. With larger map scales and a more detailed knowledge level of the species, seasonal use of habitats can be described in greater detail. A four-season rating is then the minimum required. The five-season rating subdivides winter into early and late periods, a level of detail that was only utilized for evaluating caribou habitat in this study.

Three levels for describing seasons of habitat use. Season of use must be included in the habitat capability and suitability ratings.

Table 10 Three levels for describing seasons of habitat use

Level	Code	Description	Application
2-season	D G	Dormant Growing (spring, summer, fall)	• when seasonal habitat use can only be roughly differentiated • small map scales
4-season	W P S F	Winter* Spring Summer Fall	• when four distinct seasons of habitat use can be differentiated (medium to large map scales) • species for which there is an intermediate or substantial knowledge level • when species occur in B.C. only part of the year (migratory species - only 3 of the 4 seasons rated)
5-season	EW LW P S F	Early Winter Late Winter Spring Summer Fall	• **IF** distinguishing detailed seasons for black bear and ungulates

*Winter can be used for either a 2-season or a 4-season rating; in both cases, it is the same period of time (as defined in the Chart of Seasons *in* B.C. Wildlife Habitat Ratings standards Review Draft April 1998 Appendix B).

Not all seasons in the year have to be rated. A four-season rating may be used for a migratory species that breeds in the province, but obviously "winter" will not be rated because the animal does not occur in B.C. at that time.

An ecological approach has been developed for describing seasons of habitat use because the duration of each season and the time when one season changes to the next depends on where you are in the province. In the Churn Creek study area winter is found to occur from November - April; Spring from May - June; Summer in July and August and Fall in September and October.

Habitat Use: Activity

(From B.C. Wildlife Habitat Ratings standards Review Draft May 28 1997, *Wildlife Interpretations Subcommittee, Ecosystems Working Group, Terrestrial Ecosystems Task Force, Resource Inventory Committee*)

Habitat use activities are the key life requisites and requirements of an animal for sustaining and perpetuating the species. These requirements are supplied by the species' habitat and include food, cover, reproduction, migration, hibernation, etc. For the purposes of developing habitat suitability ratings, life requisites have been divided into two categories: 1) Mandatory activities such as food and cover or life requirements and, 2) optional activities such as birthing, hibernating and denning. The definitions and codes for these habitat use activities are described in the following table.

Table 11 Activities and codes for describing habitat use.

Life Requisite	Code	Definition
Mandatory Activities		
Living	LI	habitat used for security, food, thermal, protection and general living
Food	FD	habitat used for consuming food items, including searching for and consuming food simultaneously (such as done by grazers, browsers, flying insectivores, ducks, etc.)
Security	SH	habitat used for protection or hiding from predators
Security/Thermal	ST	habitat used for security and/or thermal values (this category used when differentiation between thermal and security values is difficult or impossible)
Thermal	TH	habitat used for protection from heat, cold, precipitation or wind
Optional Activities		
Reproducing (birthing)	BI	habitat used specifically for giving birth to live young (mammals); may or may not include courtship/mating, depending on the animal species
Courtship/Mating	CO	habitat used for courting , pair-bonding or mating (when separate from reproducing habitat)
Denning/Roosting	DE	habitat used for sleeping or hiding in a cavity, crevice, cave, or burrow; does not include dens used solely for hibernating (HI) or birthing (RB)
Feeding: green up	FG	habitat used for feeding on early spring green up
Feeding: salmon	FS	habitat used for feeding on spawning salmon
Hibernating	HI	habitat used for hibernating
Migrating (seasonally)	MS	habitat used for regular, annual travel (e.g., habitat used by elk for spring and fall migrations)
Reproducing (eggs)	RP	habitat used for building a nest, laying eggs, incubation, hatching and feeding non-mobile young (amphibians, birds and reptiles); may or may not include courtship/mating, depending on the animal species
Staging	SG	habitat used for staging during spring and fall migrations

Generally an animal spends most of its time feeding or using cover for resting or protection from predators and the elements. Thus the default activity for rating habitats is feeding and/or cover; combined these are generally referred to as living activities. All habitats must be rated for either general living, feeding or cover for a specified season.

All other habitat use activities (reproducing, migrating, hibernating, etc.) have a specific habitat and time of the year associated with them. These *specific habitat use activities* do not require a season to be

identified in the ratings (but due to the set up the macros they are rated by specific season), because it is implied by the particular activity (however, the time of year when a specific life requisite occurs for any one species must be clearly defined in the species account section of the species-habitat model).

Note that the habitat use activity called "general living" is an exception because it has elements of both food/cover and specific life requisites. This particular description has been devised to: 1) provide a general category for projects that do not require detailed food and cover ratings, and 2) describe the periods in a year when other specific habitat use activities do not occur. "Living" includes general activities that are mostly comprised of feeding, using cover and moving between the habitats required for these activities[1]. As with the food/cover activities, "living" requires a season to be explicitly identified in the ratings.

Rating Habitat Use

(From B.C. Wildlife Habitat Ratings standards Review Draft April 1998, *Wildlife Interpretations Subcommittee, Resource Inventory Committee*)

Suitability ratings are used in conjunction with seasons and habitat use activities to provide a more precise description of the value of a habitat to a particular species. Thus for each species, a habitat is evaluated according to the season in which it is being used and the type of use it receives (feeding, reproducing, etc.). *All suitability ratings are expressed as a value for a particular season and habitat use activity for the species of concern, compared to the best habitat in the province used for the same season and life requisite for that species***.** For example, spring feeding habitats for mule deer are rated in comparison to the best mule deer spring feeding habitat in the province.

The combination of seasons and life requisites used for suitability ratings as well as the detail at which they are applied, will vary depending on: 1) the particular requirements of each animal species, 2) the map scale, and 3) the objectives of the habitat mapping project..

4.8 BIOTERRAIN AND ECOSYSTEM DATABASE

An EXCEL spread sheet was used to develop data bases for bioterrain and ecosystem attributes for each polygon. This was done according to *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia Version 2.0* (Ecological Data Committee 1998). Each row describes a polygon number with up to three differing terrain and ecosystem components whose deciles must add up to 10. The content of each column follows the format suggested by the technical coordinator. Bioterrain and ecosystem databases are found in Appendix 8.

[1] "Living" may also have aspects of other specified life requisites (for example, reproduction: generally habitat used for rearing young cannot be separated from the habitat used for "living" by adults; "living" thus includes the rearing component of reproduction).

4.9 SPATIAL DATA AND MAP GENERATION

Polygon spatial data captured by controlled monorestitution was converted to ARCINFO format according to the Digital Data Capture Standards for TEM, October 1998. Polygon databases were converted into ARCINFO format according to those standards and 1:20,000 hard copy maps depicting ecosection, biogeoclimatic subzone variant, site series, and structural stage were generated. G.I.S. files and map digital files are located on the C.D. submitted with the Report, Expanded Legend, and Appendices.

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Appendix 1 - Working Legend

MSxv					
BIOTERRAIN		SITE FEATURES	SITE SERIES	ECO-UNIT	PLOTS
LANDSCAPE POSITION	SURFICIAL MATERIAL				
LEVEL	Fluvial		00	SWa	C343, C843
			00	WSa	C839
			08	SHa	C848
	Glaciofluvial		01	LG	C631
			00	WS	C632
	Moraine		00	WS	C407, C899
			00	WS	C407
			01	LG	C897, 98047
			07	SG	98142, 98MR012
	Organic		00	BS	98334, C328
			00	SW	98148
			00	WS	C333,
DEPRESSION	all				
GENTLE-SLOPES	Moraine		00	PK	98140
			01	LG	C408, C409, C832, C837, C844, C847, C896, C898, 98336, 98MD014, 98MD015
			03	LK	98141
			04	GK	
			05	LT	
			06	SC	C405, C406, C901, 98333
			07	SG	C902
			08	SH	
	Colluvium		00	PK	98226, 98241
	Fluvial				
	Glaciofluvial		01	LG	C841
UPPER SLOPES	all		00	JK	
			00	WJ	
			03	LK	91MK067, 98243
			04	GK	
			05	LT	C625
CRESTS			00	JK	
			03	LK	C904, 98242
TOE SLOPES	all				
GULLIES	all				
WARM ASPECTS	ANY OF :		00	JK	
	Morainal		00	PK	91MK066
	Colluvium		00	WJw	C334, C335
	Glaciofluvial		01	LGw	
			03	LKw	98MD001
			04	GKw	
COOL ASPECTS	ANY OF :		00	JK	
	Morainal		00	PK	C331
	Colluvium		01	LGk	98046, 98143
	Glaciofluvial		03	LKk	
			04	GKk	
			06	SCk	9800903

Appendix 2 - Vegetation List

	SCIENTIFIC NAME	COMMON NAME
TREES		
	Abies lasiocarpa	subalpine fir
	Betula papyrifera	paper birch
	Picea engelmannii	Engelmann spruce
	Picea engelmannii x glauca	hybrid white spruce
	Pinus albicaulis	whitebark pine
	Pinus contorta	lodgepole pine
	Pinus ponderosa	ponderosa pine
	Populus balsamifera	balsam poplar
	Populus balsamifera ssp. trichocarpa	black cottonwood
	Populus tremuloides	trembling aspen
	Pseudotsuga menziesii	Douglas-fir
SHRUBS		
	Acer glabrum	Douglas maple
	Alnus crispa	green alder
	Alnus crispa ssp. sinuata	Sitka alder
	Alnus sp.	alder
	Amelanchier alnifolia	saskatoon
	Artemisia tridentata	big sage
	Betula glandulosa	scrub birch
	Betula occidentalis	water birch
	Chrysothamnus nauseosus	rabbit-brush
	Clematis occidentalis	Columbia clematis
	Cornus stolonifera	red-osier dogwood
	Eleagnus commutata	silverberry
	Juniperus communis	common juniper
	Juniperus horizontalis	creeping juniper
	Juniperus scopulorum	Rocky Mountain juniper
	Juniperus sp.	juniper
	Lonicera involucrata	black twinberry
	Prunus virginiana	choke cherry
	Rhododendron albiflorum	white-flowered rhododendron
	Ribes lacustre	black gooseberry
	Ribes oxycanthoides	northern gooseberry
	Rosa acicularis	prickly rose
	Rosa gymnocarpa	baldhip rose
	Rosa nutkana	Nootka rose
	Rosa woodsii	prairie rose
	Rubus idaeus	red raspberry
	Rubus parviflorus	thimbleberry
	Salix bebbiana	Bebb's willow
	Salix candida	hoary willow

	Salix geyeriana	Geyer's willow
	Salix glauca	grey-leaved willow
	Salix glauca var. villosa	grey-leaved willow
	Salix maccalliana	MacCall's willow
	Salix myrtillifolia var. cordata	bilberry willow
	Salix planifolia	tea-leaved willow
	Salix planifolia ssp. planifolia	tea-leaved willow
	Salix psuedomonticola	mountain willow
	Salix scouleriana	Scouler's willow
	Salix sp.	willow
	Shepherdia canadensis	soopolallie
	Spiraea betulifolia	birch-leaved spirea
	Symphoricarpos albus	common snowberry
	Symphoricarpos occidentalis	western snowberry
	Vaccinium membranaceum	black huckleberry
	Viburnum edule	highbush-cranberry
HERBS		
	Achillea millefolium	yarrow
	Actaea rubra	baneberry
	Agoseris glauca	short-beaked agoseris
	Agoseris glauca var. dasycephala	short-beaked agoseris
	Agoseris sp.	
	Agropyron cristatum	crested wheatgrass
	Agrostis gigantea	redtop
	Agrostis scabra	hair bentgrass
	Agrostis sp.	bentgrass
	Allium cernuum	nodding onion
	Androsace septentrionalis	northern fairy-candelabra
	Anemone multifida	cut-leaved anemone
	Anemone sp.	anemone
	Antennaria dimorpha	low pussytoes
	Antennaria microphylla	rosy pussytoes
	Antennaria neglecta	field pussytoes
	Antennaria pulcherrima	showy pussytoes
	Antennaria racemosa	racemose pussytoes
	Antennaria sp.	pussytoes
	Antennaria umbrinella	umber pussytoes
	Apocynum androsaemifolium	spreading dogbane
	Aquilegia formosa	red columbine
	Arabis holboellii	Holboell's rockcress
	Arabis sp.	
	Aralia nudicaulis	wild sarsaparilla
	Arctium lappa	great burdock
	Arctium minus	common burdock

	Arctostaphylos uva-ursi	kinnikinnick
	Arenaria capillaris	thread-leaved sandwort
	Arenaria sp.	sandwort
	Arnica angustifolia	alpine arnica
	Arnica cordifolia	heart-leaved arnica
	Arnica fulgens	orange arnica
	Arnica latifolia	mountain arnica
	Arnica rydbergii	Rydberg's arnica
	Arnica sp.	arnica
	Artemisia campestris	northern wormwood
	Artemisia dracunculus	tarragon
	Artemisia frigida	pasture sage
	Artemisia michauxiana	Michaux's mugwort
	Artemisia norvegica	mountain sagewort
	Artemisia sp.	
	Aster ciliolatus	Lindley's aster
	Aster conspicuus	showy aster
	Aster foliaceus	leafy aster
	Aster modestus	great northern aster
	Aster sp.	aster
	Astragalus miser	timber milk-vetch
	Astragalus sp.	
	Astragalus tenellus	pulse milk-vetch
	Balsamorhiza sagittata	arrow-leaved balsamroot
	Beckmannia sp.	
	Brassica campestris	field mustard
	Brassica kaber	charlock
	Bromus sp.	brome
	Bromus tectorum	cheatgrass
	Bromus vulgaris	Columbia brome
	Calamagrostis canadensis	bluejoint
	Calamagrostis purpurascens	purple reedgrass
	Calamagrostis rubescens	pinegrass
	Calochortus macrocarpus	sagebrush mariposa lily
	Caltha leptosepala	white marsh-marigold
	Campanula rotundifolia	common harebell
	Carex albonigra	two-toned sedge
	Carex aquatilis	water sedge
	Carex canescens	grey sedge
	Carex concinna	low northern sedge
	Carex concinnoides	northwestern sedge
	Carex exsiccata	inflated sedge
	Carex hoodii	Hood's sedge
	Carex media	Scandinavian sedge
	Carex obtusata	blunt sedge

	Carex praegracilis	field sedge
	Carex praticola	meadow sedge
	Carex pyrenaica	Pyrenean sedge
	Carex richardsonii	Richardson's sedge
	Carex rossii	Ross' sedge
	Carex sartwellii	Sartwell's sedge
	Carex sp.	sedge
	Carex utriculata	beaked sedge
	Carex xerantica	dry-land sedge
	Caryophyllaceae	
	Cassiope mertensiana	white mountain-heather
	Castilleja miniata	scarlet paintbrush
	Castilleja rhexifolia	alpine paintbrush
	Cerastium arvense	field chickweed
	Cerastium sp.	
	Chamaerhodos erecta	American chamaerhodos
	Chenopodium album	lamb's quarters
	Chenopodium rubrum	red goosefoot
	Cinna latifolia	nodding wood-reed
	Circaea alpina	enchanter's-nightshade
	Cirsium edule	edible thistle
	Cirsium sp.	thistle
	Cirsium undulatum	wavy-leaved thistle
	Cirsium vulgare	bull thistle
	Comandra umbellata	California comandra
	Cornus canadensis	bunchberry
	Crepis atrabarba	slender hawksbeard
	Crepis runcinata	dandelion hawksbeard
	Cynoglossum officinale	common hound's tongue
	Dactylis glomerata	orchardgrass
	Danthonia intermedia	timber oatgrass
	Danthonia sp.	oatgrass
	Delphinium glaucum	tall larkspur
	Disporum hookeri	Hooker's fairybells
	Disporum trachycarpum	rough-fruited fairybells
	Draba cana	lance-leaved draba
	Draba oligosperma	few-seeded draba
	Dryas integrifolia	entire-leaved mountain-avens
	Dryas octopetala	white mountain-avens
	Eleocharis palustris	common spike-rush
	Elymus glaucus	blue wildrye
	Elymus repens	quackgrass
	Elymus sp.	wildrye
	Elymus spicatus	bluebunch wheatgrass
	Elymus trachycaulus	slender wheatgrass

	Empetrum nigrum	crowberry
	Epilobium angustifolium	fireweed
	Epilobium ciliatum	purple-leaved willowherb
	Epilobium minutum	small-flowered willowherb
	Equisetum arvense	common horsetail
	Equisetum hyemale	scouring-rush
	Equisetum pratense	meadow horsetail
	Equisetum scirpoides	dwarf scouring-rush
	Erigeron compositus	cut-leaved daisy
	Erigeron filifolius	thread-leaved fleabane
	Erigeron flagellaris	trailing fleabane
	Erigeron linearis	line-leaved daisy
	Erigeron peregrinus	subalpine daisy
	Erigeron peregrinus ssp. callianthemus	subalpine daisy
	Erigeron pumilus	shaggy fleabane
	Erigeron sp.	fleabane
	Erigeron speciosus	showy daisy
	Erigeron subtrinervis	triple-nerved fleabane
	Eriogonum heracleoides	parsnip-flowered buckwheat
	Eriogonum umbellatum	sulphur buckwheat
	Eriophorum angustifolium	narrow-leaved cotton-grass
	Festuca arundinacea	tall fescue
	Festuca brachyphylla	alpine fescue
	Festuca occidentalis	western fescue
	Festuca saximontana	Rocky Mountain fescue
	Festuca sp.	fescue
	Fragaria vesca	wood strawberry
	Fragaria virginiana	wild strawberry
	Gaillardia aristata	brown-eyed Susan
	Galium boreale	northern bedstraw
	Galium trifidum	small bedstraw
	Galium triflorum	sweet-scented bedstraw
	Gentiana douglasiana	swamp gentian
	Geocaulon lividum	bastard toadflax
	Geranium viscosissimum	sticky purple geranium
	Geum macrophyllum	large-leaved avens
	Geum triflorum	old man’s whiskers
	Glyceria grandis	reed mannagrass
	Goodyera oblongifolia	rattlesnake-plantain
	Goodyera repens	dwarf rattlesnake orchid
	Hackelia deflexa	nodding stickseed
	Hedysarum sp.	
	Heracleum lantatum	cow-parsnip
	Heracleum sp.	cow-parsnip
	Heuchera chlorantha	meadow alumroot

	Heuchera cylindrica	round-leaved alumroot
	Hieracium albiflorum	white hawkweed
	Hieracium gracile	slender hawkweed
	Hieracium sp.	hawkweed
	Juncus balticus	Baltic rush
	Kobresia myosuroides	Bellard's kobresia
	Kochia scoparia	summer-cypress
	Koeleria macrantha	junegrass
	Lappula redowski	western stickseed
	Lathyrus nevadensis	purple peavine
	Lathyrus ochroleucus	creamy peavine
	Lemna sp.	
	Leptarrhena pyrolifolia	leatherleaf saxifrage
	Leymus cinereus	giant wildrye
	Linnaea borealis	twinflower
	Linum perenne	western blue flax
	Lithospermum incisum	yellow gromwell
	Lithospermum ruderale	lemonweed gromwell
	Lomatium macrocarpum	large-fruited desert-parsley
	Lupinus arcticus	arctic lupine
	Lupinus lyallii	dwarf mountain lupine
	Lupinus sericeus	silky lupine
	Luzula parviflora	small-flowered woodrush
	Luzula piperi	Piper's woodrush
	Lycopodium annotinum	stiff clubmoss
	Medicago lupulina	black medic
	Medicago sativa	alfalfa
	Melampyrum lineare	cow-wheat
	Melica bulbosa	oniongrass
	Melilotus alba	white sweet-clover
	Melilotus sp.	
	Mitella nuda	common mitrewort
	Moneses uniflora	single delight
	Muhlenbergia richardsonis	mat muhly
	Nassella viridula	green needlegrass
	Onobrychis vicifolia	sainfoin
	Opuntia fragilis	brittle prickly-pear cactus
	Orobanche fasciculata	clusterned broomrape
	Orthilia secunda	one-sided wintergreen
	Orthocarpus luteus	yellow owl-clover
	Osmorhiza depauperata	blunt-fruited sweet-cicely
	Oxmorhiza chilensis	mountain sweet-cicely
	Oxytropis sericea	silky locoweed
	Oxytropis sp.	
	Pedicularis bracteosa	bracted lousewort

	Pedicularis racemosa	sickletop lousewort
	Penstemon fruticosus	shrubby penstemon
	Petasites frigidus	sweet coltsfoot
	Petasites frigidus var. palmatus	palmate-leaved coltsfoot
	Petasites sagittatus	arrow-leaved coltsfoot
	Phalaris arundinacea	reed canarygrass
	Phleum alpinum	alpine timothy
	Phleum pratense	common timothy
	Phyllodoce empetriformis	pink mountain-heather
	Plantago patagonica	wooly plantain
	Platanthera obtusata	one-leaved rein orchid
	Platanthera sp.	orchid
	Poa alpina	alpine bluegrass
	Poa glauca	glaucous bluegrass
	Poa palustris	fowl bluegrass
	Poa paucispicula	western bluegrass
	Poa pratensis	Kentucky bluegrass
	Poa pratensis ssp. pratensis	Kentucky bluegrass
	Poa secunda	Sandberg's bluegrass
	Poa secunda ssp. juncifolia	Nevada bluegrass
	Poa secunda ssp. secunda	Sandberg's bluegrass
	Poa wheeleri	Wheeler's bluegrass
	Poa. sp.	bluegrass
	Polemonium pulcherrimum	showy Jacob's-ladder
	Potentilla anserina	silverweed
	Potentilla diversifolia	diverse-leaved cinquefoil
	Potentilla gracilis	graceful cinquefoil
	Potentilla hippiana	wooly cinquefoil
	Potentilla pensylvanica	Pennsylvanian cinquefoil
	Potentilla sp.	
	Potentilla uniflora	one-flowered cinquefoil
	Pyrola asarifolia	pink wintergreen
	Pyrola chlorantha	green wintergreen
	Pyrola sp.	wintergreen
	Ranunculus sp.	buttercup
	Rubus arcticus	nagoonberry
	Rumex sp.	
	Salix reticulata ssp. nivalis	dwarf snow willow
	Salsola kali	Russian thistle
	Saxifraga bronchialis	spotted saxifrage
	Scirpus americanus	American bulrush
	Scirpus sp.	
	Sedum lanceolatum	lance-leaved stonecrop
	Sedum spathulifolium	broad-leaved stonecrop
	Selaginella densa	compact selaginella

	Selaginella sp.	
	Senecio pseudaureus	streambank butterweed
	Senecio sp.	
	Senecio streptanthifolius	Rocky Mountain butterweed
	Senecio triangularis	arrow-leaved groundsel
	Sibbaldia procumbens	sibbaldia
	Silene alba	white cockle
	Silene drummondii	Drummond's campion
	Silene noctiflora	night-flowering catchfly
	Silene parryi	Parry's campion
	Silene sp.	
	Sisymbrium sp.	
	Smilacina racemosa	false Solomon's-seal
	Smilacina stellata	star-flowered false Solomon's-seal
	Solidago canadensis	Canada goldenrod
	Solidago multiradiata	northern goldenrod
	Solidago sp.	
	Solidago spathulata	spike-like goldenrod
	Sparganium nutans	small burr-reed
	Sporobolus cryptandrus	sand dropseed
	Stellaria longipes	long-stalked starwort
	Stenanthium sp.	
	Stipa comata	needle-and-thread grass
	Stipa curtiseta	short-awned porcupinegrass
	Stipa hymenoides	Indian ricegrass
	Stipa nelsonii	Columbian needlegrass
	Stipa nelsonii var. dorei	Columbian needlegrass
	Stipa occidentalis	stiff needlegrass
	Stipa richardsonii	spreading needlegrass
	Streptopus amplexifolius	clasping twistedstalk
	Suaeda sp.	
	Taraxacum ceratophorum	horned dandelion
	Taraxacum officinale	common dandelion
	Thalictrum occidentale	western meadowrue
	Tragopogon dubius	yellow salsify
	Trifolium repens	white clover
	Trisetum sp.	
	Trisetum spicatum	spike trisetum
	Trollius laxus	globeflower
	Urtica dioica	stinging nettle
	Vaccinium caespitosum	dwarf blueberry
	Vaccinium myrtillus	low bilberry
	Vaccinium scoparium	grouseberry
	Veronica wormskjoldii	alpine speedwell
	Vicia americana	American vetch

	Vicia sp.	
	Viola adunca	early blue violet
	Viola canadensis	Canada violet
	Viola glabella	stream violet
	Viola orbiculata	rounded-leaved violet
	Viola sp.	violet
	Woodsia oregana	western cliff fern
	Xanthium sp.	cocklebur
	Zigadenus elegans	mountain death-camas
	Zigadenus venenosus	meadow death-camas
MOSSES & LIVER-WORTS		
	Abietinella abietina	wiry fern moss
	Aulacomnium palustre	glow moss
	Barbilophozia hatcheri	
	Barbilophozia sp.	
	Brachythecium albicans	lawn moss
	Brachythecium sp.	
	Bryum sp.	
	Calliergon sp.	
	Ceratodon purpureus	fire moss
	Dicranella palustris	
	Dicranum acutifolium	
	Dicranum fuscescens	curly heron's-bill moss
	Dicranum polysetum	wavy-leaved moss
	Dicranum scoparium	broom moss
	Dicranum sp.	
	Drepanocladus sp.	
	Drepanocladus uncinatus	sickle moss
	Grimmia sp.	
	Homalothecium aeneum	
	Homalothecium sp.	
	Hylocomium splendens	step moss
	Hypnum pallescens	
	Hypnum revolutum	
	Hypnum sp.	
	Hypnum vaucheri	
	Lophozia sp.	
	Mnium sp.	leafy moss
	Plagiochila sp.	
	Plagiomnium drummondii	Drummond's leafy moss
	Plagiomnium venustum	
	Pleurozium schreberi	red-stemmed feathermoss
	Pohlia nutans	
	Polytrichum alpinum	stiff-leaved haircap moss

	Polytrichum juniperinum	juniper haircap moss
	Polytrichum piliferum	awned haircap moss
	Polytrichum sp.	
	Polytrichum strictum	bog haircap moss
	Ptilidium ciliare	
	Ptilium crista-castrensis	knight's plume
	Rhytidiadelphus triquetrus	electrified cat's-tail
	Rhytidiopsis robusta	pipecleaner moss
	Rhytidium rugosum	crumpled-leaf moss
	Sphagnum sp.	
	Timmia austriaca	false-polytrichum
	Tomentypnum nitens	golden fuzzy fen moss
	Tortula ruralis	sidewalk moss
LICHENS		
	Acarospora schleicheri	
	Alectoria sarmentosa	common witch's hair
	Alectoria sp.	
	Aspicilia reptans	
	Bryoria fuscescens	speckled horsehair
	Bryoria sp.	
	Buellia elegans	
	Caloplaca sp.	caloplaca
	Catapyrenium sp.	stipplescale lichens
	Cetraria aculeata	spiny heath
	Cetraria ericetorum	icelandmoss
	Cetraria islandica	icelandmoss
	Cetraria sp.	icelandmoss lichens
	Cladina arbuscula	
	Cladina arbuscula ssp. mitis	
	Cladina rangiferina	grey reindeer lichen
	Cladina sp.	
	Cladona chlorophaea	peppered pixie-cup
	Cladonia cariosa	ribbed pixie
	Cladonia carneola	royal pixie-cup
	Cladonia coccifera	
	Cladonia coniocraea	
	Cladonia cornuta	greater pixie-stick
	Cladonia ecmocyna	orange-footed pixie
	Cladonia fimbriata	powdered pixie-cup
	Cladonia gracilis	
	Cladonia macilenta	
	Cladonia macrophyllodes	
	Cladonia multiformis	slotted pixie-cup
	Cladonia phyllophora	black-stemmed pixie

	Cladonia pyxidata	brown pixie cup
	Cladonia sp.	
	Cladonia squamosa	
	Cladonia sulphurina	sulphur cladonia
	Cladonia symphocarpia	
	Collema sp.	tarpaper lichens
	Diploschistes muscorum	cow pie
	Diploschistes sp.	
	Flavocetraria nivalis	ragged snow
	Fulgensia bracteata	
	Hypogymnia physodes	monk's hood
	Icmadophila sp.	
	Letharia vulpina	common wolf lichen
	Parmelia sulcata	waxpaper
	Peltigera aphthosa	freckle pelt
	Peltigera canina	dog pelt
	Peltigera lepidophora	butterfly pelt
	Peltigera malacea	apple pelt
	Peltigera membranacea	greater dog pelt
	Peltigera polydactylon	frog pelt
	Peltigera rufescens	felt pelt
	Peltigera sp.	pelt lichens
	Physconia muscigena	ground frost
	Psora cerebriformis	brain scale
	Psora sp.	scale lichens
	Stereocaulon paschale	cottontail coral
	Stereocaulon sp.	
	Stereocaulon tomentosum	wooly coral
	Toninia sedifolia	
	Toninia sp.	
	Usnea sp.	
	Xanthoparmelia coloradoensis	Colorado rockfrog
	Xanthoparmelia sp.	rockfrog lichens
	Xanthoparmelia wyomingica	variable rockfrog
	Xanthoria candelaria	shrubby orange

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Appendix 3 – Mensuration

Estimated Diameter Class Distribution Table

PLOT #	SPECIES	10-19.9 cm		20-29.9		30-39.9		40-49.9		50-59.9		60-69.9		70-79.9		80-89.9		90-99.9		100-109.9		110-119.9		120-129.9		130-139.9		140-149.9		150-159.9		TOTALS	
		L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D
9800902	F	2	2	1		5		1		2																							
	At			1																													
	Pl																																
	Sx																																
	TOTAL	2	2	2		5		1		2																						12	2
9800455	F	45		5				1																									
	Pl																																
	Sx																																
	TOTAL	45		5				1																								51	0
9800421	F	9		1	2	3		6																									
	Pl																																
	Sx																																
	TOTAL	9		1	2	3		6																								19	2
9800439	F	5	4	11	5	12		3																									
	Pl																																
	Sx																																
	TOTAL	5	4	11	5	12		3																								31	9
9800420	F	18		10		1																											
	Pl																																
	Sx																																
	TOTAL	18		10		1																										29	0
9800419	F	24		14		4																											
	Pl																																
	Sx																																
	TOTAL	24		14		4																										42	0
9800418	F	20		1		3		1																									
	Pl																																
	Sx																																
	TOTAL	20		1		3		1																								25	0
9800458	F	1	1	6		6		3																									
	Pl																																
	Sx																																
	TOTAL	1	1	6		6		3																								16	1
9800453	F	27		6		1																											
	Pl																																
	Sx																																
	TOTAL	27		6		1																										34	0
9800449	F	34		8		4																											
	Pl																																
	Sx																																
	TOTAL	34		8		4																										46	0
9800417	F	27	6	10		2				1																							
	Pl																																
	Sx																																
	TOTAL	27	6	10		2				1																						40	6
9800447	F	18		10	1	1																											
	Pl																																
	Sx																																
	TOTAL	18		10	1	1																										29	1

9800436	F	36	2	11																															
	PI																																		
	Sx																																		
	TOTAL	36	2	11																													47	2
9800442	F	4	1			1		6		3																									
	PI																																		
	Sx																																		
	TOTAL	4	1			1		6		3																								14	1
9800035	F	31		8																															
	PI																																		
	Sx																																		
	TOTAL	31		8																														39	0
9800448	F	8		9		3		2				1																							
	PI																																		
	Sx																																		
	TOTAL	8		9		3		2				1																						23	0
9800435	F	30	3	11		5																													
	PI																																		
	Sx																																		
	TOTAL	30	3	11		5																												46	2
9800440	F	1	1		1	1		7		1		2																							
	PI																																		
	Sx																																		
	TOTAL	1	1		1	1		7		1		2																						12	2
9800428	F	3		1		1		4																											
	PI																																		
	Sx																																		
	TOTAL	3		1		1		4																										9	0

Appendix 4 - Wildlife List

CHURN CREEK TEM STUDY - WILDLIFE SPECIES LIST

The following wildlife species, or signs of them, were observed in the course of the Churn Creek TEM Study:

BIRDS-CODE	COMMON NAME	SCIENTIFIC NAME
B-AMCO	American Coot	*Fulica americana*
B-AMCR	American Crow	*Corvus brachyrhynchos*
B-AMKE	American kestrel	*Falco sparverius*
B-AMRO	American Robin	*Turdus migratorius*
B-AMWI	American wigeon	*Anas americana*
B-BAGO	Barrow's Goldeneye	*Bucephala islandica*
B-BBMA	Black-billed Magpie	*Pica pica*
B-BHGR	Black-headed Gosbeak	*Pheucticus melanocephalus*
B-CHSP	Chipping Sparrow	*Spizella passerina*
B-CHUK	Chukar	*Alectoris chukar*
B-CLNU	Clark's Nutcracker	*Nucifraga columbiana*
B-COHA	Cooper's Hawk	*Accipiter cooperii*
B-CONI	Common Nighthawk	*Chordeiles minor*
B-CORA	Common Raven	*Corvus corax*
B-DEJU	Dark-eyed Junco	*Junco hyemalis*
B-EAKI	Eastern Kingbird	*Tyrannus tyrannus*
B-GCKI	Golden-crowned Kinglet	*Regulus satrapa*
B-GOEA	Golden Eagle	*Aquila chrysaetos*
B-GRJA	Gray Jay	*Perisoreus canadensis*
B-HETH	Hermit Thrush	*Catharus guttatus*
B-KILL	Killdeer	*Charadrius vociferus*
B-LESC	Lesser Scaup	*Aythya affinis*
B-LEYE	Lesser Yellowlegs	*Tringa flavipes*
B-MALL	Mallard	*Anas platyrhynchos*
B-MOBL	Mountain Bluebird	*Sialia currucoides*
B-MOCH	Mountain Chickadee	*Parus gambeli*
B-NOFL	Northern Flicker	*Coraptes auratus*
B-NOHA	Northern Harrier	*Circus cyaneus*
B-OSFL	Olive-sided Flycatcher	*Contopus borealis*
B-PISI	Pine Siskin	*Carduelis pinus*
B-PIWO	Pileated Woodpecker	*Drycopus pileatus*
B-RBNU	Red-breasted Nuthatch	*Sitta canadensis*
B-ROHA	Rough-legged Hawk	*Buteo lagopus*
B-RTHA	Red-tailed Hawk	*Buteo jamaicensis*
B-RUGR	Ruffed Grouse	*Bonasa umbellus*
B-RUHU	Rufous Hummingbird	*Selasphorus rufus*
B-RWBL	Red-winged Blackbird	*Agelaius phoeniceus*
B-SOSP	Song Sparrow	*Melospiza melodia*
B-SPGR	Spruce Grouse	*Dendragapus canadensis*
B-SPPI	Sprague's Pipit	*Anthus spragueii*
B-SWTH	Swainson's Thrush	*Catharus ustulatus*
B-UFLY	Unspecified Flycatcher	-
B-UGRU	Unspecified Grouse	-

BIRDS-CODE	COMMON NAME	SCIENTIFIC NAME
B-UHAW	Unspecified Hawk	-
B-UHUM	Unspecified Hummingbird	-
B-UWAX	Unspecified Waxwing	-
B-UWOO	Unspecified Woodpecker	-
B-VESP	Vesper Sparrow	*Pooecetes gramineus*
B-WEME	Western Meadowlark	*Sturnella neglecta*
B-WETA	Western Tananger	*Piranga ludoviciana*
B-YEWA	Yellow Warbler	*Dendroica petechia*

MAMMALS & REPTILES - CODE	SCIENTIFIC NAME	COMMON NAME
M-ALAL	*Alces alces*	*Moose*
M-BOTA	*Bos taurus*	*Domestic Cow*
M-CACA	*Castor canadensis*	*Beaver*
M-CALA	*Canis latrans*	*Coyote*
M-EQCA	*Equus caballus*	*Domestic Horse*
M-ERDO	*Erethizon dorsatum*	*Porcupine*
M-FECO	*Felis concolor*	*Cougar*
M-LEAM	*Lepus americanus*	*Snowshoe Hare*
M-MIMO	*Microtus montanus*	*Montane Vole*
M-ODHH	*Odocoileus hemionus hemionus*	*Interior Mule Deer*
M-ORAM	*Oreamnos americanus*	*Mountain Goat (Plot No. C270)*
M-OVCC	*Ovis canadensis calforniana*	*California Bighorn Sheep*
M-TAHU	*Tamiasciurus hudsonicus*	*Red Squirrel*
M-UBEA	-	*Unspecified Bear*
M-UCHP	-	*Unspecified Chipmunk*
M-UDEE	-	*Unspecified Deer*
M-URAM	*Ursus americanus*	*Black Bear*
M-UROD	-	*Unspecified Rodent*
M-UUNG	-	*Unspecified Ungulate*
M-UVOL	-	*Unspecified Vole*
M-VUVU	*Vulpes vulpes*	*Red Fox*
R-PIME	*Pituophis melanoleucus*	*Gopher Snake*
R-USNA	-	*Unspecified Snake*

Appendix 5a - B.C. Conservation Data Centre: Rare Elements Lists for Lillooet and Williams Lake Forest District

B.C. Conservation Data Centre: Rare Vertebrate Animal Tracking List
Lillooet Forest District
November 1, 1998

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	PROVINCIAL RANK	PROVINCIAL LIST
***** AMPHIBIANS**				
ASCAPHUS TRUEI COASTAL POP	TAILED FROG COASTAL POP	G4	S3S4	BLUE
***** BIRDS**				
AERONAUTES SAXATALIS	WHITE-THROATED SWIFT	G5	S3S4B	BLUE
ARDEA HERODIAS	GREAT BLUE HERON	G5	S3B,SZN	BLUE
ASIO FLAMMEUS	SHORT-EARED OWL	G5	S2N,S3B	BLUE
BOTAURUS LENTIGINOSUS	AMERICAN BITTERN	G4	S3B,SZN	BLUE
BUTEO LAGOPUS	ROUGH-LEGGED HAWK	G5	S2S3N	YELLOW
BUTEO SWAINSONI	SWAINSON'S HAWK	G5	S2B,SZN	RED
FALCO MEXICANUS	PRAIRIE FALCON	G5	S2B,SZN	RED
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4	S4	YELLOW
MELANERPES LEWIS	LEWIS' WOODPECKER	G5	S3B,SZN	BLUE
NUMENIUS AMERICANUS	LONG-BILLED CURLEW	G5	S3B,SZN	BLUE
OTUS FLAMMEOLUS	FLAMMULATED OWL	G4	S3S4B,SZN	BLUE
OTUS KENNICOTTII MACFARLANEI	WESTERN SCREECH-OWL, MACFARLANEI SUBSPECIES	G5T?	S2	RED
SPHYRAPICUS THYROIDEUS THYROIDEUS	WILLIAMSON'S SAPSUCKER, THYROIDEUS SUBSPECIES	G5TU	S3B,SZN	BLUE
SPIZELLA BREWERI BREWERI	BREWER'S SPARROW, BREWERI SUBSPECIES	G5T4	S2B	RED
STRIX OCCIDENTALIS	SPOTTED OWL	G3	S1	RED
***** FRESHWATER FISH**				
ACIPENSER TRANSMONTANUS POP 4	WHITE STURGEON (FRASER RIVER POPULATION)	G4T2Q	S2	RED
SALVELINUS CONFLUENTUS	BULL TROUT	G3	S3	BLUE
***** MAMMALS**				
ANTROZOUS PALLIDUS	PALLID BAT	G5	S1	RED
EUDERMA MACULATUM	SPOTTED BAT	G4	S3	BLUE
GULO GULO LUSCUS	WOLVERINE, LUSCUS SUBSPECIES	G4T4	S3	BLUE
MARTES PENNANTI	FISHER	G5	S3	BLUE
MYOTIS CILIOLABRUM	WESTERN SMALL-FOOTED MYOTIS	G5	S2S3	BLUE
MYOTIS THYSANODES	FRINGED MYOTIS	G5	S2S3	BLUE
OVIS CANADENSIS CALIFORNIANA	CALIFORNIA BIGHORN SHEEP	G4G5T4	S3	BLUE
OVIS CANADENSIS CANADENSIS	ROCKY MOUNTAIN BIGHORN SHEEP	G4G5T4T5	S3	BLUE
TAXIDEA TAXUS	BADGER	G5	S2	RED
URSUS ARCTOS	GRIZZLY BEAR	G4	S3	BLUE
***** REPTILES**				
CHARINA BOTTAE	RUBBER BOA	G5	S3S4	BLUE
COLUBER CONSTRICTOR	RACER	G5	S3S4	BLUE
CROTALUS VIRIDIS	WESTERN RATTLESNAKE	G5	S3	BLUE
PITUOPHIS CATENIFER DESERTICOLA	GOPHER SNAKE, DESERTICOLA SUBSPECIES	G5T5	S3	BLUE

32 TAXA LISTED

B.C. Conservation Data Centre: Rare Vertebrate Animal Tracking List
Williams Lake Forest District
November 1, 1998

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	PROVINCIAL RANK	PROVINCIAL LIST
***** AMPHIBIANS**				
SPEA INTERMONTANA	GREAT BASIN SPADEFOOT	G5	S3	BLUE
***** BIRDS**				
AECHMOPHORUS OCCIDENTALIS	WESTERN GREBE	G5	S1B,S3N	RED
AERONAUTES SAXATALIS	WHITE-THROATED SWIFT	G5	S3S4B	BLUE
ARDEA HERODIAS	GREAT BLUE HERON	G5	S3B,SZN	BLUE
ASIO FLAMMEUS	SHORT-EARED OWL	G5	S2N,S3B	BLUE
BARTRAMIA LONGICAUDA	UPLAND SANDPIPER	G5	S1S3B,SZN	RED
BOTAURUS LENTIGINOSUS	AMERICAN BITTERN	G4	S3B,SZN	BLUE
BUTEO SWAINSONI	SWAINSON'S HAWK	G5	S2B,SZN	RED
DOLICHONYX ORYZIVORUS	BOBOLINK	G5	S3B,SZN	BLUE
FALCO MEXICANUS	PRAIRIE FALCON	G5	S2B,SZN	RED
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G4T3	S2B,SZN	RED
GRUS CANADENSIS	SANDHILL CRANE	G5	S3B,SZN	BLUE
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4	S4	YELLOW
MELANERPES LEWIS	LEWIS' WOODPECKER	G5	S3B,SZN	BLUE
NUMENIUS AMERICANUS	LONG-BILLED CURLEW	G5	S3B,SZN	BLUE
OTUS FLAMMEOLUS	FLAMMULATED OWL	G4	S3S4B,SZN	BLUE
SPIZELLA BREWERI BREWERI	BREWER'S SPARROW, BREWERI SUBSPECIES	G5T4	S2B	RED
TYMPANUCHUS PHASIANELLUS COLUMBIANUS	SHARP-TAILED GROUSE, COLUMBIANUS SUBSPECIES	G4T3	S3	BLUE
***** FRESHWATER FISH**				
ACIPENSER TRANSMONTANUS POP 4	WHITE STURGEON (FRASER RIVER POPULATION)	G4T2Q	S2	RED
PROSOPIUM SP 2	GIANT PYGMY WHITEFISH	G1	S1	RED
SALVELINUS CONFLUENTUS	BULL TROUT	G3	S3	BLUE
***** MAMMALS**				
ANTROZOUS PALLIDUS	PALLID BAT	G5	S1	RED
CORYNORHINUS TOWNSENDII	TOWNSEND'S BIG-EARED BAT	G4	S2S3	BLUE
EUDERMA MACULATUM	SPOTTED BAT	G4	S3	BLUE
GULO GULO LUSCUS	WOLVERINE, LUSCUS SUBSPECIES	G4T4	S3	BLUE
MARTES PENNANTI	FISHER	G5	S3	BLUE
MYOTIS CILIOLABRUM	WESTERN SMALL-FOOTED MYOTIS	G5	S2S3	BLUE
MYOTIS THYSANODES	FRINGED MYOTIS	G5	S2S3	BLUE
OCHOTONA PRINCEPS SEPTENTRIONALIS	COMMON PIKA, SEPTENTRIONALIS SUBSPECIES	g5t2	S2	RED
OVIS CANADENSIS CALIFORNIANA	CALIFORNIA BIGHORN SHEEP	G4G5T4	S3	BLUE
TAXIDEA TAXUS	BADGER	G5	S2	RED
URSUS ARCTOS	GRIZZLY BEAR	G4	S3	BLUE
***** REPTILES**				
CHARINA BOTTAE	RUBBER BOA	G5	S3S4	BLUE

32 TAXA LISTED

B.C. Conservation Data Centre: Rare Plant Community Tracking List
Lillooet Forest District
March 16, 1998

The plant community tracking list is incomplete, especially with respect to wetland, alpine and grassland plant communities. Some of the plant communities tracked by the CDC are common in secondary successional stages (*e.g. Pseudotsuga menziesii - Gaultheria shallon*) or in degraded conditions (*e.g. Elymus spicata - Koeleria macrantha*), but undisturbed (*e.g.* climax) occurrences of these plant community types are rare. The ranks reflect the rarity of plant community occurrences that are relatively undisturbed by humans or domestic animals. Please contact the CDC Ecologist for information on rating the condition of individual plant community occurrences.

SCIENTIFIC NAME	COMMON NAME	POTENTIAL* HABITATS	PROV RANK	PROV LIST
ABIES LASIOCARPA - PINUS ALBICAULIS - JUNIPERUS	SUBALPINE FIR/WHITEBARK PINE - JUNIPER	ESSFdv/03	S3?	BLUE
ARTEMISIA TRIDENTATA - ELYMUS SPICATUS	BIG SAGE - BLUEBUNCH WHEATGRASS	BGxh1/01 PPxh2/05 BGxh2/01 BGxw1/04	S2	RED
ARTEMISIA TRIDENTATA - ELYMUS SPICATUS - BALSAMORHIZA SAGITTATA	BIG SAGE - BLUEBUNCH WHEATGRASS - BALSAMROOT	IDFxh1a/92 PPxh1/03 IDFxh1a/94 IDFdm1/00	S2	RED
ARTEMISIA TRIDENTATA - STIPA COMATA	BIG SAGE - NEEDLE-AND-THREAD GRASS	BGxh1/01MS BGxh2/05	S3	BLUE
ARTEMISIA TRIDENTATA SSP VASEYANA - CALAMAGROSTIS RUBESCENS	VASEY'S BIG SAGE – PINEGRASS	MSxk/04 ESSFxc/04	S1S2	RED
CAREX LANUGINOSA - JUNCUS ARCTICUS	WOOLY SEDGE - ARCTIC RUSH	BGxh2/08	S2	RED
ELYMUS SPICATUS - BALSAMHORIZA SAGITTATA	BLUEBUNCH WHEATGRASS - BALSAMROOT	IDFxh1a/93 PPxh1/00K	S2S3	BLUE
ELYMUS SPICATUS - KOELERIA	BLUEBUNCH WHEATGRASS – JUNEGRASS	BGxh1/00 BGxw1/01 IDFdk1a/92 IDFxh2a/00 MSxk/03 IDFxh2a/92 IDFdm1/02	S2	RED
ELYMUS SPICATUS - PULSATILLA OCCIDENTALIS	BLUEBUNCH WHEATGRASS - PASQUEFLOWER	ESSFxc/03	S1	RED
FESTUCA CAMPESTRIS - ELYMUS SPICATUS	ROUGH FESCUE - BLUEBUNCH WHEATGRASS	BGxh2/06 BGxw1/06 PPdh2/00	S2	RED
FESTUCA IDAHOENSIS - ELYMUS SPICATUS	FESCUE - BLUEBUNCH WHEATGRASS	IDFxh1a/91	S2	RED
JUNIPERUS COMMUNIS - ELYMUS SPICATUS	JUNIPER - BUNCHGRASS	ESSFdc2/02 MSdm2/02	S3	BLUE
PICEA ENGELMANII X GLAUCA - EQUISETUM - MNIUM	HYBRID WHITE SPRUCE - HORSETAIL - LEAFY MOSS	MSdm2/07 MSxk/09	S3	BLUE
PICEA ENGELMANII X GLAUCA - PAXISTIMA - PLEUROZIUM	HYBRID WHITE SPRUCE - FALSEBOX - FEATHERMOSS	MSdm1/01 MSdm2/01	S3?	BLUE
PICEA ENGELMANII X GLAUCA - RIBES LACUSTRE - VACCINIUM SCOPARIUM	HYBRID WHITE SPRUCE - GOOSEBERRY - GROUSEBERRY	MSdm2/05 MSxk/08	S3	BLUE
PICEA GLAUCA - CYPRIPEDIUM	SPRUCE - ORCHID	IDFxh2/00?	S1	RED

PINUS ALBICAULIS - KOELARIA MACRANTHA	WHITEBARK PINE - JUNEGRASS	ESSFdv/02	S2S3	BLUE
PINUS PONDEROSA - ARISTIDA LONGISETA	PONDEROSA PINE - RED THREE-AWN	BGxh2/03 PPxh1/02 BGxh1/04	S3	BLUE
PINUS PONDEROSA - ELYMUS SPICATUS	PONDEROSA PINE - BLUEBUNCH WHEATGRASS	BGxh2/04 BGxw1/03 PPxh2/03 PPxh2/04	S2S3	BLUE
PINUS PONDEROSA - ELYMUS SPICATUS - FESTUCA CAMPESTRIS	PONDEROSA PINE - BLUEBUNCH WHEATGRASS -ROUGH FESCUE	BGxw1/05 PPxh2/01 PPxh1/05	S2S3	BLUE
POPULUS BALSAMIFERA SSP TRICHOCARPA - BETULA OCCIDENTALIS	BLACK COTTONWOOD - WATER BIRCH PPxh2/07	BGxh1/07	S1	RED
POPULUS BALSAMIFERA SSP. TRICHOCARPA - SYMPHORICARPOS ALBUS - CORNUS SERICEA	COTTONWOOD - SNOWBERRY - DOGWOOD	BGxh2/07	S1S2	RED
POPULUS TREMULOIDES – SYMPHORICARPOS ALBUS - POA PRATENSIS	TREMBLING ASPEN - SNOWBERRY - KENTUCKY BLUEGRASS	BGxw1/08 IDFxh1a/98 IDFxh2a/95 IDFdk1a/94	S2	RED
PSEUDOTSUGA MENZIESII - BETULA PAPYRIFERA - ACER GLABRUM	HYBRID WHITE SPRUCE/DOUGLAS-FIR - DOUGLAS MAPLE - DOGWOOD	IDFxh1/08	S3	BLUE
PSEUDOTSUGA MENZIESII - PINUS PONDEROSA - CEANOTHUS VELUTINUS	DOUGLAS-FIR - PONDEROSA PINE - SNOWBRUSH - PINEGRASS	IDFxh1/04	S3?	BLUE
PSEUDOTSUGA MENZIESII - PINUS PONDEROSA - ELYMUS SPICATUS	DOUGLAS-FIR - PONDEROSA PINE - BLUE BUNCH WHEATGRASS - BALSAMROOT	IDFxh1/02 IDFxh2/03 IDFxh1/03 IDFdm1/03 IDFdk2/02 IDFuu/00 IDFxh2/04 IDFxh2/02	S3	BLUE
PSEUDOTSUGA MENZIESII - PINUS PONDEROSA - FESTUCA IDAHOENSIS	DOUGLAS-FIR - PONDEROSA PINE - PINEGRASS - IDAHO FESCUE	IDFxh1/05	S3?	BLUE
PSEUDOTSUGA/THUJA PLICATA - ACER CIRCINATUM	WESTERN REDCEDAR/DOUGLAS-FIR - VINE MAPLE	IDFww/05	S3?	BLUE
ROSA WOODSII - FESTUCA IDAHOENSIS	PRAIRIE ROSE - IDAHO FESCUE	IDFxh1a/97	S2S3	BLUE
STIPA RICHARDSONII	SPREADING NEEDLEGRASS	IDFdk1a/93	S2	RED

30 COMMUNITIES LISTED

*BGC site series as defined by Ministry of Forests "Field Guide to Site Identification and Interpretation" for this Forest Region.

B.C. Conservation Data Centre: Rare Plant Community Tracking List
Williams Lake Forest District
March 16, 1998

The plant community tracking list is incomplete, especially with respect to wetland, alpine and grassland plant communities. Some of the plant communities tracked by the CDC are common in secondary successional stages (*e.g. Pseudotsuga menziesii - Gaultheria shallon*) or in degraded conditions (*e.g. Elymus spicata - Koeleria macrantha*), but undisturbed (*e.g.* climax) occurrences of these plant community types are rare. The ranks reflect the rarity of plant community occurrences that are relatively undisturbed by humans or domestic animals. Please contact the CDC Ecologist for information on rating the condition of individual plant community occurrences.

SCIENTIFIC NAME	COMMON NAME	POTENTIAL* HABITATS	PROV RANK	PROV LIST
ALNUS - ATHYRIUM	ALDER - LADY FERN	ESSFwk1/00	S2?	RED
ARTEMISIA TRIDENTATA - ELYMUS SPICATUS	BIG SAGE - BLUEBUNCH WHEATGRASS	BGxh3/01 BGxw2/00	S2	RED
BETULA GLANDULOSA - RIBES OXYACANTHOIDES	SCRUB BIRCH - NORTHERN GOOSEBERRY	BGxh3/00 BGxw2/00	S2	RED
CAREX ATHERODES FEN - MARSH	AWNED SEDGE FEN - MARSH	IDFdk3/W8	S3	BLUE
CAREX LASIOCARPA - DREPANOCLADUS ADUNCUS	SLENDER SEDGE - MOSS	IDFdk3/W10	S3	BLUE
DISTICHLIS STRICTA - PUCCINELLIA NUTTALLIANA	SALTGRASS - ALKALIGRASS	SBPSxc/W1 IDFdk3/W1	S3	BLUE
ELYMUS SPICATUS - BALSAMHORIZA SAGITTATA	BLUEBUNCH WHEATGRASS - BALSAMROOT	IDFxm/00	S2S3	BLUE
ELYMUS SPICATUS - KOELERIA	BLUEBUNCH WHEATGRASS – JUNEGRASS	IDFdk3/00 BGxh3/00 BGxw2/01 IDFxm/00	S2	RED
GLYCERIA BOREALIS FEN	NORTHERN MANNAGRASS FEN	SBPSxc/W10	S3	BLUE
JUNCUS BALTICUS - POTENTILLA ANSERINA	BALTIC RUSH - SILVERWEED	BGxw2/00 IDFxm/00	S2	RED
LEDUM GROENLANDICUM - SPHAGNUM SPP.	LABRADOR TEA - SPHAGNUM	SBPSxc/W9	S2S3	BLUE
MENYANTHES TRIFOLIATA - CAREX LASIOCARPA	BUCKBEAN - SLENDER SEDGE	IDFdk3/W11	S3	BLUE
PICEA ENGELMANII X GLAUCA – CALAMA-GROSTIS RUBESCENS - HYLOCOMIUM	HYBRID WHITE SPRUCE/DOUGLAS-FIR - STEPMOSS	SBPSmk/05	S3	BLUE
PICEA ENGELMANII X GLAUCA - EQUISETUM - MNIUM	HYBRID WHITE SPRUCE - HORSETAIL - LEAFY MOSS	MSxk/09	S3	BLUE
PICEA ENGELMANII X GLAUCA – MATTEUCCIA	HYBRID WHITE SPRUCE - OSTRICH FERN	SBSmh/08	S2	RED
PICEA ENGELMANII X GLAUCA - OPLOPANAX - HYLOCOMIUM	HYBRID WHITE SPRUCE - DEVIL'S CLUB - STEP MOSS	SBSmc1/07	S3	BLUE
PICEA ENGELMANII X GLAUCA - PLEUROZIUM - BRACHYTHECIUM	HYBRID WHITE SPRUCE - FEATHERMOSS - BRACHYTHECIUM	IDFdk4/09	S3	BLUE
PICEA ENGELMANII X GLAUCA - RIBES LACUSTRE - VACCINIUM SCOPARIUM	HYBRID WHITE SPRUCE - GOOSEBERRY - GROUSEBERRY	MSxk/08	S3	BLUE
PICEA ENGELMANII X GLAUCA - ROSA ACICULARIS - ARALIA NUDICAULIS	HYBRID WHITE SPRUCE - PRICKLY ROSE - SARSAPARILLA	IDFdk3/08	S3	BLUE
PICEA ENGELMANII X GLAUCA - ROSA	HYBRID WHITE SPRUCE - PRICKLY	IDFdk3/07	S3	BLUE

ACICULARIS - CAREX (RXC)	ROSE –SEDGE			
PICEA ENGELMANII X GLAUCA - ROSA ACICULARIS - PETASITES	HYBRID WHITE SPRUCE - PRICKLY ROSE - COLTSFOOT	IDFxw/07 IDFxm/08	S2	RED
PICEA ENGELMANII X GLAUCA - STEREOCAULON SPP.	HYBRID WHITE SPRUCE - CORAL LICHENS	SBSdw2/00	S2	RED
PINUS CONTORTA - FESTUCA ALTAICA - STEREOCAULON	LODGEPOLE PINE - FE SCUE - STEREOCAULON	MSxv/02	S3	BLUE
PINUS CONTORTA - LEDUM GLANDULOSUM - EMPETRUM	LODGEPOLE PINE - TRAPPER'S TEA - CROWBERRY	MSxv/05	S2	RED
POPULUS TREMULOIDES - STIPA TREMBLING RICHARDSONII - GEUM TRIFLORUM	ASPEN - SPREADING NEEDLEGRASS - OLD MAN'S WHISKERS	BGxw2/00 IDFxm/00	S2	RED
PSEUDOTSUGA MENZIESII - ACER - GLABRUM HYLOCOMIUM	DOUGLAS-FIR - DOUGLAS MAPLE - STEP MOSS	SBSmh/04	S3	BLUE
PSEUDOTSUGA MENZIESII - ELYMUS SPICATUS - CALAMAGROSTIS RUBESCENS	DOUGLAS-FIR - BLUEBUNCH WHEATGRASS -PINEGRASS	IDFdk4/05	S3	BLUE
PSEUDOTSUGA MENZIESII - ELYMUS SPICATUS - STIPA OCCIDENTALIS	DOUGLAS-FIR - BLUEBUNCH WHEATGRASS -NEEDLEGRASS	IDFdk3/04	S3	BLUE
PSEUDOTSUGA MENZIESII - JUNIPERUS COMMUNIS - ARCTOSTAPHYLOS	DOUGLAS-FIR - COMMON JUNIPER - KINNIKINNICK	IDFdk3/02	S3	BLUE
PSEUDOTSUGA MENZIESII - JUNIPERUS COMMUNIS - CLADONIA	DOUGLAS-FIR - COMMON JUNIPER - CLADONIA	IDFxm/03	S2	RED
PSEUDOTSUGA MENZIESII - JUNIPERUS COMMUNIS	DOUGLAS-FIR - COMMON JUNIPER - - PENSTEMON PELTIGERA	IDFxm/02 IDFdk3/03 IDFdk4/02	S2S3	BLUE
PSEUDOTSUGA MENZIESII - JUNIPERUS SCOPULORUM - ARTEMISIA FRIGIDA	DOUGLAS-FIR - ROCKY MOUNTAIN JUNIPER - PASTURE SAGE	IDFxm/04 IDFdk4/04 IDFdk4/03	S3	BLUE
PSEUDOTSUGA MENZIESII - PICEA ENGEL-MANII X GLAUCA - RUBUS PARVIFLORUS	HYBRID WHITE SPRUCE/DOUGLAS-FIR - THIMBLEBERRY	SBSdw1/06 SBSmh/01 SBSmh/06 SBSmh/05	S3?	BLUE
PSEUDOTSUGA MENZIESII - PLEUROZIUM - HYLOCOMIUM	DOUGLAS-FIR - FEATHERMOSS - STEPMOSS	IDFdk4/07 IDFdk3/05 IDFxm/05 IDFxm/06	S3	BLUE
PSEUDOTSUGA MENZIESII - ROSA WOODSII - ARALIA NUDICAULIS	DOUGLAS-FIR - PRICKLY ROSE - SARSAPARILLA	IDFxm/07	S2S3	BLUE
SALIX SSP. - CAREX SARTWELLI	TALL WILLOW - SARTWELL'S SEDGE	IDFdk3/W6	S3	BLUE
SCIRPUS LACUSTRIS MARSH	BULRUSH MARSH	SBPSxc/W15 SBPSdc/W15 SBPSmc/W15 IDFdk3/W14	S3	BLUE
SELAGINELLA DENSA - ELYMUS SPICATUS - CLADONIA	SELAGINELLA - BLUEBUNCH WHEATGRASS -CLADONIA	IDFdk4/00	S3	BLUE
SPOROBOLUS CRYPTANDRUS - STIPA COMATA	SAND DROPSEED - NEEDLE-AND-THREAD GRASS	BGxh3/00 BGxw2/00 IDFxm/00 IDFxw/00	S2	RED
STIPA CURTISETA - ARTEMISIA CAMPESTRIS	SHORT-AWNED PORCUPINE GRASS - PACIFIC SAGEBRUSH	IDFxm/00	S2	RED
STIPA RICHARDSONII	SPREADING NEEDLEGRASS	BGxw2/00	S2	RED

		IDFdk4/00 IDFxm/00		
TRIGLOCHIN MARITIMUM MARSH	ARROWGRASS MARSH	IDFdk3/W12	S2S3	BLUE

42 COMMUNITIES LISTED

*BGC site series as defined by Ministry of Forests "Field Guide to Site Identification and Interpretation" for this Forest Region.

B.C. Conservation Data Centre: Rare Vascular Plant Tracking List
Lillooet Forest District
November 6, 1998

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	PROVINCIAL RANK	PROVINCIAL LIST
ALLIUM GEYERI VAR GEYERI	GEYER'S ONION	G4G5T4	S2	RED
ALLIUM GEYERI VAR TENERUM	GEYER'S ONION	G4G5T?	S2	RED
ANAGALLIS MINIMA	CHAFFWEED	G5	S2S3	BLUE
APOCYNUM MEDIUM	WESTERN DOGBANE	G5?	S2S3	BLUE
ASTRAGALUS LENTIGINOSUS	FRECKLED MILK-VETCH	G5	S2	RED
BOUTELOUA GRACILIS	BLUE GRAMA	G5	S1	RED
CAREX HYSTERICINA	PORCUPINE SEDGE	G5	S1?	BLUE
CAREX MARITIMA	CURVED-SPIKED SEDGE	G4G5	S2S3	BLUE
CAREX VALLICOLA	VALLEY SEDGE	G5	S1	RED
CASTILLEJA RUPICOLA	CLIFF PAINTBRUSH	G2G3	S1?	BLUE
CHENOPODIUM DESICCATUM	NARROW-LEAVED GOOSEFOOT	G5	S2	RED
CREPIS ATRIBARBA SSP ATRIBARBA	SLENDER HAWKSBEARD	G5T5	S1	RED
CREPIS MODOCENSIS SSP MODOCENSIS	LOW HAWKSBEARD	G4G5T4	S1	RED
CREPIS MODOCENSIS SSP ROSTRATA	LOW HAWKSBEARD	G4G5T?	S1	RED
CREPIS OCCIDENTALIS SSP PUMILA	WESTERN HAWKSBEARD	G5T5	S1	RED
DRABA GLABELLA VAR GLABELLA	SMOOTH DRABA	G4G5T4	S2S3	BLUE
EUPHORBIA SERPYLLIFOLIA	THYME-LEAVED SPURGE	G5	S2S3	BLUE
GLYCYRRHIZA LEPIDOTA VAR LEPIDOTA	WILD LICORICE	G5T?	S1	RED
HACKELIA DIFFUSA	SPREADING STICKSEED	G4	S1?	BLUE
HUTCHINSIA PROCUMBENS	HUTCHINSIA	G5	S1	RED
HYDROPHYLLUM FENDLERI VAR ALBIFRONS	FENDLER'S WATERLEAF	G4G5T?	S2S3	BLUE
IPOMOPSIS MINUTIFLORA	SMALL-FLOWERED IPOMOPSIS	G2G3	S2	RED
JUNCUS ALBESCENS	WHITISH RUSH	G5	S2S3	BLUE
LOTUS NEVADENSIS VAR DOUGLASII	NEVADA BIRDS-FOOT TREFOIL	G5T?	S1	RED
MECONELLA OREGANA	WHITE MECONELLA	G2	S2	RED
MELICA BULBOSA	ONIONGRASS	G5	S1?	BLUE

MELICA SPECTABILIS	PURPLE ONIONGRASS	G5	S2S3
BLUE			
MUHLENBERGIA RACEMOSA	SATIN GRASS	G5	S1
RED			
MYOSURUS APETALUS VAR BOREALIS	MOUSETAIL	G5T?	S1
RED			
NEMOPHILA BREVIFLORA	GREAT BASIN NEMOPHILA	G5	S2S3
BLUE			
NICOTIANA ATTENUATA	COYOTE TOBACCO	G4	S1
RED			
PECTOCARYA PENICILLATA	WINGED COMBSEED	G5	S1
RED			
PHLOX HOODII	HOOD'S PHLOX	G5	S1?
BLUE			
POA ABBREVIATA SSP PATTERSONII	ABBREVIATED BLUEGRASS	G5T5	S1?
BLUE			
POLEMONIUM CAERULEUM SSP	TALL JACOB'S-LADDER	G?T?	S1?
BLUE			
AMYGDALINUM			
POLEMONIUM ELEGANS	ELEGANT JACOB'S-LADDER	G4	S2S3
BLUE			
POLYGONUM POLYGALOIDES SSP	KELLOGG'S KNOTWEED	G4G5T?	S1?
BLUE			
KELLOGGII			
POLYSTICHUM KRUCKEBERGII	KRUCKEBERG'S SWORD FERN	G4	S2S3
BLUE			
POTENTILLA DIVERSIFOLIA VAR	DIVERSE-LEAVED CINQUEFOIL	G5T4	S2S3
BLUE			
PERDISSECTA			
POTENTILLA NIVEA VAR	FIVE-LEAVED CINQUEFOIL	G5T4	S2S3
BLUE			
PENTAPHYLLA			
POTENTILLA PARADOXA	BUSHY CINQUEFOIL	G5	S1
RED			
RANUNCULUS PEDATIFIDUS	BIRDFOOT BUTTERCUP	G5	S2S3
BLUE			
SALIX BOOTHII	BOOTH'S WILLOW	G5	S2S3
BLUE			

43 TAXA LISTED

B.C. Conservation Data Centre: Rare Vascular Plant Tracking List
Williams Lake Forest District
November 6, 1998

SCIENTIFIC NAME	COMMON NAME PROVINCIAL	GLOBAL RANK	PROVINCIAL RANK	LIST
ALLIUM GEYERI VAR GEYERI	GEYER'S ONION	G4G5T4	S2	RED
APOCYNUM SIBIRICUM VAR SALIGNUM	CLASPING-LEAVED DOGBANE	G5?T?	S1?	BLUE
ARABIS HOLBOELLII VAR PINETORUM	HOLBOELL'S ROCKCRESS	G5T?	S1?	BLUE
ARNICA CHAMISSONIS SSP INCANA	MEADOW ARNICA	G5T?	S1?	BLUE
ATRIPLEX ARGENTEA SSP ARGENTEA	SILVERY ORACHE	G5T5	S1	RED
CAREX HYSTERICINA	PORCUPINE SEDGE	G5	S1?	BLUE
CAREX SAXIMONTANA	ROCKY MOUNTAIN SEDGE	G5	S2S3	BLUE
CAREX SIMULATA	SHORT-BEAKED SEDGE	G5	S2S3	BLUE
CAREX XERANTICA	DRY-LAND SEDGE	G5	S2S3	BLUE
CASTILLEJA TENUIS	HAIRY OWL-CLOVER	G5	S1	RED
CHAMAERHODOS ERECTA SSP NUTTALLII	AMERICAN CHAMAERHODOS	G5T5	S2S3	BLUE
CHENOPODIUM DESICCATUM	NARROW-LEAVED GOOSEFOOT	G5	S2	RED
CREPIS ATRIBARBA SSP ATRIBARBA	SLENDER HAWKSBEARD	G5T5	S1	RED
DRABA REPTANS	CAROLINA DRABA	G5	S1	RED
EPILOBIUM CILIATUM SSP WATSONII	PURPLE-LEAVED WILLOWHERB	G5T?	S2S3	BLUE
EPILOBIUM LEPTOCARPUM	SMALL-FLOWERED WILLOWHERB	G5	S2S3	BLUE
EUPHORBIA SERPYLLIFOLIA	THYME-LEAVED SPURGE	G5	S2S3	BLUE
GLYCERIA PULCHELLA	SLENDER MANNAGRASS	G5	S2S3	BLUE
JUNCUS REGELII	REGEL'S RUSH	G5	S2S3	BLUE
PELLAEA ATROPURPUREA	PURPLE CLIFF-BRAKE	G5	S1?	BLUE
POTENTILLA NIVEA VAR PENTAPHYLLA	FIVE-LEAVED CINQUEFOIL	G5T4	S2S3	BLUE
PYROLA ELLIPTICA	WHITE WINTERGREEN	G5	S1?	BLUE
RANUNCULUS PEDATIFIDUS	BIRDFOOT BUTTERCUP	G5	S2S3	BLUE
SALIX BOOTHII	BOOTH'S WILLOW	G5	S2S3	BLUE

SALIX SERISSIMA	AUTUMN WILLOW	G4	S2S3
BLUE			
SCOLOCHLOA FESTUCACEA	SPRANGLE-TOP	G5	S2S3
BLUE			
SILENE DRUMMONDII VAR	DRUMMOND'S CAMPION	G5T5	S1?
BLUE			
DRUMMONDII			
STIPA SPARTEA	PORCUPINE-GRASS	G5	S1
RED			

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Appendix 5b - B.C. Conservation Data Centre: Rare Elements Occurrences in the Churn Creek Study Area

Appendix 5c - Rare Vertebrates Previously Observed in Churn Creek Study Area as Detailed by B.C. Conservation Data Centre

The following rare vertebrates have previously been observed in the Churn Creek Study Area, as detailed in the B.C. Conservation Data Centre Rare Element Occurences Report, which is also found in Appendix 5b.

Common Name	Scientific Name	Prov. List	Location	Sub-zone	UTM NAD 83 East/North
Townsend's big-eared bat	*Plecotus townsendii*	Blue	outlet from Brown L.; 0.7 km S. of lake on Empire Valley Ranch	BGxw2	10 550004 5696206
Townsend's big-eared bat	*Plecotus townsendii*	Blue	contact MELP Regional Endangered Species Specialist	BGxw2	DATA PROTECTED
Spotted bat	*Euderma maculatum*	Blue	North side of Churn Cr.;19 km from Fraser R.; second bench above Churn Cr.	IDFxm	10 534902 5700306
Spotted bat	*Euderma maculatum*	Blue	Fraser R., 6 km S. of Canoe Cr.	BGxh3	10 553902 5694406
Spotted bat	*Euderma maculatum*	Blue	Confluence of Higginbottom Cr. with Lone cabin Cr.	BGxw2	10 548003 5686105
Lewis' woodpecker	*Melanerpes lewisii*	Blue	Grinder Cr./ Fraser R.,MacGee Flats	BGxh3	10 551503 5688505
Western small-footed myotis	*Myotis ciliolabrum*	Blue	Empire Valley, outlet from Brown L.; 0.7 km S. of lake on Empire Valley Ranch site	BGxw2	10 550103 5693105
Western small-footed myotis	*Myotis ciliolabrum*	Blue	N. side of Churn Cr.; 19 km from Fraser R.; second bench above creek	IDFxm	10 534902 5700306
Western small-footed myotis	*Myotis ciliolabrum*	Blue	6km N. of Canoe Cr. Ranch headquarters along Dog Cr. road	BGxh3	10 553103 5702205

Common Name	Scientific Name	Prov. List	Location	Sub-zone	UTM NAD 83 East/North
Western small-footed myotis	*Myotis ciliolabrum*	Blue	contact MELP Regional Endangered Species Specialist	BGxw2	DATA PROTECTED
Western small-footed myotis	*Myotis ciliolabrum*	Blue	Pond near confluence of Higginbottom and Lone Cabin Creeks	BGxw2	10 548003 5686105
Fringed myotis	*Myotis thysanodes*	Blue	contact MELP Regional Endangered Species Specialist	BGxw2	DATA PROTECTED
Fringed myotis	*Myotis thysanodes*	Blue	4km S. of Empire Valley Ranch buildings	IDFxm	10 550402 5689605
Fringed myotis	*Myotis thysanodes*	Blue	Pond near confluence of Higginbottom and Lone Cabin Creeks	BGxw2	10 548003 5686105
Flammulated owl	*Otus flammeolus*	Blue	In forested slope above Empire Valley; take track S. of Empire Valley Ranch Buildings for 3km; hike up hill to forest edge	IDFxm	10 549402 5690706

Appendix 5d - Rare Vertebrate Observations in Churn Creek TEM Study

The following rare vertebrate observations were made during the course of the Churn Creek TEM Study

SPECIES	PLOT NO.	TYPE OF OBSERVATION		SUBZONE/ SITE SERIES	ECO-UNIT	MAP NO./ GENERAL LOCATION
		Sighting - quantity	Sign - type			
Swainson's Hawk - *Buteo swainsonii* (RED-LISTED)	C63	2 indiv.		IDFxm	-	92O.049 N. of Koster Cr.
Bald Eagle - *Haliaeetus leucocephalus* (YELLOW-LISTED)	C138		RE (1 nest)	BGxh	CL	92O.039 cliff in gully next to Fraser R.
	C390	1 indiv.		BGxh3	-	92O.029
	C392	1 indiv.		BGxh3	-	92O.039
	C647	1 indiv.		BGxh3	-	92O.049 gravel bar on Fraser R.
California bighorn sheep *Ovis canadensis californiana* (BLUE-LISTED)	C36		TP	BGxh3	ES	92O.039 E. of Empire Ranch- sheep trails criss-cross this site
	C51	2 ewes & 1 lamb		BGxh3	-	92O.039
	C91		TP	BGxh3	ES	92O.049 Fraser R. across from Kenworthy Cr.
	C133	30 indiv.		BGxh3	-	92O.039
	C346	5 adults		BGxh3	-	92O.039
	C391	13 indiv.		BGxh3	-	92O.039

SPECIES	PLOT NO.	TYPE OF OBSERVATION		SUBZONE/ SITE SERIES	ECO-UNIT	MAP NO./ GENERAL LOCATION
		Sighting - quantity	Sign - type			
	9800410		EX	BGxh3/01	SW	Empire Ranch, below calving barn by Fraser R.
	9800414		EX	BGxh3/01	SW	MacGee Flats, Empire Ranch
	9800444		EX	BGxh3/01	SW	Fraser R., directly across from Empire Valley
California bighorn sheep *Ovis canadensis californiana*	C139		EX	BGxh3/01	SW	92O.039 Extremely high winter use - pellets cover 60% of ground
	C575		EX	BGxh3/01	SW	92O.039
	C605		EX	BGxh3/01	SW	92O.049
	C606		EX	BGxh3/01	SW	92O.049
	C608		EX	BGxh3/01	SW	92O.029
	C615		EX	BGxh3/01	SW	92O.029
	C686		EX	BGxh3/01	SW	92O.049
	C709		EX	BGxh3/01	SW	92O.049
	C698		EX	BGxh3/02	DJ	92O.049
	C614		EX	BGxh3/80	SC	92O.029
	C45		TP	BGxh3/87	WA	92O.039 E. of Empire Ranch
	C146		EX	BGxh3/87	WA	92O.039
	C616		TP	BGxh3/87	WA	92O.029 old burn
	9800034		EX	BGxw2/01	WN	E. of Empire Ranch
	C582		EX	BGxw2/01	WN	92O.039
	C44	13 ewes & juveniles; 2 lambs		BGxw2/01	WN	92O.039
	C59	10 rams		BGxw2/01	WN	92O.049 Empire Ranch - off main road to ranch, N. of calving barn
	98004		EX	BGxw2/86	WO	N. of MacGee Flats.

SPECIES	PLOT NO.	TYPE OF OBSERVATION		SUBZONE/ SITE SERIES	ECO-UNIT	MAP NO./ GENERAL LOCATION
		Sighting - quantity	**Sign - type**			
	13					Empire Ranch
	C702		EX	BGxw2/87	PL	92O.049
	C562	4 indiv.		IDFxm/00	CR	92O.048
	9800450		EX	IDFxm/31	WT	92O.039 Sheep Point, grassland by fence
	C623		EX	IDFxm/31	WT	92O.039
	C670		EX	IDFxm/31	WT	92O.039
	9800456		EX	IDFxm/32	WP	92O.039 SE-facing slope off flats above Grinder Cr.
	9800441		EX	IDFxm/33	WY	92O.048 Churn Flats
California bighorn sheep *Ovis canadensis californiana*	9800454		EX	IDFxm/33	WY	92O.039 grassland above Grinder Cr.
	C548		EX	IDFxm/33	WY	92O.048
	C557		EX	IDFxm/33	WY	92O.048

Appendix 5e - Rare Vascular Plants Previously Observed in Churn Creek Study Area as Detailed by B.C. Conservation Data Centre

The following rare vascular plants were previously observed in the Churn Creek Study Area, as detailed in the B.C. Conservation Data Centre Rare Elements Occurrence Report, which may be found in Appendix 5b.

Common Name	Scientific Name	Prov. List	Location	Sub-zone	UTM NAD 83 East/North
American chamaerhodos	*Chamaerhodos erecta ssp. nuttallii*	Blue	opposite Crows Bar Creek on Fraser River	BGxw2	10 554003 5681505
slender hawksbeard	*Crepis atrabarba ssp. atrabarba*	Red	Churn Cr.	BGxw2	10 540603 5705806
thyme-leaved spurge	*Euphorbia serpyllifolia*	Blue	Canoe Cr. IR 1, 4.8 km west-southwest of	BGxh3	10 555302 5700106
Drummond's campion	*Silene drummondii var. drummondii*	Blue	2.25 km east of Churn Cr.	IDFxm	10 534702 5703806

Appendix 5f - Rare Vascular Plant Observations in Churn Creek Study Area

The following rare vascular plant observations were made during the course of the Churn Creek TEM Study:

COMMON NAME	SCIENTIFIC NAME	PROV. LIST	PLOT NO.	SUBZONE/ SITE SERIES	ECO-UNIT	MAP NO./ GENERAL LOCATION
dry-land sedge	*Carex xerantica*	Blue	980031	IDFxm/33	WY	92O.039 5.5 km S. of Empire Ranch of Lone Cabin Rd.
Drummond's campion	*Silene drummondii var. drummondii*	Blue	C624	IDFxm/01	DP	92O.029
Drummond's campion	*Silene drummondii var. drummondii*	Blue	C263	IDFdk4/00	WB	92O.038
American chamaerhodos	*Chamaerodos erecta ssp. nuttallii*	Blue	C46	IDFxm/31	WT	92O.039 Sheep Point Rd.

Appendix 5g - Rare Plant Community Observations in Churn Creek TEM Study

The following rare plant communities were observed during the course of the Churn creek TEM study:

SCIENTIFIC NAME	COMMON NAME	SITE SERIES	PROV. LIST
Artemisia tridentata - Elymus spicatus	Big Sage - Bluebunch Wheatgrass	BGxh3/01 BGxw2/00	red
Elymus spicatus - Koeleria	Bluebunch Wheatgrass - Junegrass	BGxh3/00 BGxw2/01 IDFxm/00 IDFdk3/00	red
Juncus balticus - Potentilla anserina	Baltic Rush - Silverweed	BGxw2/00 IDFxm/00	red
Pseudotsuga menziesii - Juniperus communis - Cladonia	Douglas-Fir - Common Juniper - Cladonia	IDFxm/03	red
Pseudotusga menziesii - Rosa woodsii - Aralia nudicaulis	Douglas-Fir - Prickly Rose - Sarsaparilla	IDFxm/07	blue
Picea engelmanii x glauca - Rosa acicularis - Petasites	Hybrid White Spruce - Prickly Rose - Coltsfoot	IDFxm/08	red
Psuedotsuga menziesii - Juniperus communis - Penstemon	Douglas-Fir - Common Juniper - Penstemon	IDFxm/02 IDFdk3/03 IDFdk4/02	blue
Pseudotsuga menziesii - Juniperus scopulorum - Artemisia frigida	Douglas-Fir - Rocky Mountain Juniper - Pasture Sage	IDFxm/04 IDFdk4/04 IDFdk4/03	blue
Psuedotsuga menziesii - Pleurozium - Hylocomium	Douglas-Fir - Feathermoss - Step Moss	IDFxm/05 IDFxm/06 IDFdk3/05 IDFdk4/07	blue
Pseudotsuga menziesii - Elymus spicatus - Calamagrostis rubescens	Douglas-Fir - Bluebunch Wheatgrass - Pinegrass	IDFdk4/05	blue
Picea engelmanii x glauca - Pleurozium - Brachythecium	Hybrid White Spruce - Feathermoss - Brachythecium	IDFdk4/09	blue
Pinus contorta - Ledum glandulosum - Empetrum	Lodgepole Pine - Trapper's Tea - Crowberry	MSxv/05	red
Picea engelmanii x glauca - Equisetum - Mnium	Hybrid White Spruce - Horsetail - Leafy Moss	MSxk/09	blue
Picea engelmanii x glauca - Ribes lacustre - Vaccinium scoparium	Hybrid White Spruce - Gooseberry - Grouseberry	MSxk/08	blue

Appendix 6 - Wildlife Habitat Models & Assumptions

(lwlr_chr.pdf)

Appendix 7a - Venus and Gravity Data - Vegetation

(chr_ap7a.xls)

Appendix 7b - Venus and Gravity Data - Environmental

(chr_ap7b.xls)

Appendix 7c - Kamloops Forest Region Plot Data

Appendix 8 - Bioterrain and Eco Database

(lpro_chr.csv, lecp_chr.csv, lusr_chr.csv)

Appendix 9 - Wildlife Ratings Tables

(lrat_chr.csv)