Seabridge Gold Inc.

KSM PROJECT
2009 Vegetation and Ecosystem Mapping Baseline Report

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Executive Summary

This report presents the Vegetation and Ecosystems Baseline Study undertaken by Rescan Environmental Services Ltd. (Rescan) on behalf of Seabridge Gold Inc. (Seabridge) at the KSM Project. The KSM Project is a gold/copper project located in the mountainous terrain of northwestern British Columbia (BC), approximately 950 km northwest of Vancouver, BC, and approximately 65 km northwest of Stewart, BC. The proposed project lies approximately 20 km southeast of Barrick Gold's recently-closed Eskay Creek Mine and 30 km northeast of the Alaska border.

Ecosystems and vegetation within the KSM Study Area were characterized at the regional and local scales using BC's Biogeoclimatic Ecosystem Classification (BEC) system and two mapping methodologies. Terrestrial Ecosystem Mapping (TEM) was used to map the Local Study Area (LSA) (55,187 ha) while Predictive Ecosystem Mapping (PEM) was used to map the Regional Study Area (RSA) (338,008 ha). Data from field surveys in 2008 and 2009 (208 survey plots in total) were used to refine the mapping and to provide detailed plant species information.

Six BEC units are present within the Local and RSAs, which consist of coastal and interior low elevation forested zones, middle elevation subalpine forested zones, and high elevation parkland / alpine zones. Parkland and subalpine forests are the most common BEC units in both the local and regional study areas, with the low elevation forested areas relatively uncommon.

Almost half (46%) of the RSA, and 35% of the LSA is comprised of non-vegetated units such as water, glaciers, and sparsely vegetated alpine areas. Mature forests are the dominant forested structural stage in the LSA, and mature/old forests are the dominant forested structural stage in the RSA. Shrub-dominated areas such as avalanche tracks are also very common.

Invasive plant species were not identified during the field surveys. No plant species of conservation concern listed by the BC Conservation Data Centre (CDC) or the Committee on the Status of Endangered Wildlife Canada (COSEWIC) were identified within either study area. Eight ecosystems blue-listed by the BC CDC and one category of potentially blue-listed ecosystems were mapped by TEM, predicted by PEM, and/or identified in the field during baseline studies.

A total of 100 plant tissue samples from five species were collected from the study area in 2008 and 2009 to establish the baseline metal concentrations in sampled vegetation.

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Acronyms and Abbreviations

This section contains definitions of technical terms, acronyms and abbreviations present in this report. Acronyms and abbreviations used in this document are defined where they are first used. The following list of abbreviations will assist readers who may choose to review only portions of the document.

Alpine	High-elevation land above the tree-line. Alpine vegetation on zonal sites is dominated by low shrubs, herbs, bryophytes and lichens. Although treeless by definition, patches of stunted (krummholz) trees may occur. Much of the alpine is covered by rock and ice rather than vegetation.
Attribute	A characteristic required for describing or specifying some entity (Dunster and Dunster 1996), which is associated with an ecosystem map unit.
BC CDC	British Columbia Conservation Data Centre - collects and disseminates information on plants, animals and ecosystems (ecological communities) at risk at the provincial level, and is tied to NatureServe, an international, non-profit organization of cooperating Conservation Data Centres and Natural Heritage Programs all using the same methodology to gather and exchange information on the threatened elements of biodiversity.
BEC	Biogeoclimatic Ecosystem Classification – a standard, hierarchical classification system for mapping terrestrial ecosystems in British Columbia.
Biogeoclimatic subzone	A level of the biogeoclimatic classification system that defines the climate of an area, as characterized by the plant association occurring on zonal sites (e.g., Mountain Hemlock moist maritime, MHmm)(BC Ministry of Forests and Range 2007).
Biogeoclimatic units	A general term referring to any level of Biogeoclimatic zones, subzones, variants or phases. Biogeoclimatic units are inferred from a system of ecological classification based on a floristic hierarchy of plant associations. The recognized units are a synthesis of climate, vegetation, and soil data (Pojar, Klinka, and Meidinger 1987).
Biogeoclimatic variant	A further subdivision of biogeoclimatic subzone reflecting further differences in regional climate. Variants are described as warmer, colder, drier, wetter, or snowier than the 'typical' subzone (e.g., Mountain Hemlock moist maritime leeward variant (MHmm2).
Biogeoclimatic zone	Geographical areas having similar patterns of energy flow, vegetation and soils as a result of a broadly homogeneous macroclimate. Biogeoclimatic zones are comprised of biogeoclimatic subzones with similar zonal climax ecosystems (BC Ministry of Forests and Range 2007).

Blue-list	A list of ecological communities, and indigenous species and subspecies of special concern in British Columbia. Elements are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed elements are at risk, but are not Extirpated, Endangered or Threatened (BC MOE 2007a).
Climax ecosystem	The final and relatively stable stage in plant succession for a given environment where the species present perpetuate themselves in the absence of disturbance (BC Ministry of Forests 1985).
COSEWIC	Committee on the Status of Endangered Wildlife in Canada - A federal committee of experts that assesses and designates the level of threat to wildlife and vegetation species in Canada.
Decile	The proportion (in tenths) of a polygon covered by a particular ecosystem unit.
DEM	Digital Elevation Model - a digital array of elevations for a number of ground positions at regularly spaced intervals.
Ecological Community	A term used by the BC CDC and NatureServe to include natural plant communities and plant associations and the full range of ecosystems that occur in British Columbia.
Ecosystem (terrestrial)	A volume of earth-space that is composed of non-living parts (climate, geologic materials, groundwater, and soils) and living or biotic parts, which are all constantly in a state of motion, transformation, and development. No size or scale is inferred.
Forb	Non-grassy herbaceous plant.
Herb	A plant, either annual, biennial or perennial, with stems that die back to the ground at the end of the growing season. Herbaceous species include forbs, graminoids (sedge, grasses, and rushes), ferns, and fern allies (e.g., horsetails).
Invasive Plant	Any alien plant species that has the potential to pose undesirable or detrimental impacts on humans, animals or ecosystems.
Land Cover	The physical and biological cover over the surface of land, including water, vegetation, bare soil, and/or artificial structures (Ellis 2007).
LSA	Local Study Area - vegetation and ecosystems are discussed for this area that is 55,187 ha in size.
Mesic	Water removed somewhat slowly in relation to supply; soil may remain moist for a significant, but sometimes short period of the year. Available soil moisture reflects climatic inputs (BC Ministry of Environment Lands and Parks and BC Ministry of Forests Research Branch 1998).

Model An idealized representation of reality developed to describe, analyze or understand the behaviour of some aspect of it a mathematical representation of the relationship under study.

Moisture regime Indicates, on a relative scale, the available moisture for plant growth in terms of the soil's ability to hold, lose, or receive water. Described as moisture classes from Very Xeric (0) to Hydric (8) (BC Ministry of Environment Lands and Parks and BC Ministry of Forests Research Branch 1998).

Nutrient regime Indicates the available nutrient supply for plant growth on a site, relative to the supply on all surrounding sites. Nutrient regime is based on a number of environmental and biotic factors, and is described as classes from very poor (A) to very rich (E) and saline (F) (BC Ministry of Environment Lands and Parks and BC Ministry of Forests Research Branch 1998).

Parkland Subalpine area characterized by forest clumps interspersed with open subalpine meadows and shrub thickets. Vegetation cover may vary in the proportion of treed patches, meadows, and shrub thickets. The term parkland can also be used for lower elevation forest that are open due to restricted moisture availability, such as occurs in the Ponderosa Pine zone.

PEM Predictive Ecosystem Mapping - a modelled approach to ecosystem mapping using various spatial datasets as input. Mapping follows provincial standards and a pre-defined classification system.

Pixel “Picture element” - A single point in a digital image; the smallest discreet component of an image.

Polygon Delineations that represent discrete areas on a map, bounded by a line. On an ecosystem map, polygons depicting ecosystem map units are nested within larger polygons containing the biogeoclimatic and ecoregion map units. Polygons depicting ecosystem units represent areas from less than one hectare to several hundred hectares, depending on the scale of mapping.

Red-list List of ecological communities, and indigenous species and subspecies that are extirpated, endangered or threatened in British Columbia. Red listed species and sub-species have- or are candidates for- official Extirpated, Endangered or Threatened Status in B.C. Not all Red-listed taxa will necessarily become formally designated. Placing taxa on these lists flags them as being at risk and requiring investigation.

RSA Regional Study Area - vegetation and ecosystems are discussed for this area that is 338,008 ha in size.

SARA *Species at Risk Act* (2002) - A piece of Canadian federal legislation which is designed to meet one of Canada’s key commitments under the International Convention on Biological Diversity. The goal of the Act is to protect endangered or threatened organisms and their habitats. It also manages species which are not yet threatened, but whose existence or habitat is in jeopardy.

Scale The degree of resolution at which ecological processes, structure, and changes across space and time are observed and measured (Avers, Cleland, and McNab 1993). Common scales of terrestrial ecosystem mapping are 1:10,000 and 1:50,000.

Site series Describes all land areas capable of producing the same late seral or climax plant community within a biogeoclimatic subzone or variant (Banner et al. 1993). Site series can usually be related to a specified range of soil moisture and nutrient regimes within a subzone or variant, but other factors, such as aspect or disturbance history may influence it as well. Site series form the basis of ecosystem units. Definition is taken directly from the TEM standards.

Structural Stage Describes the structural characteristics, and often the age, of vegetated ecosystems (RIC 1998).

TEM Terrestrial Ecosystem Mapping – delineation and attribution of ecosystem units based on air photo interpretation. Mapping follows provincial standards and a pre-defined classification system.

Topography The configuration of a surface, including its relief and the position of its natural and man-made features.

TRIM Terrain Resource Information Management – refers to the digital dataset of geographic base mapping completed for the province of BC in 1996 at a scale of 1:20,000. The dataset includes elevational data, stream networks, and so on.

Wetland Sites dominated by hydrophytic vegetation where soils are water-saturated for a sufficient length of time such that excess water and resulting low soil oxygen levels are principal determinants of vegetation and soil development (Mackenzie and Moran 2004).

2. Introduction

2.1 PROJECT PROPONENT

The proponent for the KSM (Kerr-Sulphurets-Mitchell) Project is Seabridge Gold Inc. (Seabridge), a publicly traded junior gold company with common shares trading on the Toronto Stock Exchange in Canada and on the American Stock Exchange in the United States.

2.2 KSM PROJECT DESCRIPTION

The KSM Project is a large proposed gold-copper mining project. Reserve figures released in a preliminary feasibility study announced on March 31, 2010 include 1.6 billion tonnes of ore containing 30.2 million ounces of gold, 7 billion pounds of copper, 133 million ounces of silver and 210 million pounds of molybdenum in the proven and probable categories. This environmental baseline study was designed to address a wide range of alternatives that have been assessed from engineering and cost perspective at various times during the baseline studies. The following project description is the base case for the March 2010 Preliminary Feasibility Study. Maps in subsequent sections of this baseline report may depict slightly different footprint configurations relating to earlier designs that prevailed at the time the fieldwork was completed.

The proposed Project as defined for the purposes of this environmental baseline study will be comprised of two distinct and geographically separate areas (the mining area and processing plant and tailing management area), shown in Figure 2.2-1. The proposed mining area is located in the drainage basin of Sulphurets Creek, a major tributary of the Unuk River. The proposed location of the processing plant and tailing management facility is in the headwaters of tributaries of Teigen and Treaty Creeks, which flow to the Bell-Irving River. The two areas will be connected by a pair of parallel tunnels. An overview of these proposed mine components is provided in the following two Sections.

2.2.1 Mining Area

It is proposed that the mining area will be accessed by a new road to be constructed from the current Eskay Creek mine road. The access road will be used to transport personnel, heavy mining equipment, mining supplies, and explosives. This new road will trend southwestwards to the headwaters of Coulter Creek and then follow the general course of Coulter Creek to the Unuk River. After crossing the Unuk River it will follow the north side of the Sulphurets Creek Valley and cross Mitchell Creek. The Unuk River is considered navigable water under the *Navigable Waters Protection Act*. Branch roads will lead to each of the Kerr, Sulphurets and Mitchell deposits. Another branch road will head south parallel to Ted Morris Creek towards the toe of the north flowing tongue of Frank Mackie Glacier to provide access to the explosives manufacturing plant and related explosives magazines.

The support facilities for the mining area are proposed in the vicinity of the confluence of Sulphurets and Mitchell creeks. They will include accommodation for mine employees and administration and maintenance facilities.

The ore deposits will be bulk mined with large shovels and trucks and will use conventional drilling and blasting methods. The Kerr deposit is located on a ridge south of Sulphurets Lake. It is proposed that ore and non-ore mined rock will be transported from the Kerr deposit by conveyor to a tunnel portal (Sulphurets Mitchell tunnel) on the north side of Sulphurets Creek. These materials will be transported through the tunnel by conveyor to the Mitchell Creek Valley where they will be transported to the ore preparation complex or the Mitchell-McTagg rock storage facilities, respectively.

FIGURE 1.2-1

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KSM Project Location

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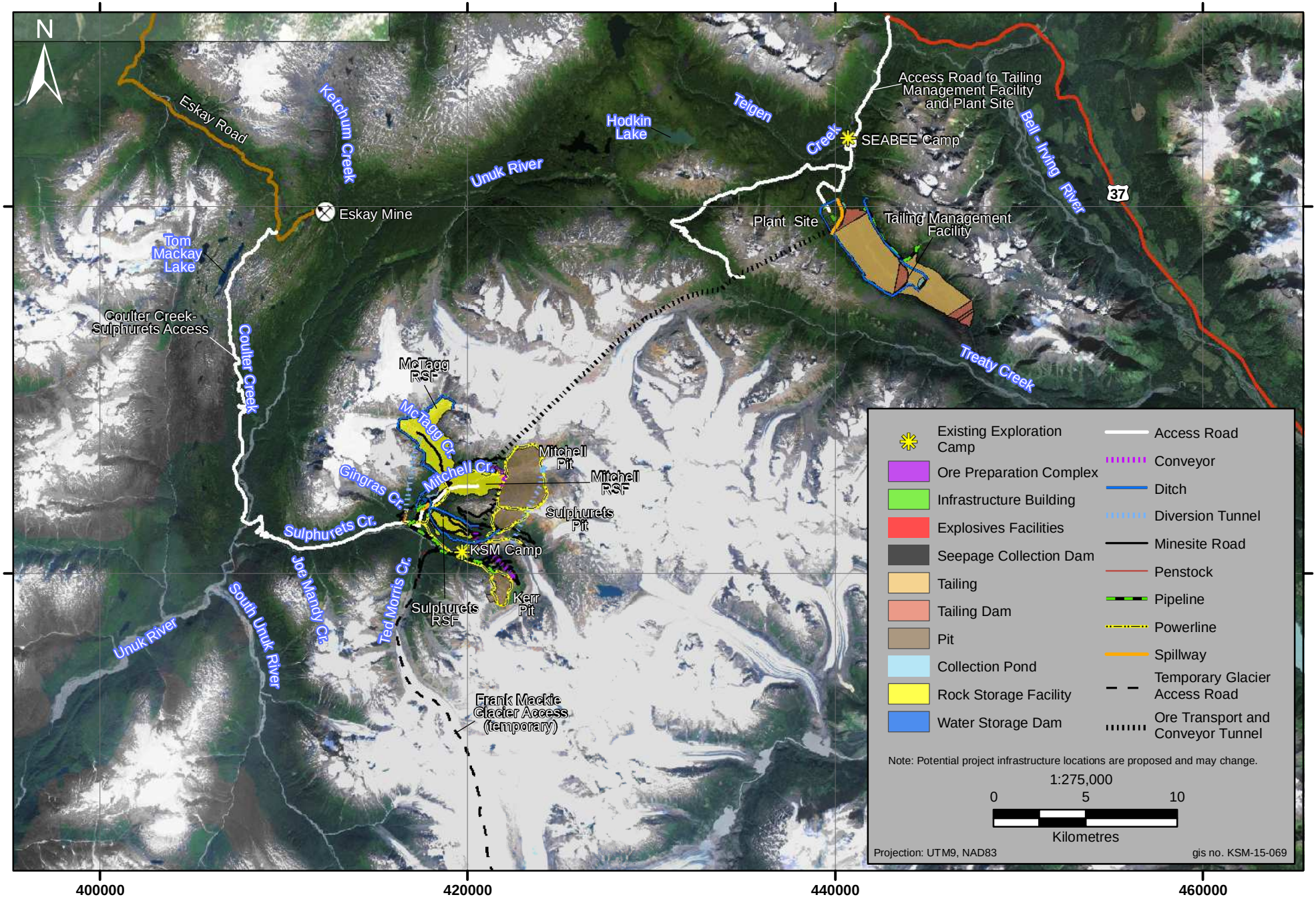

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KSM Project Layout and Road Access

FIGURE 1.3-1

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River it will follow the north side of the Sulphurets Creek Valley and cross Mitchell Creek. The Unuk River is considered navigable water under the *Navigable Waters Protection Act*. Branch roads will lead to each of the Kerr, Sulphurets and Mitchell deposits. Another branch road will head south parallel to Ted Morris Creek towards the toe of the north flowing tongue of Frank Mackie Glacier to provide access to the explosives manufacturing plant and related explosives magazines.

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The Sulphurets deposit is located on the south side of the ridge north of Sulphurets Lake. It is proposed that ore will be transported by truck to the Sulphurets Mitchell tunnel and then by conveyor to the ore preparation complex. Non-ore mined rock will be transported to the Sulphurets rock storage facility on the south side of the ridge between the Mitchell Creek and Sulphurets Creek valleys, or to the Mitchell-McTagg rock storage facilities.

The Mitchell deposit straddles the Mitchell Creek Valley in an area recently exposed by the recession of the Mitchell Glacier. Mining of the deposit is proposed on both sides of the valley and to a depth of over 400 m below the current valley bottom. Seabridge proposes to construct a diversion tunnel from near the toe of the Mitchell Glacier, southwards towards the Sulphurets Creek Valley upstream of Sulphurets Lake to divert the flow of Mitchell Creek away from the proposed open pit area. It is proposed that the significant hydraulic head created by this tunnel will be used to drive a hydro-electric plant to generate a small portion of the electricity requirements of the Project.

Large volumes of low grade or barren rock will be removed in order to access the ore in each of the deposits. Non-ore rock removed to access ore will consist of both potentially acid generating (PAG) and not potentially acid generating (not PAG) rock. Rock storage areas have been defined in the Mitchell Creek and McTagg Creek valleys and on the south-facing side of the ridge between Sulphurets Creek and Mitchell Creek valleys. Runoff and seepage from the rock storage areas will be collected in a water storage facility contained behind a dam, to be located in the lower reaches of Mitchell Creek, and treated prior to discharge to the environment. The piped flow from the storage facility to the water treatment plant may be used to drive a hydro-electric plant.

A second diversion tunnel is proposed to direct the flow of McTagg Creek to the Sulphurets Creek Valley, thus avoiding the rock storage areas. The discharge from this tunnel will be available to drive a hydro-electric plant.

A run-of-river hydro-electric plant is proposed to harness the hydraulic head of the cascade in the lower reaches of Sulphurets Creek.

Ore from the deposits will be transported to an ore preparation complex, consisting of crushing and grinding facilities and related ore storage stockpiles, located on the north side of the Mitchell Creek Valley west of the Mitchell pit. Prepared ore will be mixed with water and pumped through one of two parallel 23 km-long tunnels to the process plant, proposed to be located in the drainage of a north-

flowing tributary of Teigen Creek. The tunnels will daylight for a short distance near the divide between the Unuk River drainage and Treaty Creek before proceeding to the plant site in the Teigen Creek drainage. They will accommodate two pipelines to transport ore slurry as well as a return water pipeline, a diesel fuel pipeline, and a transmission line. The tunnels will slope towards Mitchell Creek so that all drainage can be controlled at the mine site and treated as necessary prior to release to the environment.

1.3.2 Processing and Tailing Management Area

The tunnel from the Mitchell Creek Valley will terminate on the south side of the valley formed by a north flowing tributary of Teigen Creek (South Teigen Creek) and a south flowing tributary of Treaty Creek (North Treaty Creek Tributary), adjacent to the plant site.

The plant will use a conventional grinding and flotation flowsheet to produce separate copper/gold and molybdenum concentrates, gold doré and tailing. It will process up to 120,000 tonnes per day of ore to produce an average of 1,200 tonnes per day of concentrate. The concentrate will be dried and transported to the port of Stewart by truck. It is anticipated that approximately 20 to 30 round trips per day will be required using 40 tonne payload trucks.

Vehicle access to the plant site will be by a 14 km long road along Teigen Creek from Highway 37. This road will require bridges to cross Teigen creek, which may be considered to be navigable water, and smaller tributaries.

The tailing will be pumped through pipelines to the tailing management facility located in the upper reaches of the Teigen Creek Valley, extending southeast over the divide into a tributary of the Treaty Creek drainage. The facility will be constructed in two phases: the north cell will be developed between a north dam, to be located across the valley of the south tributary of Teigen Creek near the plant site, and a south dam, to be located near the crest of the valley floor; and a south cell that will be retained by a southeast dam, to be located in the headwaters of the north tributary of Treaty Creek. The proposed facility will have storage capacity for the life of the Project within an area about 8 km long and 1.5 km wide. Seepage from the south and southeast dams will be pumped back into the impoundment to reduce any potential impact on the Treaty Creek drainage. Water diversion channels will be constructed on both flanks of the impoundment, where feasible, to divert clean water away from the impoundment. Supernatant water will be recovered from the impoundment using barge mounted pumps and recycled to the plant for process water. In the event that discharge is required, the excess water in the impoundment will be pumped over the northern dam towards the Teigen Creek drainage. Treatment of discharge water may be required to meet permit conditions.

It is assumed that electricity to power the plant and mine site will be obtained from the provincial electricity grid. A secondary transmission line will be constructed from a switching station, to be located near the point where Highway 37 crosses Snowbank Creek. The secondary line will follow the general alignment of the access road, to the plant site, and then pass through the tunnel to the mine site.

2. Objectives

The objectives of the vegetation and ecosystems baseline studies were to provide a description of:

- the types and distribution of terrestrial ecosystems occurring on the landscape through Terrestrial Ecosystem Mapping (TEM) of the Local Study Area (LSA) and Predictive Ecosystem Mapping (PEM) of the Regional Study Area (RSA);
- ecosystems present in the study areas that are listed by the BC Conservation Data Centre (BC CDC);
- sensitive ecosystems present in the study area;
- plant species present in the Project study areas, including invasive plant species, and those species tracked by the BC CDC, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and protected under the *Species At Risk Act* (SARA); and
- baseline metal concentrations of plant tissue samples within the Project study areas.

Information contained in this report will be used to provide input to other studies, such as wildlife habitat assessments.

3. Methods

3.1 STUDY AREAS

Ecosystems and vegetation were characterized for two study areas, a Local Study Area (LSA) and a Regional Study Area (RSA) (Figure 3.1-1). The LSA is defined by a buffer extending at least to the height of land or 1.5 km around the outer limits of the proposed infrastructure and linear developments, which ever comes first. The LSA has been further broken down into four separate areas for the purposes of this report because of the variety of landforms and vegetation types present in the LSA, the different types of effects that may result from the various infrastructure components, and the relatively large geographical separation among some of the various infrastructure components. These four areas are the Western LSA, the Eastern LSA, the Mitchell-Teigen Tunnel LSA, and the Coulter Access Corridor. The Western LSA has a coastal climate and coincides with the Mining Area described in Section 1.3.1. The Eastern LSA represents a transitional climate from coastal to interior and coincides with the Processing and Tailing Management Area described in Section 1.3.2. The Mitchell-Teigen Tunnel LSA is glacier, rock or alpine tundra and defines the 23 km long parallel tunnels between the Mitchell and Teigen valleys. The Coulter Access Corridor is described in Section 1.5.1.2. The LSA covers approximately 55,187 ha, including all four sections.

The RSA, 338,008 ha in size, parallels the RSA utilized in the Wildlife Characterization Baseline Report (Rescan 2010c). Design of the RSA took into account the area that provides habitat for wildlife species that may come into contact with proposed Project infrastructure during the course of a season or a lifetime. Other ecological factors, such as height of land were also considered when delineating boundaries.

3.2 ECOSYSTEM MAPPING

Ecosystem mapping is the process of using ecological features such as terrain, soil, and vegetation to delineate meaningful units on a map. These meaningful units are based upon a pre-existing ecosystem classification scheme. Ecosystem classification and mapping has been ongoing in BC for many years. The province has several different classification systems, which differ with respect to the physical and ecological features that are used to define ecosystem boundaries and the scales at which ecosystems are delineated. The most commonly used system for forest management and other site specific management is the Biogeoclimatic Ecosystem Classification (BEC) system. A full description of BEC methodology and associated terms can be found in Banner et al. (1993) and on the BC Ministry of Forests and Range internet site (BC Ministry of Forests and Range 2007). A brief overview of the BEC system and its application to the Project is provided in Section 3.2.1.

3.2.1 Biogeoclimatic Ecosystem Classification (BEC) System

The Biogeoclimatic Ecosystem Classification (BEC) system is a hierarchical classification method that uses a standardized terminology and methodology to organize and present information pertaining to the ecosystems of BC. The BEC system groups ecosystems at broad-scale (regional level) and fine-scales (local level). At the broadest scale, relatively large areas are classified into zones, subzones and variants. Zones reflect macro-level climate and are primarily determined from relative precipitation and temperature regimes. Zones are divided into smaller subzones based on distinct, climate-reflective plant associations. Subzones may be divided into variants, which further classify subzones as slightly wetter, drier, cooler or hotter than other areas within a subzone. The unique combination of zone, subzone and variant, is referred to as a BEC unit.

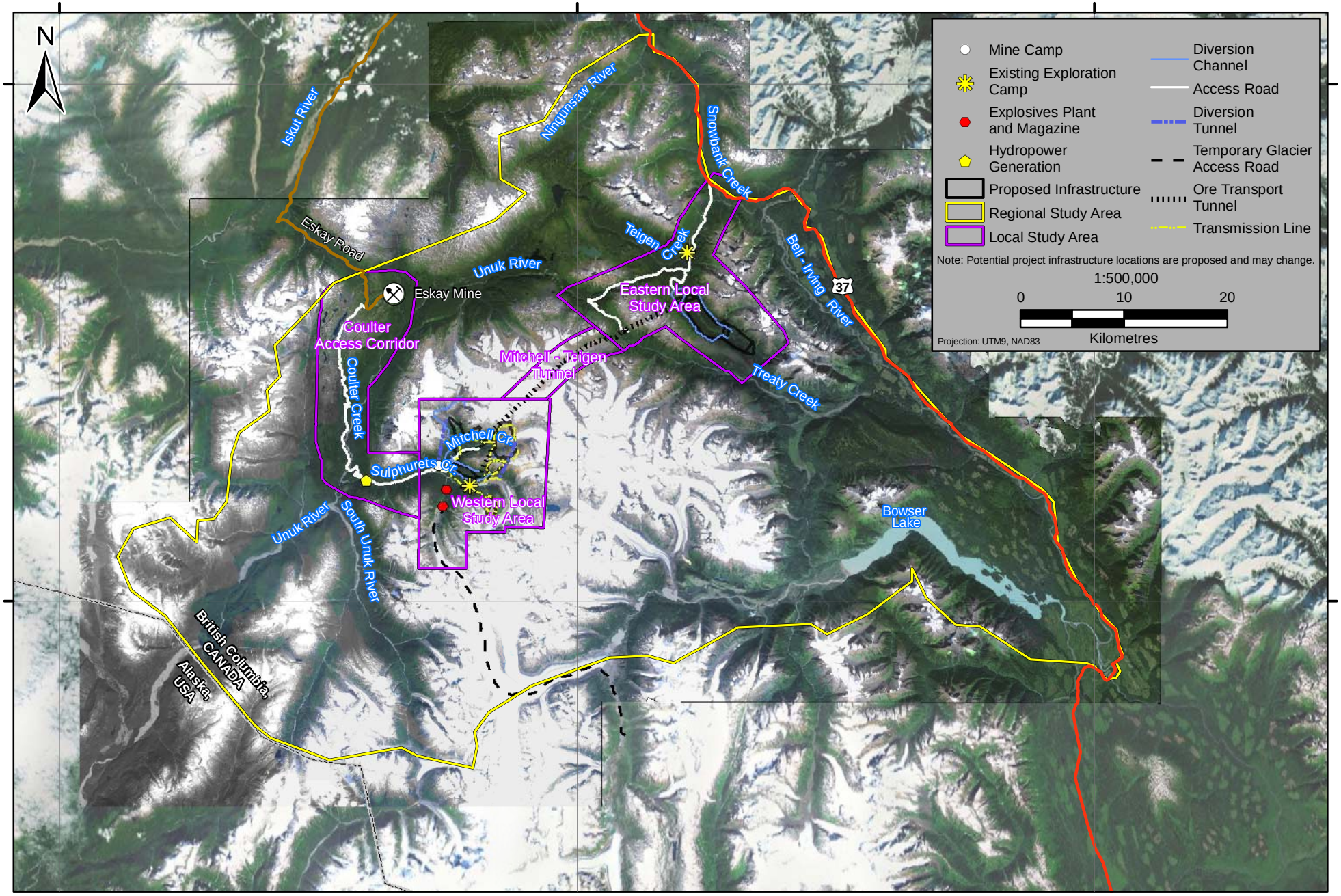

FIGURE 3.1-1

KSM Project - Vegetation and Ecosystems Study Area Boundaries

SEABRIDGE GOLD

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Within each BEC unit, there are a series of finer-scale (local) ecosystems, termed site series, which are based on the site's potential to produce a similar stable plant community at late successional stages (Banner et al. 1993). Site series are identified by site conditions, soil conditions and vegetation communities and generally refer to forested ecosystems. Each site series is assigned a two-digit, numerical code. The site series that best reflects the subzone and is the least influenced by local topography and/or soil properties is termed "zonal". The zonal site series of any subzone or variant is always coded as "01". This site series typically has intermediate soil moisture (mesic) and nutrient regimes, occurs on mid-slope positions, and has moderately deep, to deep soils with unrestricted drainage (Banner et al. 1993). All other site series within the same biogeoclimatic subzone or variant are measured in relation to the zonal site (e.g., wetter or drier than zonal). Non-forested ecosystems remain largely undefined in the BEC system and are assigned the code "00". A unique two-lettered map code is also assigned to these units to help distinguish among them.

In an effort to simplify the ecosystem mapping for this report, site series have been grouped into more general categories (General Ecosystem Types) according to their relative moisture status and vegetation structure (Table 3.2-1). These categories were used to summarize PEM, TEM, and field survey information within the LSA and RSA. A more detailed description of the ecosystems discussed in this report is found in Appendix 1.

Two different methodologies are commonly used to map sites series for a given area of interest: TEM and PEM. Terrestrial Ecosystem Mapping is usually used at larger scales where more detailed information is required. Predictive Ecosystem Mapping is usually used at smaller scales and is ideal for covering large areas when less detail is required. For the KSM Project, TEM was used for the LSA and PEM was used for the RSA. These two mapping methods are described in the following sections.

3.2.2 Terrestrial Ecosystem Mapping (TEM) of the Local Study Area

Terrestrial Ecosystem Mapping requires interpretation of ecosystem boundaries and attributes from aerial photographs by a mapping specialist. The first step involves the identification of permanent terrain units (based on surficial material, geomorphology and slope), while the second involves the identification of ecosystems (site series, from the BEC system), which are mapped within the terrain polygons. Each ecosystem within a polygon is recorded as a decile on a scale from one to ten, which represents its proportional area within the polygon (e.g., 70% moist forest, 20% wetland and 10% forested swamp) (RIC 1998). There are a maximum of three deciles per polygon. Decile 1 contains the most dominant ecosystem type. Decile 2 and 3 contain the second and third most dominant ecosystem types, respectively.

The LSA was mapped using TEM as specified in the KSM Application Information Requirements (AIR) and the standard mine permit application requirement (BC Ministry of Energy and Mines 1998). Mapping was conducted using 1:20,000 scale 2008 colour aerial photographs and followed provincial standards (Howes and Kenk 1997; RIC 1998, 2000). Field survey data were used to refine the ecosystem units delineated.

3.2.3 Predictive Ecosystem Mapping (PEM) of the Regional Study Area

Predictive Ecosystem Mapping, like TEM, is an ecosystem mapping method in BC that uses the BEC system. While TEM requires manual delineation of ecosystems, PEM is an automated, computer-based method using available spatial data and ecological knowledge.

Table 3.2-1. General Ecosystem Types

General Ecosystem Type	BEC Site Series/Map Code	Description
Avalanche Track	CWHwm/51, ESSFwv/51, MHmm2/52, ICHvc/51, GT, AV	Vertical swaths of herbaceous and/or shrubby vegetation created and maintained by avalanche activity (could contain early succession forested ecosystems).
Drier Forest	CWHwm/02, MHmm2/02, ESSFwv/02, ESSFwv/03, ICHvc/02	Dry forest-dominated ecosystems of a young to old structural stage.
Drier Herb	DH, FC, CG	Dry herbaceous ecosystems (could contain early succession forested ecosystem).
Drier Shrub/Herb	DS	Dry shrub-dominated ecosystems (could contain early succession forested ecosystem).
Floodplain Forest	CWHwm/05, CWHwm/06, CWHwm/07, ICHvc/04, ICHvc/05, ESSFwv/00 (FP), FP	Forests adjacent to rivers subject to periodic flooding (of a young to old structural stage).
Mesic Forest	CWHwm/01, CWHwm/03, MHmm2/01, ESSFwv/01, ESSFwv/04, ESSFwv/05, ICHvc/01, MHmm2/01, MHmm2/03	Forest ecosystems with an intermediate moisture range of a young to old structural stage.
Mesic Herb	AM	Herbaceous ecosystems with an intermediate moisture range (could contain early succession forested ecosystem).
Mesic Shrub/Herb	VF, MP	Shrub or dwarf-shrub dominated ecosystems with an intermediate moisture range (could contain early succession forested ecosystem).
Moist Forest	ICHvc/03, CWHwm/04, MHmm2/04, MHmm2/05	Moist forest-dominated ecosystems of a young to old structural stage.
Parkland Forest/Krummholz	KH, PK	Stunted, patchy tree communities growing in parkland and subalpine regions.
Wetland Shrub/Herb	ESSFwv/31, ICHvc/31, ICHvc/52, MHmm2/31, Wm, Wf, Ws, OW, GW, WE	Non-forested wetland ecosystems.
Wetland Forest	CWHwm/09, CWHwm/10, ESSFwv/09, ICHvc/06, MHmm2/08, MHmm2/09	Forested wetlands (e.g., bogs and swamps) of a young to old structural stage.
Wetter Forest	CWHwm/08, ESSFwv/06, ESSFwv/07, ESSFwv/08, MHmm2/06, MHmm2/07	Very moist to wet forests of a young to old structural stage.
Wetter Herb	VW	Very moist to wet herbaceous ecosystems (could contain early succession forested ecosystems).
Wetter Shrub/Herb	VS, WT	Very moist to wet shrub-dominated ecosystems (could contain early succession forested ecosystems).
Sparsely Vegetated	BA, CL, ES, MN, RO, RU, TA,	Vegetation cover is generally <10%.
Non-vegetated	RI, LA, WA, PS, GL, GI, PD, RZ, MI	Water, snow/ice, and anthropogenic areas.

**Moisture Regime is relative to the BEC unit within which the ecosystem occurs.*

The KSM PEM was used to characterize the distribution of ecosystem units in the KSM RSA. It is raster-based, with a cell size of 20 m (which relates to 20 m by 20 m on the ground). The PEM is also one of the input layers used in wildlife habitat suitability modelling (Rescan 2010e), the results of which will be used in the Wildlife and Wildlife Habitat Effects Assessment.

Predictive Ecosystem Mapping was first developed in the 1990s. The process works by designing rules that formalize known relationships between site series and environmental (e.g., terrain) data. As an example, a particular wet forested ecosystem type may be known to occur in depressions, toe-slopes, or adjacent to water-bodies. With the relevant environmental data known, the likely location of this ecosystem can be predicted.

The KSM PEM was developed using the programs and procedures developed by LandMapper Environmental Solutions Inc. (LMES). The procedures are termed the LMES Direct-to-Site-Series (DSS) method and are based on two primary assumptions. The first assumption is that topography is one of the primary controlling factors behind the local flow and accumulation of water, energy, and matter in landscapes (MacMillan 2003). The flow and accumulation of water shapes the development and properties of soils and site-level environmental conditions. The second assumption is that, where subtle differences among classes are important, human-imposed classification systems are superior to those based on statistical analyses and ordination (MacMillan 2003). These assumptions, and consequently the LMES DSS procedures, parallel the logic and decision making processes outlined in the regional Field Guide produced by the BC Ministry of Forests (MoF) (Banner et al. 1993).

With the LMES DSS method, map units are identified and described using both hard (Boolean) and soft (fuzzy) logic. Boolean logic is characterized by such statements as "yes/no", "0/1", and "true/false." Fuzzy logic, on the other hand, uses a concept of *degree of membership* to a particular class (MacMillan et al. 2000). With Boolean logic, a particular pixel may be classified as "wet" or "dry," for example, whereas using fuzzy logic, that same pixel may be recognized as being 40% wet, and 60% dry, allowing for the use of such statements as "slightly dry," and thus approximating a more "human" way of thinking (Hellmann 2001). Further detail on the LMES DSS method and its associated logic systems can be found in MacMillan (2005).

3.2.3.1 PEM Input Components

Regional Climate

The location and extent of different biogeoclimatic zones, sub-zones, and variants was input to provide broad-scale information that describes the regional climate of a geographic area. BEC lines were acquired from the BC MoFR at the scale of 1:250 000. These classification zones were the initial stratification in the model; subsequent refinement into BEC unit-specific site series followed.

Land Cover

A map of land cover was created through digital image classification of satellite imagery. Image classification refers to the automated statistical process of clustering pixels based on the spectral signatures of the ground feature(s) represented in those pixels. The analyst can either define the classes a priori (termed, "supervised" classification), or can group spectral clusters into meaningful classes a posteriori ("unsupervised" classification).

Digital satellite imagery was provided by PhotoSat. SPOT5 panchromatic imagery was acquired on July 22, 2004 and September 28, 2004. This imagery is grey-scale and has a spatial resolution (i.e., pixel size) of 5 m. The panchromatic imagery was fused with true-colour imagery (colour bands red, green and blue) from the Landsat 7 ETM+ satellite (30 m spatial resolution) acquired on August 6, 2002. The fused imagery has the colour resolution of the Landsat imagery and the spatial resolution of the SPOT imagery. However, portions of the Landsat imagery were hazy; these areas were maintained as grayscale.

An unsupervised image classification was run on this fused imagery using the ISODATA algorithm and software from PCI Geomatics. Limited spectral separability among certain classes, resulting partly from the input of both gray-scale and colour data into the algorithm, required some manual editing of the classification output. Following this editing, seven land cover classes were defined: water, snow/ice, forest, barren, shrub/herb, dwarf shrub/herb, and herbaceous. The land cover map was re-sampled from a spatial resolution of 5 m to one of 20 m to match the resolution of the topographic input layers. These land cover categories were compiled into a variable called "classify" (Plate 3.2-1) which was used in the PEM rule sets.

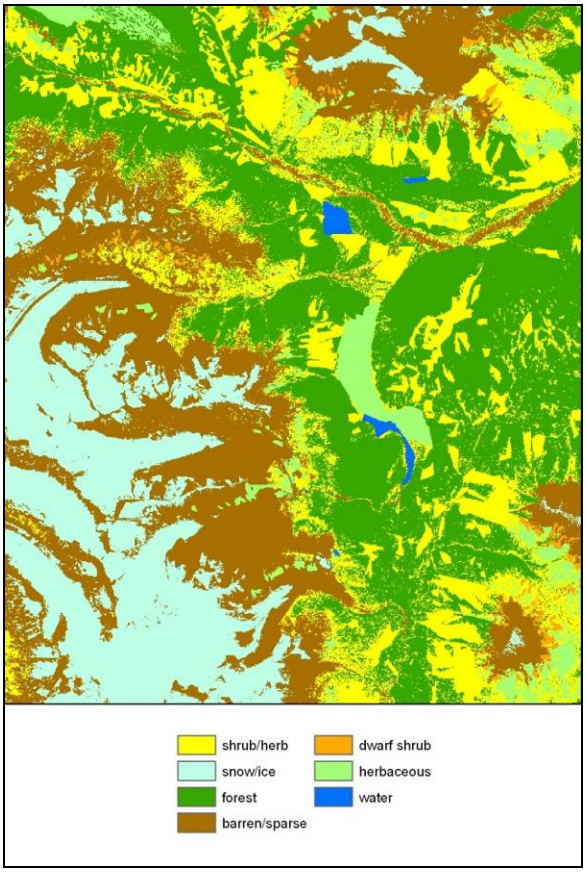

Plate 3.2-1. Example of the Land Cover map ("classify" variable) used as input for the PEM.

Topography and Landscape Position

Terrestrial Resource Information Management (TRIM) data, including a Digital Elevation Model (DEM) (20 m pixels), was purchased from the BC government. In addition to absolute relief (elevation), a number of other derivatives from the DEM were used as input variables. These variables include descriptors of local shape and orientation (i.e., aspect, slope gradient and curvature), and of relative slope position (e.g., "crest", "mid-slope", "toe-slope"). Descriptors of relative slope position include the LMES program variables "Z to pit," "Percent Z to pit," "Z to stream" (Plate 3.2-2) and "Percent Z to stream," all of which indicate a given pixels' height above the nearest depression/stream. Another variable of relative slope position is "LnQArea" (log of upslope, or catchment area) which indicates where on a slope a given pixel is based on how much area lies above it that would be capable of shedding water (the smaller the upslope area, the closer that pixel is to a crest). Measures of relative

slope position help establish the context of each grid cell in the larger landscape. A more detailed discussion of these terrain derivatives is provided in MacMillan (2000) and MacMillan et al. (2007).

Potential Moisture

Potential moisture is another derivative of the DEM. Potential moisture is measured using the dimensionless Quinn Wetness Index (*Qweti*). This variable approximates the concepts associated with the terms used to describe relative moisture in the regional field guides (e.g., dry, moist, wet) (Plate 3.2-2). The general assumption associated with this variable is that water flows downhill and accumulates in level or depressed, down-slope landform positions. While reality may reflect more complex scenarios, this attribute is a reasonable predictor of relative moisture status. This variable however is not as effective in identifying seepage conditions or wet areas resulting from high water tables (e.g., sub-surface moisture).

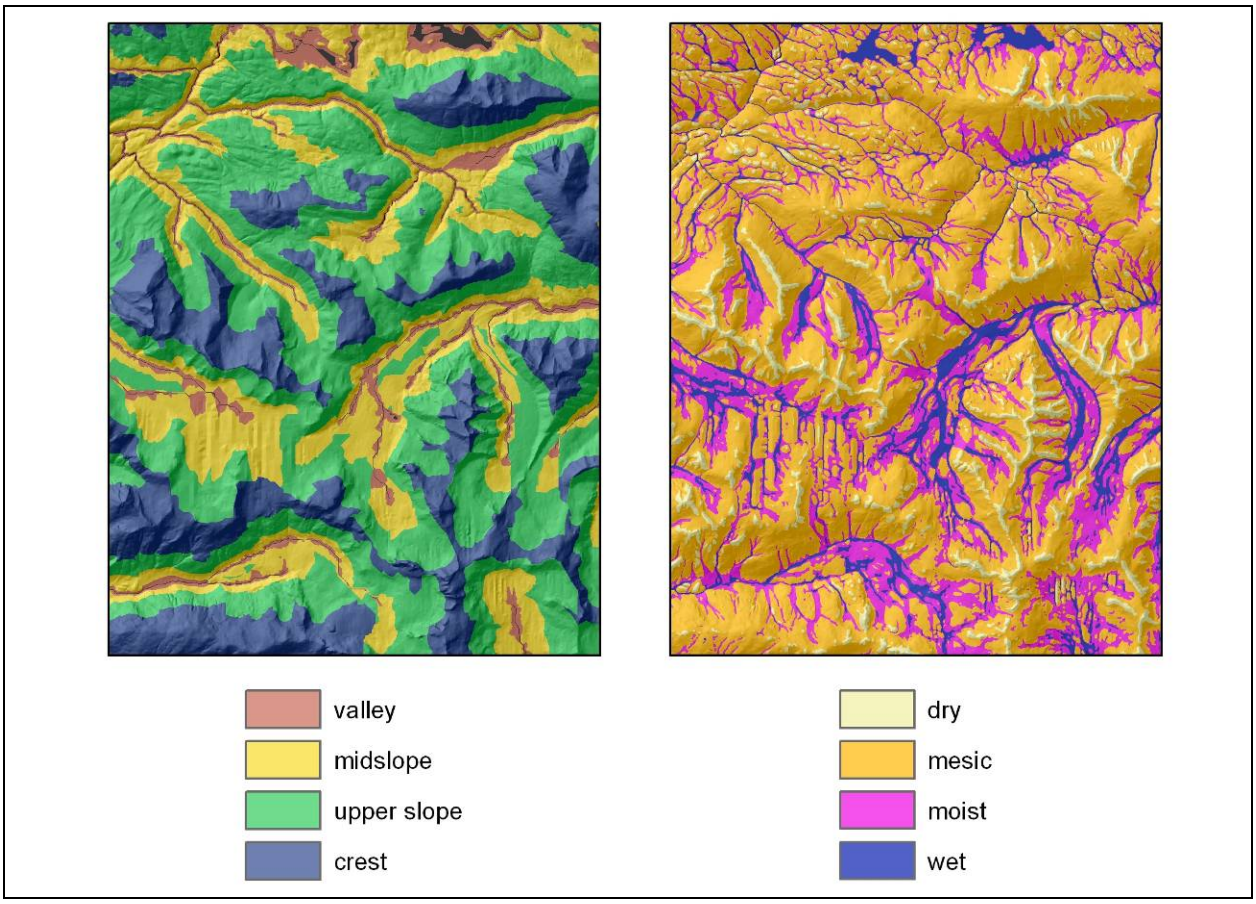

Plate 3.2-2. Example of the Z to Stream (left) and the Qweti (right) PEM input variables.

Exceptions

Water features (lakes, rivers, wetlands) within the TRIM data were overlaid on the PEM as a final step, overriding any other map unit possibility within those locations. As well, floodplain units (largely deciduous) in structural stage 4, 5, 6 or 7 were manually delineated (in addition to being modelled). As several floodplain forests are blue-listed by the BC Conservation Data Centre (BC CDC), it was important to ensure the presence of floodplain forests were accurately mapped. Shrubby floodplain areas were mapped by the PEM as generic mesic or wet shrub/herb units.

3.2.3.2 PEM Input Data Quality

Terrain Resource Information Management (TRIM)

The TRIM data does not capture vey fine topographic variations, including small wetlands and gullies, thus the PEM may fail to accurately describe these small features. Another limitation is that the TRIM was created prior to the date of imagery capture, and the extent of some lakes, rivers and wetlands in the TRIM were noted to vary slightly from those that could be seen on the imagery. However, interpretation of the more recent satellite imagery was used to manually correct many of these discrepancies in the TRIM.

The classification (e.g., swamp or marsh) of TRIM wetlands was verified at a number of sites within the local study area using baseline wetland data from 2008. Wetland baseline data from 2009 were not yet available at the time of the PEM completion, but the added value of this data for checking the quality of the TRIM would have been minimal because a) the wetland data would not have covered the entire extent of the PEM area b) the wetland baseline data is based on the TRIM and c) the wetland baseline data is at a finer scale than that of the PEM.

BEC Lines

The scale of provincial BEC mapping (generally 1:250,000) is "conceptual" in that it is based on knowledge of regional climate. The MoFR is currently updating ("localizing") BEC zone lines throughout the province to reflect local climates and site conditions (e.g., at the scale of 1:20,000). These localized BEC lines are more precise than the original lines, but were not available for the KSM study area. Efforts were made during mapping to "localize" these boundaries through elevation breaks noted in the field and through consultation with the Research Ecologist at the Ministry of Forests and Range office in Smithers, BC.

Satellite Imagery

The satellite imagery was orthorectified and projected to the same projection as the other digital data. The spatial resolution of this imagery (5 m) means that features smaller than 5 m cannot be detected. This resolution is perfectly adequate for ecosystem mapping (i.e., where the landscape is generalized into representative units).

In some areas, cloud/haze, or heavy shadow decreased the quality of the imagery, and made automatic image classification difficult. Manually editing the image was particularly helpful in these areas.

3.2.3.3 PEM Assembly

Assembly of the PEM involved combining and analyzing the various input data layers via two types of rules. Fuzzy attribute rules ("arules") were constructed to define and delineate the numerical input data into particular, semantic constructs such as "ridge," "steeply sloping," or "very wet" (MacMillan, Moon, and Coupe 2007). The mapper constructs these "arules" using likelihood models, the parameters of which are chosen based on a combination of visual review of the digital layers, and consultation of the regional field guide (Banner et al. 1993) which contains descriptions, landscape profile diagrams, and edatopic grids summarizing the site series existing in the region.

Once the attributes have been defined, the prediction of site series can begin. Fuzzy class rules ("crules") represent a distinct combination of both Boolean and fuzzy attributes that together define a particular "environmental setting" within which a particular site series/ecosystem unit (or combination of site series/ecosystem units) can be expected to occur. Environmental settings were defined on the basis of BEC units (delineated using Boolean logic), and on the basis of finer-scale environmental

conditions such as relative slope position, slope gradient and elevation (i.e., the previously defined fuzzy attributes). Appendix 2 contains all the rule sets created for this PEM. It is important to note that application of these rules is not appropriate for another geographic area since they were developed using site specific ecological knowledge and site specific environmental attributes.

3.2.3.4 PEM Assessment and Refinement

The PEM was routinely assessed and refined throughout its development using a variety of data, which included field survey data, high resolution ortho-photographs and TEM.

Field Data

Data from field plots surveyed during ecosystems and vegetation field studies, and herb meadow sites surveyed during marmot surveys carried out by wildlife biologists, were used to refine the land cover map derived from satellite image classification. The land cover type (e.g., forest, shrub, herb meadow, dwarf shrub, wetland, etc) identified at a particular location in the field was compared to the classified value at that same location. Where the two were not the same, the image classification was manually edited to match the field assessment. Likewise, the actual site series predicted by the PEM were compared to those mapped in the field. The PEM was refined if it did not reasonably approximate the field results.

High-Resolution Orthophotos

Orthophotos (geometrically corrected aerial photographs) at a scale of 1:20,000 were available for the TEM study area, but not for the entire PEM study area. Where available, the higher resolution orthophotos were used to manually edit and refine the image classification derived from the coarser satellite imagery. This use of orthophotos was particularly helpful in areas where shadow or cloud on the satellite imagery resulted in errors in the image classification. The orthophotos were also used in delineation of floodplain units through exceptions mapping.

TEM

TEM polygons were overlaid on the image classification. Ecosystem types predicted by the PEM that fell within a given TEM polygon were compared to the dominant and subdominant ecosystems types identified by TEM. The level of agreement between the two was assessed. Where significant differences resulted, the image classification was manually edited.

3.2.4 Vegetation Structural Stage

The existing developmental stage of the vegetation within an area has been described using structural stage. Vegetation structural information is an important attribute commonly used to describe the habitat characteristics of vegetated ecosystems (RIC 1998). Structural stages range from largely unvegetated units to old forest (Table 3.2-2). A numeric code is provided for each stage, the details of which are provided in the TEM standards (RIC 1998). Structural stage is a required PEM and TEM attribute (RIC 1999).

Structural stage mapping was completed for the LSA concurrently with the delineation of site series during TEM through air photo interpretation. For the RSA, structural stage was assigned during PEM, based on the classified satellite imagery land cover outputs. On this one-dimensional imagery, some structural stages can be difficult to distinguish from one another. However, field surveys indicated forests were largely structural stages 6 and 7, with a minor component of structural stage 5. Therefore, all areas classified as “conifer” in the land cover map were assumed to be structural stages 6 and 7 for the purposes of this study and the wildlife assessments. Likewise, all areas classified as “shrub” and

"herb" were assigned a structural stage of 3 and 2, respectively. Manually delineated floodplain forests based on visual image interpretation (Section 3.2.5) were assigned a structural stage of 4/5. General assumptions were made for the structural stages of the wetlands from the TRIM base. Marshes by definition are herb so were assigned structural stage 2; swamps can be a range of structural stages but are most commonly structural stage 3, thus were assigned to the shrub group.

Table 3.2-2. Vegetation Structural Stages

Structural Stage Code	Structural Stage
1	Sparse/Bryoid
2	Herb/Dwarf shrub
3	Shrub (Herb)
4	Pole/Sapling
5	Young Forest
6	Mature Forest
7	Old Forest
N/A	Non-vegetated (water/snow/anthropogenic)

3.2.5 Field Surveys

The primary goal of the field surveys was to aid in the mapping of terrestrial ecosystems in the LSA and RSA by providing information on the types, locations and frequency of occurrence of various ecosystems present. Surveying effort was concentrated in the LSA where the greatest potential Project-related effects on vegetation are expected to occur. The collection of vegetation data for the baseline studies occurred during three trips in the summers of 2008 and 2009, each approximately 12 days in duration. The terrestrial ecosystems and vegetation field surveys occurred concurrently with wildlife habitat and soils baseline field surveys (Rescan 2010c, 2010b). Data were collected in accordance with provincial standards and regional field guides (Banner et al. 1993; BC Ministry of Environment Lands and Parks and BC Ministry of Forests Research Branch 1998). Field data were entered into the provincial data entry program VENUS (version 5.0).

Field survey plots measured 20 m x 20 m (or smaller in alpine or wetland sites) and were established in areas characteristic of a single terrain and (where feasible) ecosystem unit. Site locations were selected based on representative slope positions, landform types, soil texture, soil drainage, species composition, stand structure and physiognomy according to the provincial standards (RIC 1998).

At each survey location, Ground Inspection Forms (GIF) (Appendix 3) were used to record the following attributes: date, geographic location, slope, aspect, elevation, relative slope position, soil drainage, plant species and ecosystem unit, structural stage, and crown closure. Percent cover was estimated for the dominant and/or indicator plants and for the overall tree, shrub, herb and moss/lichen layers present. In addition to these more detailed 'ground' inspections, a number of less detailed 'visual' observations were conducted. These visual surveys were usually conducted while travelling between ground inspection sites, particularly at unique or transitional sites, or from the helicopter. Both types of survey data were used to refine the delineation of ecosystem units for TEM and assisted in the creation of PEM rule sets.

3.2.6 Ecosystems and Plants of Interest

Certain plants and ecosystems have been highlighted for this report because of their conservation status or sensitivity to development. These elements of interest are collectively called "ecosystems and plants of interest."

3.2.6.1 Listed Ecosystems and Listed Plants

The BC Conservation Data Centre (BC CDC) lists ecological communities (ecosystems) and plant species as red (endangered, threatened, or extirpated), blue (of special concern) or yellow (not at risk) depending on factors such as their rarity, intrinsic vulnerability, environmental specificity, threats, and long- and short-term trends in population size or area (BC Ministry of Environment 2007a). Listed plant species may or may not also be listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and protected by the *Species At Risk Act* (SARA) (2002). Listed ecosystems are not rated by COSEWIC nor are they included in the SARA registry.

Prior to field work, a search of the online databases maintained by the BC CDC and COSEWIC were conducted for rare ecosystems and rare plant species potentially occurring in the proposed Project area (Appendices 4 and 5). The CDC database was queried to return all red and blue listed ecosystems known to occur within the Kalum and Skeena-Stikine Forest Districts and the BEC zones present within the KSM RSA. Similarly, all potential red and blue listed plant species known to occur within the BEC zones present within the RSA and known to occur within the Kitimat-Stikine Regional District were identified. Querying the database in this way is meant to refine the possibilities of listed ecosystems that may occur in the study area, and should not be seen as returning the only possibilities (limited data on the distribution of some ecosystems may mean they may not be listed for all the BEC units they actually occur in). Results of the queries were then compared to field data and mapped locations to document known (or predicted in the case of mapping) occurrences of listed ecosystems and plants.

3.2.6.2 Sensitive Ecosystems

Sensitive ecosystems as defined by the BC Ministry of Environment Sensitive Ecosystems Inventory (SEI) are fragile, or easily degraded by disturbance (McPhee et al. 2000). They are often remnants of the natural ecosystems that once occupied a much larger area (BC Ministry of Environment 2007b). Sensitive ecosystems often depend on complex ecological processes that can be easily disrupted (McPhee et al. 2000). For this project, sensitive ecosystems refer to riparian areas, wetlands, and alpine ecosystems; their particular sensitivities are discussed in the following sections.

Riparian and Floodplain Ecosystems

Riparian ecosystems are found adjacent to water bodies (including wetlands) and are transitional between aquatic and upland terrestrial ecosystems. Floodplain ecosystems, found on floodplains as the name suggests, are one type of riparian ecosystem. In general, riparian ecosystems (including floodplain ecosystems) occupy a small proportion of the landscape and contain distinctively different species and habitats that are not present elsewhere (BC Ministry of Forests 1995). Riparian and floodplain ecosystems serve a number of important ecological functions, such as providing course woody debris for fish habitat and increasing bank stability to reduce erosion (Banner and MacKenzie 1998). Riparian and floodplain ecosystems are sensitive to changes in hydrological regime (e.g., flooding frequency and duration) and to invasions of non-native plant species. Riparian ecosystems are recognized in the Cassiar-Iskut Stikine LRMP and the draft Nass South SRMP as important ecosystems to manage well (BC ILMB 2000, 2009).

In many regions of southern BC, the Riparian Areas Regulation (enacted under Section 12 of BC's *Fish Protection Act* in July 2004) mandates a buffer of 30 m on either side of a water body within which industrial, commercial and residential developments and activities are subject to special constraints. For forestry related activities throughout the province, riparian management areas range from 20 m (for small, non fish-bearing streams (stream class S6), to 30 m (for stream class S5 and for wetland classes 2, 3 and 4) to 100 m (for large, fish-bearing streams (stream class S1) (BC Ministry of Forests and Range 2004).

Floodplain ecosystems were delineated alongside large rivers via TEM and PEM. Riparian areas alongside smaller streams are too small to map using those methodologies. To estimate the extent of riparian areas missed by mapping, a 30 m buffer was applied to both sides of all TRIM streams and rivers within the LSA and RSA excluding areas that were already mapped as specific floodplains in the TEM or PEM (e.g., those site series described in Tables 4.2.5 and 4.2.6). This buffer matches that required by the *Riparian Areas Regulation Act* and is within the range of riparian management areas and zones required for forestry activities. This buffer width may overestimate the extent of riparian vegetation in some portions of the study area, and underestimate it in other portions, but serves to highlight where sensitive vegetation and ecosystems may occur, and thus where special management may be recommended. Wetlands were not buffered because field surveys indicated riparian areas are minimal around wetlands in the KSM local study area.

Wetland Ecosystems

Wetlands are dynamic, low-lying areas on the landscape that are saturated with water for a significant portion of the growing season. They include both the wet basin and surrounding transitional area between wetter areas and upland vegetation (Mackenzie and Moran 2004; Huel 2000). Wetlands range from small, shallow areas of water that are present for only a few weeks after snow melt, to sites that comprise large, permanent open water zones (Stewart and Kantrud 1971). Wetlands are particularly important ecosystems as they fulfill a wide range of ecological, hydrological, biochemical and habitat functions (Environment Canada 2003). They maintain water quality and regulate water flow on the landscape (MacKenzie and Moran 2004). They also provide habitat for a wide variety of wildlife. Wetlands are sensitive to changes in hydrologic regime, and many wetlands in the province (up to 70% in some regions) have been altered or lost due to human activity (Ducks Unlimited Canada 2010). Wetland ecosystems are recognized in the Cassiar-Iskut Stikine LRMP and the draft Nass South SRMP as important ecosystems to manage well (BC ILMB 2000, 2009).

Wetland ecosystems in BC may be classified using the *Wetlands of British Columbia* guide (MacKenzie and Moran 2004). Forested wetlands (bogs and swamps) are also classified separately using the BEC system, as are generic non-forested wetlands. Thus certain wetland ecosystems have two different codes, reflecting the two different classification schemes (e.g., the Fm03 is a code used in the BC Wetland Classification system, but is called the ICHvc/05 site series in the BEC field guide). The BC wetland classification system was utilized for mapping wetlands in the field and, where possible, for non-forested wetlands via the TEM in the LSA, but was not utilized in the PEM as the wetland classification is too detailed for PEM capabilities. TRIM data of generic marshes, swamps and fens were also utilized for the PEM.

A description of the quantity, size and location of wetlands as well as the hydrological physical, chemical and biological characteristics of wetlands are also presented in the *KSM Wetland Baseline Report* (Rescan 2010d).

Alpine Vegetation

Alpine ecosystems are defined by a general absence of trees, although krummholz forms may exist. Alpine ecosystems are often dominated by non-vegetated areas, such as permanent snow, glaciers and rock outcrops. The vegetated areas are dominated by herb, dwarf shrub, moss, or lichen layers. Alpine vegetation is considered sensitive because disturbed vegetation may not recover to pre-disturbance levels even in the long-term (Frank and del Moral 1986; Forbes, Ebersole, and Strandberg 2001; Mingyu et al. 2009). This situation is particularly true of dwarf shrubs and krummholz trees which, despite their small stature, may be very old because the harsh growing conditions in the alpine result in slow growth. Protecting alpine ecosystems is a goal of the Cassiar-Iskut Stikine LRMP (BC ILMB 2000).

3.2.6.3 Invasive Plant Species

Invasive plants generally refer to species (native or non-native) that have the ability to out-compete native species when introduced into natural settings (Haber 1997). Typically, invasive plants aggressively establish in disturbed areas, thereby decreasing biodiversity and forest and range productivity (Polster 2005). In BC, invasive plant species are referred to as nuisance or noxious weeds, the latter term reserved for those that are particularly aggressive for which the *Weed Control Act* (1996) applies. A review of invasive plants (both noxious and nuisance weeds) in BC (Cranston, Ralph, and Wikeem 2002) was conducted prior to fieldwork, and the results were compared with baseline field results to document any invasive plants present in the proposed Project area.

3.2.7 Metal Concentrations in Plant Tissue

Tracking metal concentrations in plant tissues is a standard requirement of a mine permit application and is used to guide reclamation planning and establishment of end land use objectives (BC Ministry of Energy and Mines 1998). The analysis aims to describe the metal levels that naturally occur in vegetation growing within the study area. Future plant tissue metal concentrations may be compared to baseline values to assess any changes.

Plant species targeted for metals sampling were based on the following:

- likelihood of food source for people or animals;
- frequency of occurrence/ease of collection; and
- rate of bioaccumulation (i.e., known bioindicators).

For example, willow (*Salix* spp.) is eaten by moose (*Alces alces*) in the fall and winter and is a proven bioindicator of Cadmium (Cd) and Zinc (Zn) (Pugh et al 2002, Vandercasteele et al. 2002). Moose is a focal species discussed in the Wildlife Characterization Baseline Report (Rescan 2010c). *Vaccinium* spp. leaves/berries are also a food source, and studies near contaminated sites have shown high heavy metal concentrations in *Vaccinium* spp. tissues in plants near these sites (Pugh et al. 2002, Bagatto and Shorthouse 1991, Poykio et al. 2005). Little information is available about metal uptake in plant species such as red raspberry (*Rubus idaeus*), black huckleberry (*Vaccinium membranceum*) and Sitka valerian (*Valeriana sitchensis*). However, the prevalence of these species in the study area, and their likelihood of being used as a food source by humans and wildlife (including grizzly bear, *Ursus arctos*), provides the rationale for including their sampling.

The above-ground portion of herbaceous plants and the new growth of woody species (shrubs) were sampled. Soil and root material was removed prior to the sample being placed into a plastic sampling bag. Plant samples were sent to ALS Environmental in Vancouver, BC, for analysis.

Uptake, allocation and concentration of various metals differ according to factors such as species, tissue type, time of year, soil type, and distance to source of contamination (Bagatto and Shorthouse 1990; Pugh, Dick, and Fredeen 2002; Mbila and Thompson 2004; Poykio et al. 2005). For this reason, metal concentrations in leaves and berries were summarized separately depending on each species/tissue type. As well, within each species, samples were categorized as either "control" (for samples greater than 500 m from proposed infrastructure including pits, roads, and tailing management facility) or "infrastructure" (for samples within 500 m of proposed infrastructure). The distance of 500 m was chosen because the majority of fugitive dust created during the lifetime of the Project would be expected to settle within this distance (US EPA 1995; Auerbach, Walker, and Walker 1997). Metal concentrations with values below the detection limit were replaced with half the value of the detection limit for summary calculations. Although this methodology for addressing what are

essentially missing values does not capture the true frequency distribution of the concentrations (Nosal, Legge, and Krupa 2000), assigning values to undetected concentrations in this manner is common practice where it can be assumed the values are not zero, but where the level of risk is low enough not to warrant additional statistical analyses (i.e., with regards to human health) (US EPA 2000).

4. Results

This section describes the vegetation and ecosystems in the LSA and RSA at two scales. First, the broad-scale regional ecosystems (BEC units) are described, and second, the finer-scale general ecosystem types, vegetation structural stages, ecosystems and plants of interest and metal concentrations of plant tissues are described.

4.1 BROAD-SCALE ECOSYSTEMS: BIOGEOCLIMATIC ECOSYSTEM CLASSIFICATION (BEC) UNITS

Six BEC units occur within the LSA and RSA, including both coastal and interior units (Tables 4.1-1 and 4.1-2). Four of the six BEC units are forested, while two are alpine / parkland units. In the LSA and the RSA, the two alpine BEC units, Boreal Altai Fescue Alpine undifferentiated parkland (BAFAunp) and Coastal Mountain-heather Alpine undifferentiated parkland (CMAunp), together contribute more than 40% of the study areas.

The RSA contains a higher proportion of interior BEC units than coastal BEC units overall (65% versus 35%). In the LSA, the coastal BEC units (CMAunp, Coastal Western Hemlock wet maritime subzone (CWHwm), and the Mountain Hemlock leeward moist maritime variant (MHmm2) are generally more prevalent in the Western LSA and the Coulter Access Corridor, while the transitional/interior BEC units (BAFAunp, Interior Cedar Hemlock very wet cold subzone (ICHvc), and Engelmann Spruce - Subalpine Fir wet very cold subzone (ESSFwv) are generally more prevalent in the Eastern LSA and the Mitchell-Teigen Tunnel LSA.

Table 4.1-1. BEC Units in the Regional Study Area

BEC Unit Name	Description	BEC Unit Label	RSA Extent (ha)	RSA Extent (%)
Boreal Altai Fescue Alpine - Undifferentiated Parkland Subzone	Alpine/Parkland	BAFAunp	87,995	26
Coastal Mountain-heather Alpine - Undifferentiated Parkland Subzone	Alpine/Parkland	CMAunp	65,036	19
Coastal Western Hemlock - Wet Maritime Subzone	Low elevation forest (coastal)	CWHwm	17,835	5
Engelmann Spruce – Subalpine Fir Wet Very Cold Subzone	Subalpine forest (interior)	ESSFwv	81,443	24
Interior Cedar Hemlock - Very Wet Cold Subzone	Low elevation forest (interior)	ICHvc	47,404	14
Mountain Hemlock - Leeward Moist Maritime Variant*	Subalpine forest (coastal)	MHmm2	38,294	11
Total			**338,008**	**100**

** The official ecological classification of the Mountain Hemlock BEC unit in the vicinity of the KSM Project is currently incomplete; subzones and/or variants are not yet recognized or documented for this area. However, data collected by field personnel during the 2008 and 2009 baseline field studies, and consultation with the Research Ecologist at the Ministry of Forests and Range office in Smithers, resulted in reclassification of the KSM Project location from MHun (undifferentiated) to the Mountain Hemlock leeward moist maritime (MHmm2) BEC unit.*

Table 4.1-2. BEC Units in the Local Study Area

BEC Unit	Western LSA Extent (ha)	Coulter Access Corridor Extent (ha)	Mitchell-Teigen Tunnel LSA Extent (ha)	Eastern LSA Extent (ha)	Total LSA Extent (ha)	Total LSA Extent (%)
BAFAunp	303	200	1,928	5,365	7,795	14
CMAunp	11,578	3,044	412	0	15,033	27
CWHwm	133	4,360	0	0	4,493	8
ESSFwv	0	2,511	757	12,247	15,515	28
ICHvc	0	0	0	908	908	2
MHmm2	5,232	6,211	0	0	11,443	21
Total	**17,247**	**16,325**	**3,097**	**18,519**	**55,187**	**100**

4.1.1 Boreal Altai Fescue Alpine – Parkland (BAFAunp)

The BAFA zone is one of three alpine BEC zones. It is found at high elevations in the provinces' interior. The parkland region is the transitional zone in between forested subzones at lower elevations and the true alpine at higher elevations (B.C. Ministry of Forests and Range 2006). Vegetation is dominated by spruce and subalpine fir (B.C. Ministry of Forests and Range 2006), dwarf willows, sedges, lichens and grasses (Banner et al. 1993).

4.1.2 Coastal Mountain-Heather Alpine – Parkland (CMAunp)

The CMA zone is another alpine BEC zone and occurs at high elevations on the coastal mountains. The parkland region is the transitional zone in between forested subzones at lower elevations and the true alpine at higher elevations (B.C. Ministry of Forests and Range 2006). This zone is a relatively moist environment, and tends to have a deeper snowpack and begin at lower elevations than the other alpine zones (B.C. Ministry of Forests and Range 2006). The CMA parkland vegetation consists of mountain heathers (*Cassiope* spp.), while mountain hemlock (*Tsuga mertensiana*), yellow-cedar (*Chamaecyparis nootkatensis*) and subalpine fir (*Abies lasiocarpa*) are the treeline tree species that are primarily in krummholz form (BC Ministry of Forests and Range 2006).

4.1.3 The Coastal Western Hemlock Zone – Wet Maritime Subzone (CWHwm)

The CWH occupies low to mid elevations along coastal regions of BC. The climate is moderated by the proximity of the ocean, and is typified by large amounts of precipitation and relatively warm temperatures. The CWHwm (wet maritime subzone) is the most northerly of the CWH subzones, and has heavier snow and a shorter growing season than more southerly subzones (Banner et al. 1993). It occurs at elevations from 0 to 600 m. The summer is cool and moist, fall is very wet, and winter is cool and has heavy, wet snowfalls. Climatic data from the nearby town of Stewart, which is representative of this subzone, suggests a mean annual temperature of 5.1ºC and mean annual precipitation of 1,843 mm (Banner et al. 1993).

This subzone is noted for its low plant species diversity; unlike more southerly subzones. Zonal sites are typically dominated by western hemlock (*Tsuga heterophylla*) and Sitka spruce (*Picea sitchensis*). Blueberries, both oval leaved blueberry (*Vaccinium ovalifolium*) and Alaskan blueberry (*Vaccinium alaskaense*), are abundant in the understory (except in floodplain sites), and typically occur with false azalea (*Menziesia ferruginea*), bunchberry (*Cornus canadensis*), five-leaved bramble (*Rubus pedatus*), and spiny wood fern (*Dryopteris expansa*). Western red cedar (*Thuja plicata*), yellow cedar and amabalis fir are uncommon or absent (Banner et al. 1993).

4.1.4 Engelmann Spruce – Subalpine Fir Zone - Very Cold Subzone (ESSFwv)

The ESSF zone is broadly transitional between true coastal and interior BEC units. The ESSF zone is the highest forested zone in BC, occurring on rugged mountainous terrain throughout the province at elevations above other forested zones (Coupe et al. 1991, Banner et al. 1993). The ESSFwv (wet, very cold ESSF) is the most northerly ESSF subzone in BC, occupying the northwestern part of the province (north of the Skeena River), typically between 900 and 1,550 m in elevation. It is one of the wetter subzones in the ESSF, with mean annual precipitation ranging from 650 to 1,100 mm (Banner et al. 1993). It has a snowier winter and a moister growing season than other ESSF subzones. Growing season moisture deficits are unlikely (Banner et al. 1993). Snow may persist for six to nine months (Banner et al. 1993).

The forests are predominately coniferous. Zonal sites represent moderately productive forests, and are dominated by subalpine fir. The ESSFwv subzone commonly has a moderately dense ericaceous shrub layer and a very productive herbaceous layer on zonal sites (Coupe, Stewart, and Wikeem 1991). The dominant understorey plants are black huckleberry, oval-leaved blueberry, false azalea, five-leaved bramble, bunchberry, red-stemmed feathermoss (*Pleurozium schreberi*), and leafy liverworts.

4.1.5 The Interior Cedar Hemlock (ICH) – Very Wet Cold Subzone (ICHvc)

The ICH zone is a transitional zone between the wetter CWH zone to the west and the drier Sub-Boreal Spruce (SBS) zone to the east, and contains both coastal and interior plant species. The ICH zone contains the highest number of tree species of all the biogeoclimatic zones in BC (BC MoFR 1996). The ICHvc ranges in elevation from 240 to 1,000 m. The subzone is cool and moist year-round with a thick and long-lasting snowpack, thus zonal sites are productive forests containing moisture-loving species such as devil's club (*Oplopanax horridus*) and oak fern (*Gymnocarpium dryopteris*) (Ketcheson et al. 1991; Banner et al. 1993).

4.1.6 The Mountain Hemlock Zone - Moist Maritime Subzone – Leeward Variant (MHmm2)

The Mountain Hemlock (MH) zone is the subalpine zone of BC's Coast Mountains, and is the coastal counterpart to the interior's ESSF zone. As with the ESSF, continuous forests give way to patchy clumps of trees, subalpine heath and lush meadows at higher elevations (Banner et al. 1993).

The ecological classification of the Mountain Hemlock BEC unit in the vicinity of the KSM Project is currently incomplete; subzones and/or variants are not yet recognized or documented for this area. However, data collected by field personnel during the 2008 baseline field studies, and consultation with the Research Ecologist at the Ministry of Forests and Range office in Smithers, resulted in reclassification of the KSM Project location from MHun subzone to the MHmm2 variant. The MHmm2 in the region generally starts at 900 to 950m in elevation, becomes parkland at 1100 to 1150 m and alpine at 1,450 m (Banner 2009). The MHmm2 has a climate transitional between the coast and interior, characterized by long, moist, cold winters and short, cool, moist summers. Heavy snow, a short growing season, wet soils and exposure to wind and cold reduces the forest productivity in this zone (Banner et al. 1993). Forests on zonal sites are dominated by amabalis fir (*Abies amabilis*) and mountain hemlock, with western hemlock occurring at lower elevations and subalpine fir occurring less commonly (Pojar, Klinka, and Demarchci 1991).

4.2 FINE-SCALE ECOLOGY: GENERAL ECOSYSTEM TYPES, VEGETATION STRUCTURAL STAGES, AND ECOSYSTEMS OF INTEREST

This section describes the distribution of ecosystems and structural stages across the landscape. It is important to note that ecosystems identified by the PEM may not be identified by the TEM and vice versa. Those identified by the PEM and not the TEM are primarily a function of the size of area mapped by PEM. The larger area provides more opportunity for different ecosystems to be mapped as different combinations of site conditions are more likely to occur. Ecosystems identified by the TEM and not the PEM are largely due to the ability to identify more specific ecosystems. For example, different water features (e.g., rivers, lakes, reservoir, shallow open water) and non-vegetated or sparsely vegetated areas (e.g., rock, talus, exposed soil) can be identified through air photo interpretation but are difficult to model. Similarly, some ecosystems identified in the field may not have been mapped, due to the level of detail that is possible to collect in the field but not through mapping.

4.2.1 Summary of General Ecosystem Types

When vegetation mapping is conducted for a site using the BEC system, the mapping product can contain up to several hundred combinations of BEC subzones, variants and structural stages. Hence, for ease of interpretation, these units are grouped together into General Ecosystem Types.

4.2.1.1 General Ecosystem Types in the Local Study Area

The most common general ecosystem types in the LSA are non-vegetated and sparsely vegetated. Together, these general ecosystem types make up 35% of the LSA in total, being proportionally highest in the Mitchell-Teigen Tunnel LSA where together they account for over 90% of that area.

Mesic forests are the most common forested type within the LSA (Figure 4.2-1, Table 4.2-1). This is true within each of the subareas, except for the Mitchell-Teigen Tunnel LSA, which is dominated by non-forested ecosystems such as drier and mesic herbaceous ecosystems and avalanche tracks. Mesic herb, wetter forests, parkland forest/krummholz and avalanche tracks are the next most common general ecosystem types overall in the LSA. The remaining general ecosystem types, including floodplain forests and drier forests, comprise less than 5% each of the overall LSA.

The extent of each general ecosystem type with its corresponding site series within the LSA is summarized in Appendix 7. Detailed Terrestrial Ecosystem Mapping for the four subareas within the LSA is found in Appendix 8.

4.2.1.2 General Ecosystem Types in the Regional Study Area

Almost half of the RSA, mapped by PEM, is comprised of non-vegetated units such as water, glaciers and rock outcrops, and sparsely vegetated areas (e.g., in the alpine) (Figure 4.2-2, Table 4.2-2,). Of the vegetated portions, mesic forests dominate, accounting for 63,851 ha (19%) in total. Non-forested avalanche track ecosystems are also quite common, accounting for 11% of the RSA. Drier forested and non-forested units are predicted to be relatively uncommon, accounting for approximately 1% each of the RSA. The remaining general ecosystem types are predicted to comprise no more than 7% each of the RSA.

The extent of each general ecosystem type with their corresponding site series within the RSA is summarized in Appendix 9.

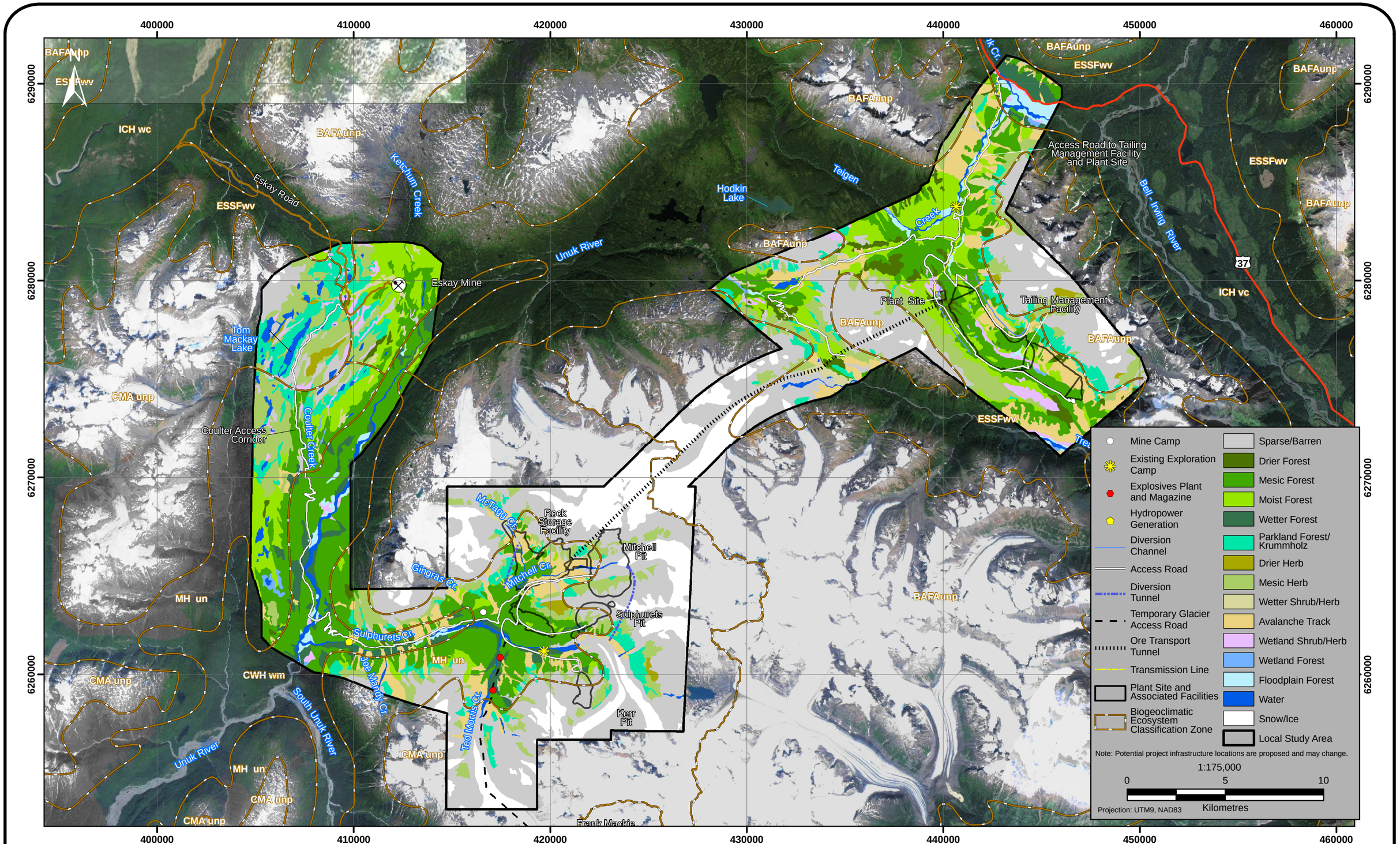

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FIGURE 4.2-1

KSM Project - Distribution of General Ecosystem Types in the Local Study Area

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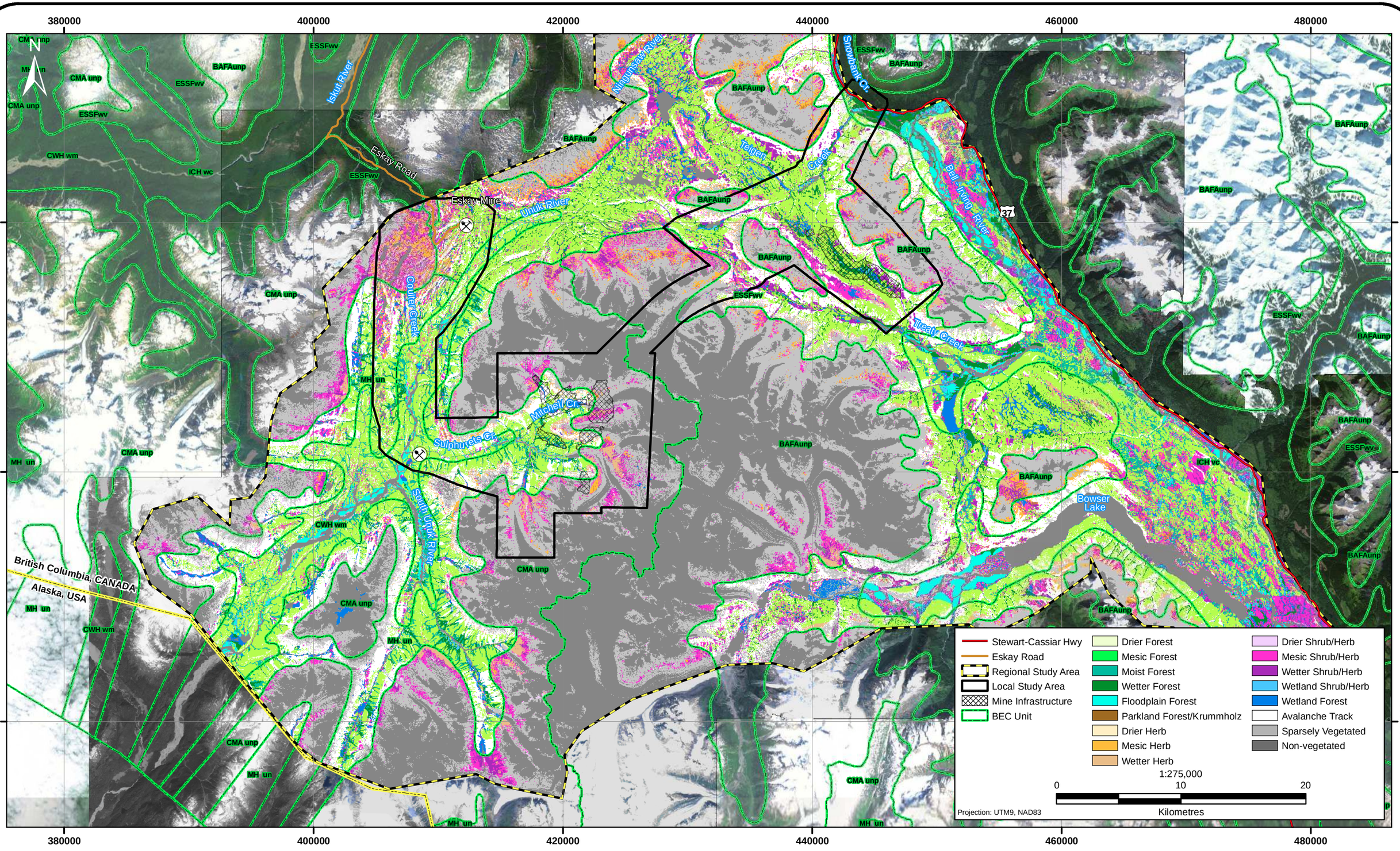

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FIGURE 4.2-2

KSM Project - Distribution of General Ecosystem Types in the Regional Study Area

Rescan™

Table 4.2-1. General Ecosystem Types in the Local Study Area

General Ecosystem Type	Western LSA Extent (ha)	Coulter Access Corridor Extent (ha)	Mitchell-Teigen Tunnel LSA Extent (ha)	Eastern LSA Extent (ha)	Total LSA Extent (ha)	Total LSA Extent (%)
Avalanche Track	1,115	638	44	1,791	6,588	7
Drier Forest	9	190	0	832	1,031	2
Drier Herb	678	272	82	502	1,533	3
Drier Shrub/Herb*	N/A	N/A	N/A	N/A	N/A	N/A
Floodplain Forest	76	340	0	478	894	2
Mesic Forest	1,776	4,213	0	3,216	9,201	17
Mesic Herb	1,449	2,230	80	2,522	6,281	11
Mesic Shrub/Herb*	N/A	N/A	N/A	N/A	N/A	N/A
Moist Forest	588	1,480	0	307	2,375	4
Non-vegetated	4,406	990	1,632	882	11,008	14
Parkland Forest/Krummholz	900	1,633	56	1,070	3,659	7
Sparsely Vegetated	5,884	1,204	1,176	3,299	8,466	21
Wetland Forest	28	184	0	91	303	1
Wetland Shrub/Herb	28	1,089	0	645	1,761	3
Wetter Forest	265	1,667	0	2,646	4,578	8
Wetter Herb*	N/A	N/A	N/A	N/A	N/A	N/A
Wetter Shrub/Herb	46	196	27	238	506	1
Grand Total	**17,247**	**16,325**	**3,097**	**18,519**	**55,187**	**100**

**these general ecosystem types were mapped by the PEM only*

Table 4.2-2. General Ecosystem Types in the Regional Study Area

General Ecosystem Type	RSA Extent (ha)	RSA Extent (%)
Avalanche Track	38,821	11
Drier Forest	2,187	1
Drier Herb	120	0
Drier Shrub/Herb	1,862	1
Floodplain Forest	3,970	1
Mesic Forest	63,851	19
Mesic Herb	6,890	2
Mesic Shrub/Herb	22,066	7
Moist Forest	8,993	3
Non-vegetated	85,589	25
Parkland Forest/Krummholz	5,134	2
Sparsely Vegetated	71,222	21
Wetland Forest	1,433	0
Wetland Shrub/Herb	5,672	2
Wetter Forest	8,196	2
Wetter Herb	1,486	0
Wetter Shrub/Herb	10,514	3
Grand Total	**338,008**	**100**

4.2.2 Vegetation Structural Stage

The LSA and RSA contain a mix of forested and non-forested structural stages, as described further in Sections 4.2.2.1 and 4.2.2.2. Spatially, forests are found largely along valley bottoms and undisturbed side slopes, while herb meadows, snow/ice, and barren areas dominate the landscape at the highest elevations (Figure 4.2-3 and 4.2-4).

4.2.2.1 Vegetation Structural Stages in the Local Study Area

Structural stage 1 (sparse/byroid) is the most extensive structural stage, accounting for approximately 21% of the overall LSA (Table 4.2-3). Herb/dwarf shrub and mature forest are next most abundant, both accounting for approximately 18% of the overall LSA. Shrub/herb (which includes krummholz), young forest and old forest comprise the remaining portions of the vegetated landbase. Non-vegetated areas (e.g., water, rock outcrops) are very common, particularly in the Mitchell-Teigen Tunnel LSA where they cover more than 50% of the area. More detailed structural stage mapping for the four subareas within the LSA is found in the TEM (Appendix 8).

Table 4.2-3. Vegetation Structural Stages in the Local Study Area

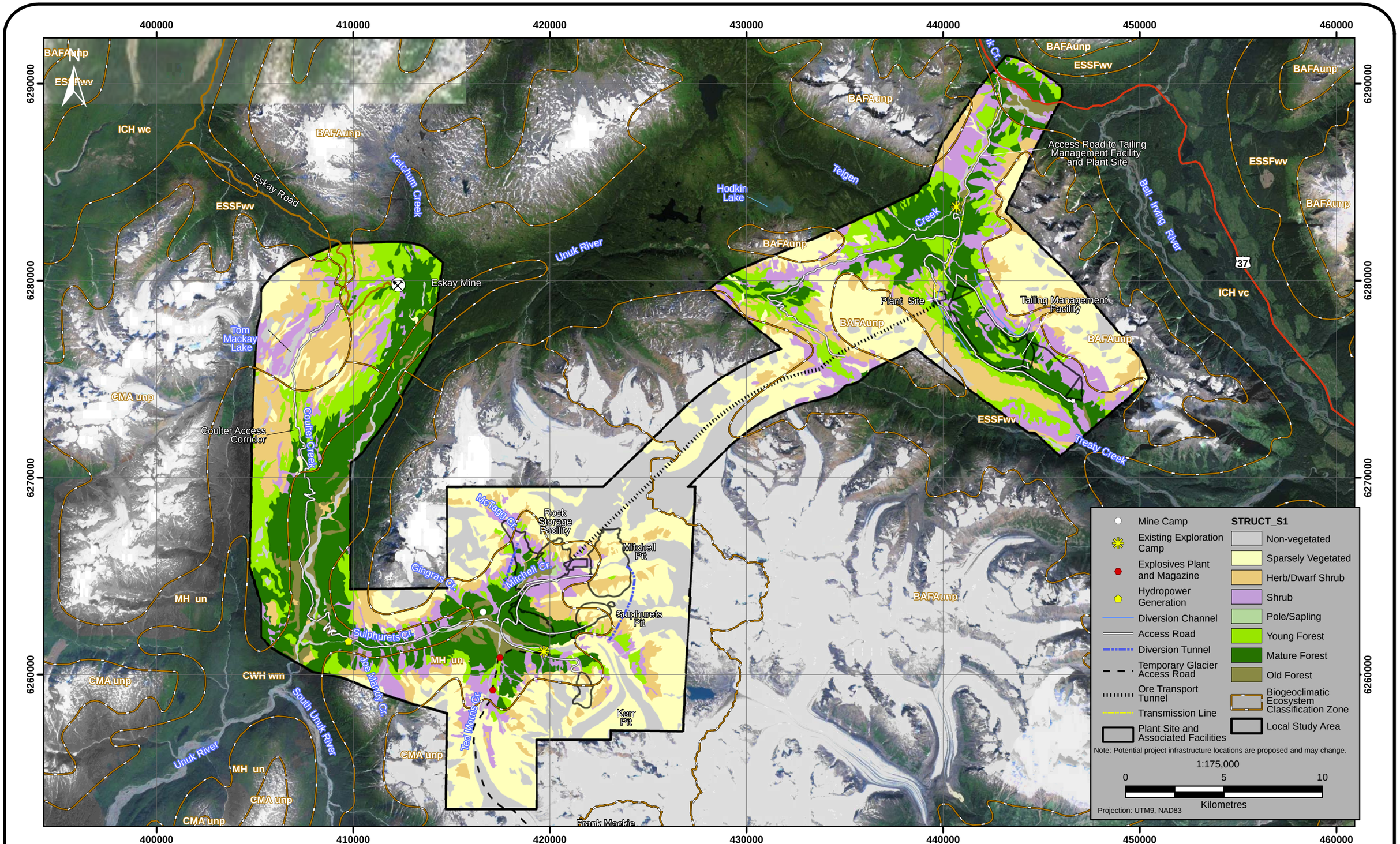
Structural Stage Code	Structural Stage	Western LSA Extent (ha)	Coulter Access Corridor Extent (ha)	Mitchell-Teigen Tunnel LSA Extent (ha)	Eastern LSA Extent (ha)	Total LSA Extent (ha)	Total LSA Extent (%)
1	Sparse/Bryoid	5,934	1,216	1,815	3,346	11,681	21
2	Herb/Dwarf Shrub	2,295	3,577	165	3,711	9,745	18
3	Shrub/Herb	1,831	2,051	126	3,536	7,545	14
4	Pole/Sapling	19	0	0	0	19	0.03
5	Young Forest	641	2,425	0	3,167	6,233	11
6	Mature Forest	1,655	4,904	0	3,609	10,168	18
7	Old Forest	516	1,175	0	315	2,006	4
N/A	Non-vegetated	4,355	978	1,623	835	7,792	14
Grand Total		**17,247**	**16,325**	**3,114**	**18,519**	**55,187**	**100**

4.2.2.2 Vegetation Structural Stages in the Regional Study Area

Almost half of the RSA is non-vegetated or sparsely vegetated (Table 4.2-4). Mature to old forests comprise a quarter of the RSA, and shrub-dominated ecosystems are also very common.

Table 4.2-4. Vegetation Structural Stages in the Regional Study Area

Structural Stage Code	Structural Stage	RSA (ha)	RSA (%)
1	Sparse/Bryoid	71,222	21
2	Herb/Dwarf shrub	14,050	4
3	Shrub/Herb	80,382	24
4,5	Young Forest	1,435	0.4
6,7	Mature/Old Forest	85,330	25
N/A	Non-vegetated	85,589	25
Grand Total		**338,008**	**100**



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KSM Project - Structural Stages in the Local Study Area

FIGURE 4.2-3

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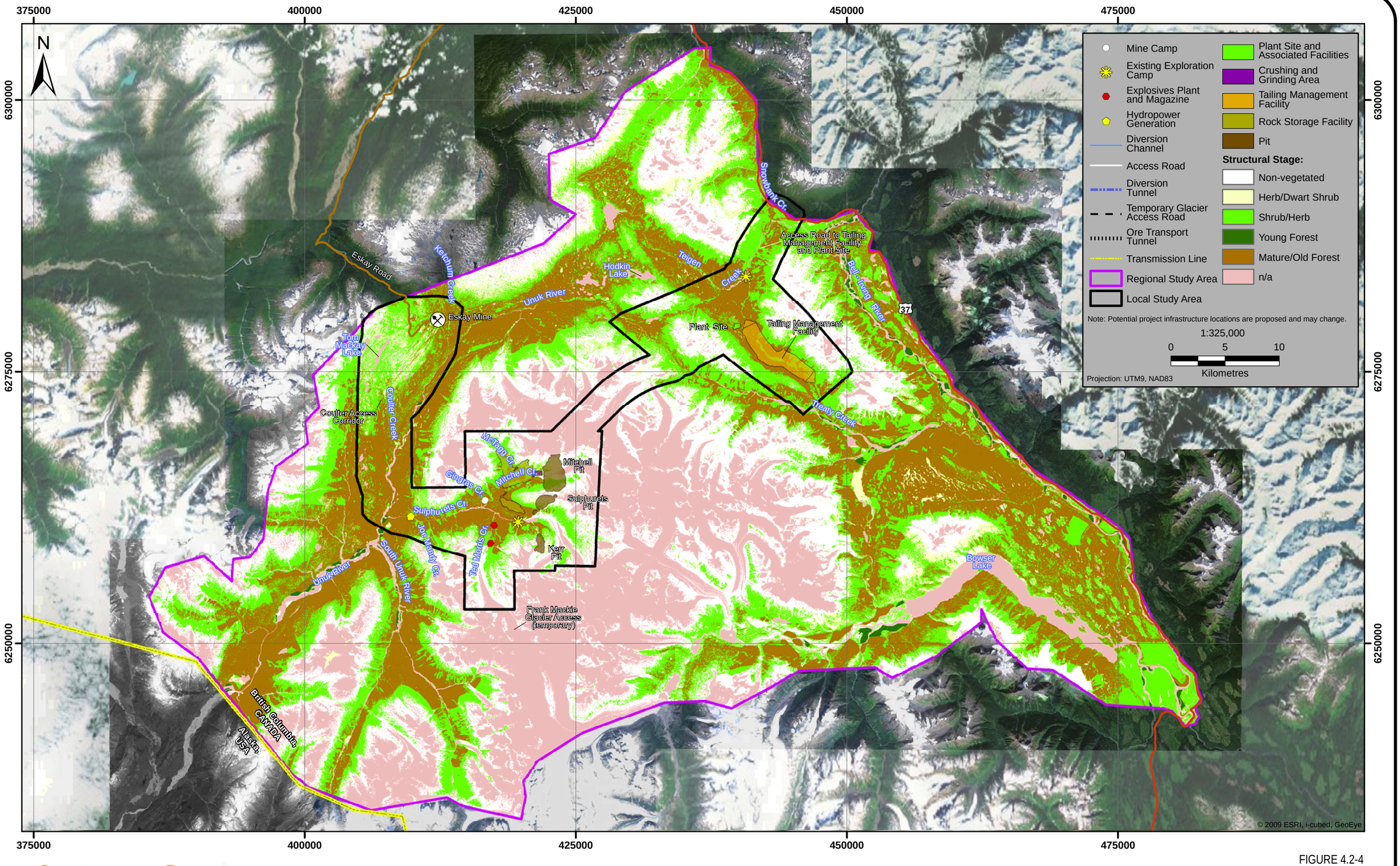

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FIGURE 4.2-4

KSM Project - Distribution of Structural Stages in the Regional Study Area

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4.2.3 Ecosystems Identified in the Field

A total of 208 survey plots (45 sites series and 14 general ecosystem types) were surveyed during 2008 and 2009 field studies (Figure 4.2-5) (Appendix 6). Surveys were most often within the ESSFwv, followed by the MHmm2, while BAFAunp and ICHvc were least sampled (Figure 4.2-6). Mesic forests were the most commonly sampled general ecosystem types, accounting for 33% of the surveys. Mesic herb and avalanche track ecosystems were the next most commonly sampled general ecosystem types, accounting for 15% and 11% of the surveys, respectively. All other general ecosystem types account for less than 10% each of the survey effort.

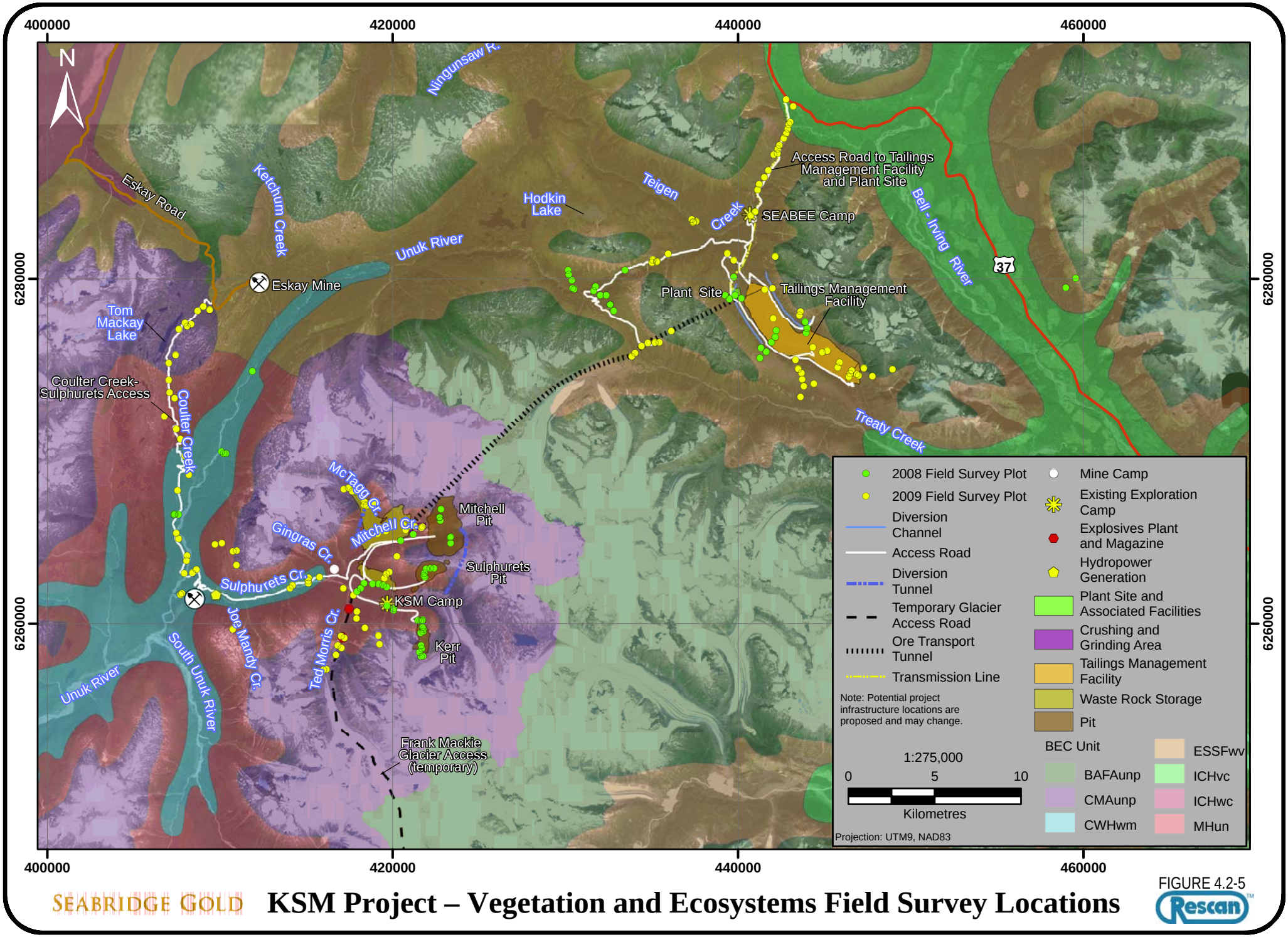
4.2.4 Listed Ecosystems

The BC CDC currently tracks 66 ecological communities (ecosystems) within the Kalum and Skeena-Stikine Forest Districts and within the BEC zones present in the RSA (Appendix 5). Of these communities, 52 are blue listed and 14 are red listed. Eight listed ecosystems and one category of potentially listed ecosystems were mapped, predicted, or identified in the field during baseline studies (Table 4.2-5, Figure 4.2-7). Descriptions of each listed community are provided in this section.

Table 4.2-5. Extent of Listed Ecosystems

Scientific Name	English Name	Ecosystem Unit	BC CDC Status	LSA (ha) (TEM)[1]	RSA (ha) (PEM)[1]	# of Field Plots[2]
Populus balsamifera – Abies lasiocarpa – Oplopanax horridus	Cottonwood – subalpine fir – devil's club	ICHvc/05[3] (Fm03)	Blue	185	0.3	3
Alnus incana – Equisetum arvense	Mountain alder – common horsetail	Fl01[3]	Blue	N/A	N/A	1
N/A	Unclassified floodplain	FP[4]	Blue	290	1	4
Tsuga heterophylla - Picea sitchensis/Hylocomium splendens	western hemlock – Sitka spruce/step moss	CWHwm/02	Blue	105	640	0
Picea sitchensis/Rubus spectabilis Wet Maritime	Sitka spruce/salmonberry Wet Maritime	CWHwm/05	Blue	252	42	5
Populus balsamifera ssp. *Trichocarpa – Alnus rubra/ Rubus spectabilis*	Black cottonwood – red alder/salmonberry	CWHwm/06	Blue	47	452	1
Tsuga heterophylla/ Sphagnum girgensohnii	western hemlock/common green peat-moss	CWHwm/08	Blue	3	327	0
Picea sitchensis/ Lysichiton americanus (Thuja plicata – Tsuga heterophylla – Lysichiton americanus)	Sitka spruce/skunk cabbage (CwHw - skunk cabbage)	CWHwm/09 (Ws54)	Blue	39	183	1
Alnus incana - Athyrium filix (Alnus incana – Lysichiton americanus – Athyrium filix-femina and *Alnus incana – Cornus stolonifera – Athyrium filix-femina)*	Mountain alder - lady fern (Ws01 - Mountain alder - skunk cabbage - lady fern and Fl02 - mountain alder - red-osier dogwood – lady fern)	ICHvc/52 (Ws01, Fl02)	Blue	12	N/A	0

[1] *Areas of these ecosystems may be less than stated, particularly for those mapped by PEM. Site series CWHwm/09 and CWHwm/10 were lumped together by PEM, as were CWHwm/06 and CWHwm/07.*
[2] *Includes field data from wetland surveys (Rescan 2010d).*
[3] *Although not technically listed by the BC CDC within the ESSFwv BEC unit where these plots were located, correspondence with CDC personnel (Cadrin pers comm 2010) suggests that this is an issue of limited data on their distribution.*
[4] *These areas likely include both CDC-listed and non-listed floodplain forests.*

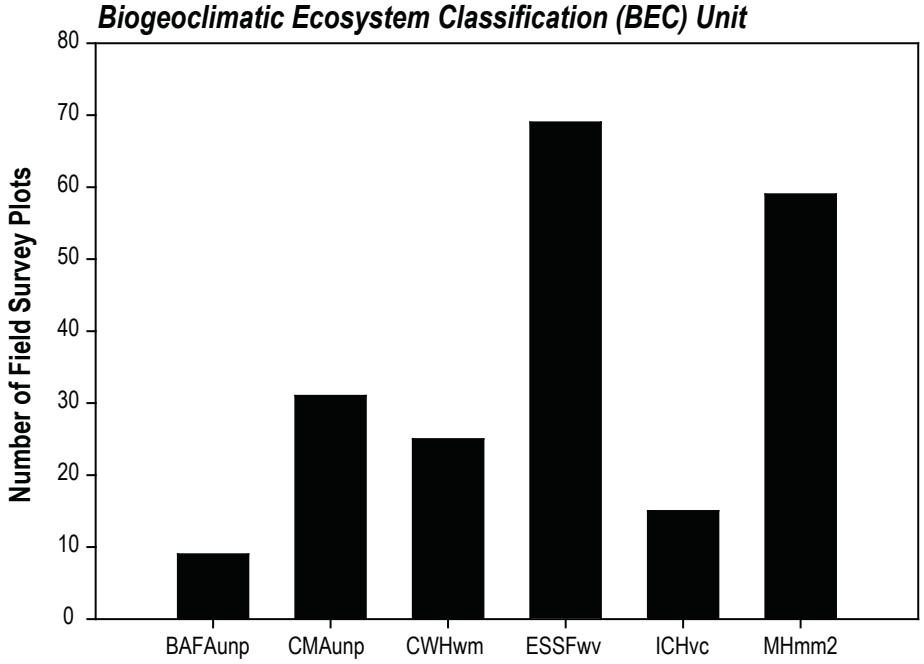


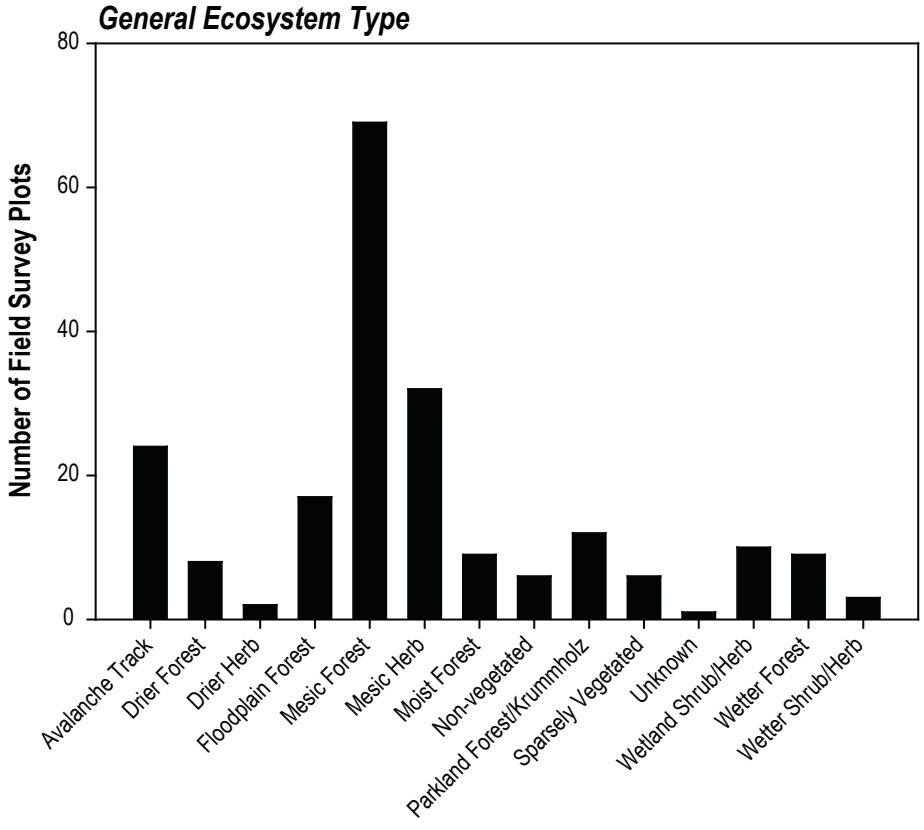
SEABRIDGE GOLD

KSM Project – Vegetation and Ecosystems Field Survey Locations

FIGURE 4.2-5

Rescan





Biogeoclimatic Ecosystem Classification (BEC) Units and General Ecosystem Types

FIGURE 4.2-6

SEABRIDGE GOLD

Rescan™

The following should be noted:

1. The extents listed are estimates only, as listed ecosystems require on-the-ground identification. This situation is particularly true of ecosystems mapped via PEM. As well, certain ecosystems, for example CWHwm/06 and CWHwm/09, are difficult to model and delineate because their landscape position and moisture regimes are similar to CWHwm/07 and CWHwm/10, respectively. Actual areas of these ecosystems may be less than is stated, but to be conservative, the maximum modelled area is assumed.

2. Two of the listed floodplain units (ICHvc/05 (Fm03) and Fl01) were identified during field studies. Although not technically listed by the BC CDC within the ESSFwv BEC unit where these plots were located, correspondence with CDC personnel (Cadrin pers comm 2010) suggests that this non-listing is more of a result of limited data on its distribution at this point in time, rather than its abundance in that BEC unit.

3. Floodplain sites within the study area were mapped as unclassified floodplains (FP) in both the TEM and the PEM where the BEC unit does not have floodplain sites defined for it (i.e., ESSFwv, MHmm2). Polygons mapped as FP may include CDC-listed floodplain ecosystems such as Fl01, Fl02 and Fm03, as well as non-listed ecosystems such as willow-dominated gravel bars. All polygons labelled as FP were included as listed floodplains to err on the conservative side. In floodplain areas that may be affected by the Project, field surveys to confirm the floodplain community type should be conducted prior to construction. Floodplain sites surveyed in the field were identified as an unclassified floodplain (FP) as well, when the plot did not fit any of the floodplain types described in the Wetlands of BC guide (Mackenzie and Moran 2004).

Fm03: Cottonwood – subalpine fir – devil's club (Populus balsamifera – Abies lasiocarpa – Oplopanax horridus)

This middle-bench floodplain forest occurs on sandy or gravelly flats adjacent to streams and rivers with relatively prolonged flood durations (Mackenzie and Moran 2004). Cottonwood (*Populus balsamifera*) forms an open canopy with scattered subalpine fir and interior spruce, and devil's club is abundant in the understorey (Mackenzie and Moran 2004). Soils are moist to very moist, and rich to very rich.

Fl01: Mountain alder – common horsetail (Alnus incana – Equisetum arvense)

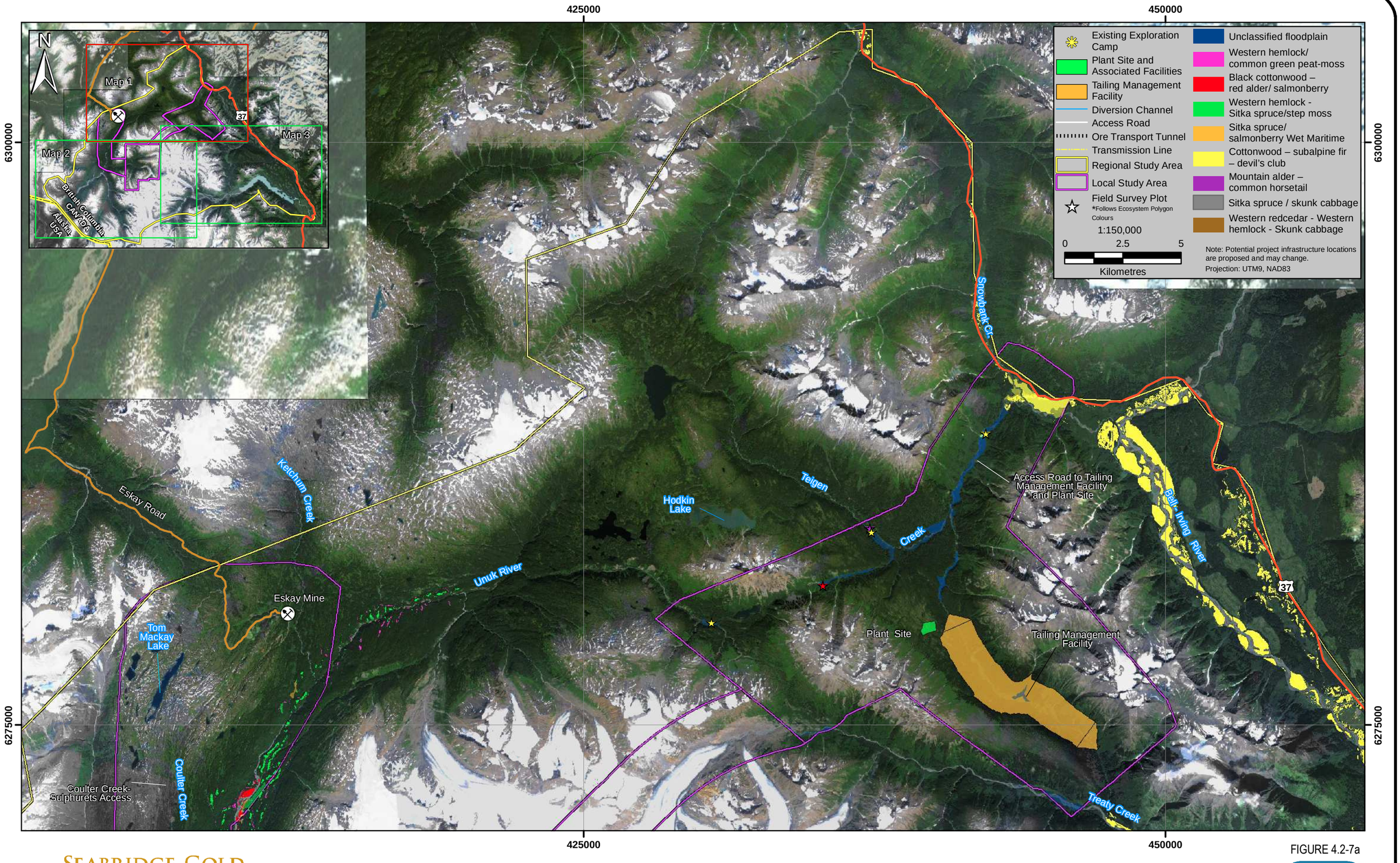
This low-bench floodplain forest occurs on gravel or sand bars adjacent to relatively high-gradient creeks and streams that can have a "flashy" flood regime (Mackenzie and Moran 2004). Mountain alder (*Alnus incana*) is the dominant shrub and forms a continuous canopy on most sites. Soils are moist to very moist, and medium to rich.

CWHwm/02: Western hemlock - Sitka spruce / step moss (Tsuga heterophylla – Picea sitchensis/ Hylocomium splendens)

This forested ecosystem occurs only on the driest upper slopes and ridge crests. Productivity is relatively low. Forests are dominated by western hemlock and Sitka spruce and the herb layer is nearly absent (Banner et al. 1993).

CWHwm/05: Sitka spruce/salmonberry Wet Maritime (Picea sitchensis/Rubus spectabilis Wet Maritime)

This forested ecosystem is found on high bench floodplain sites that experience seasonally fluctuating water tables and occasional flooding (Banner et al. 1993). They are highly productive coniferous forests dominated by Sitka spruce and amabalis fir, with salmonberry (*Rubus spectabilis*), devil's club, stink currant (Ribes bracteosum), red-osier dogwood (Cornus stolinifera) and ferns comprising the understory (Banner et al. 1993).

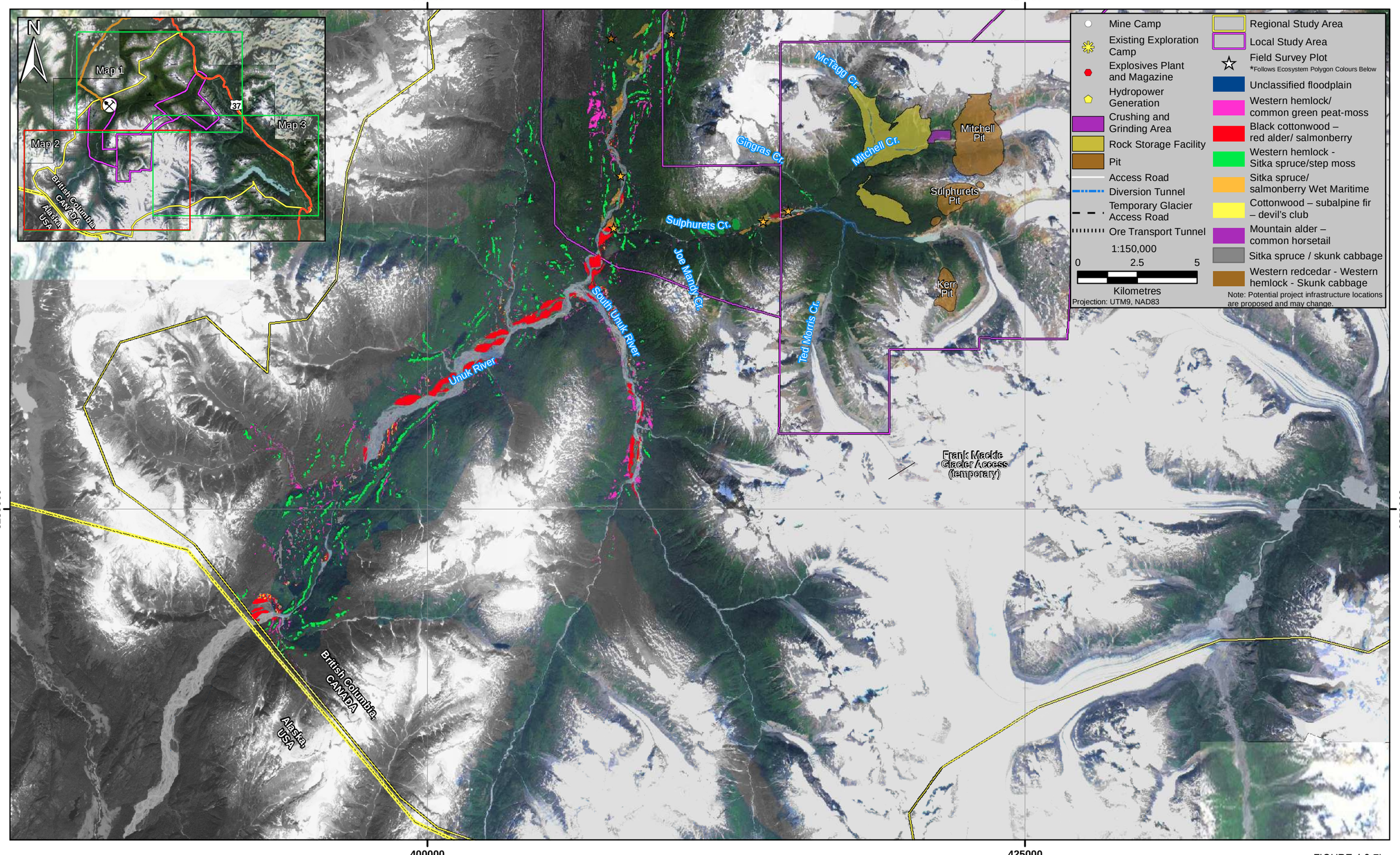


SEABRIDGE GOLD

KSM Project - Location of Listed Ecosystems, Map 1

FIGURE 4.2-7a

Rescan™

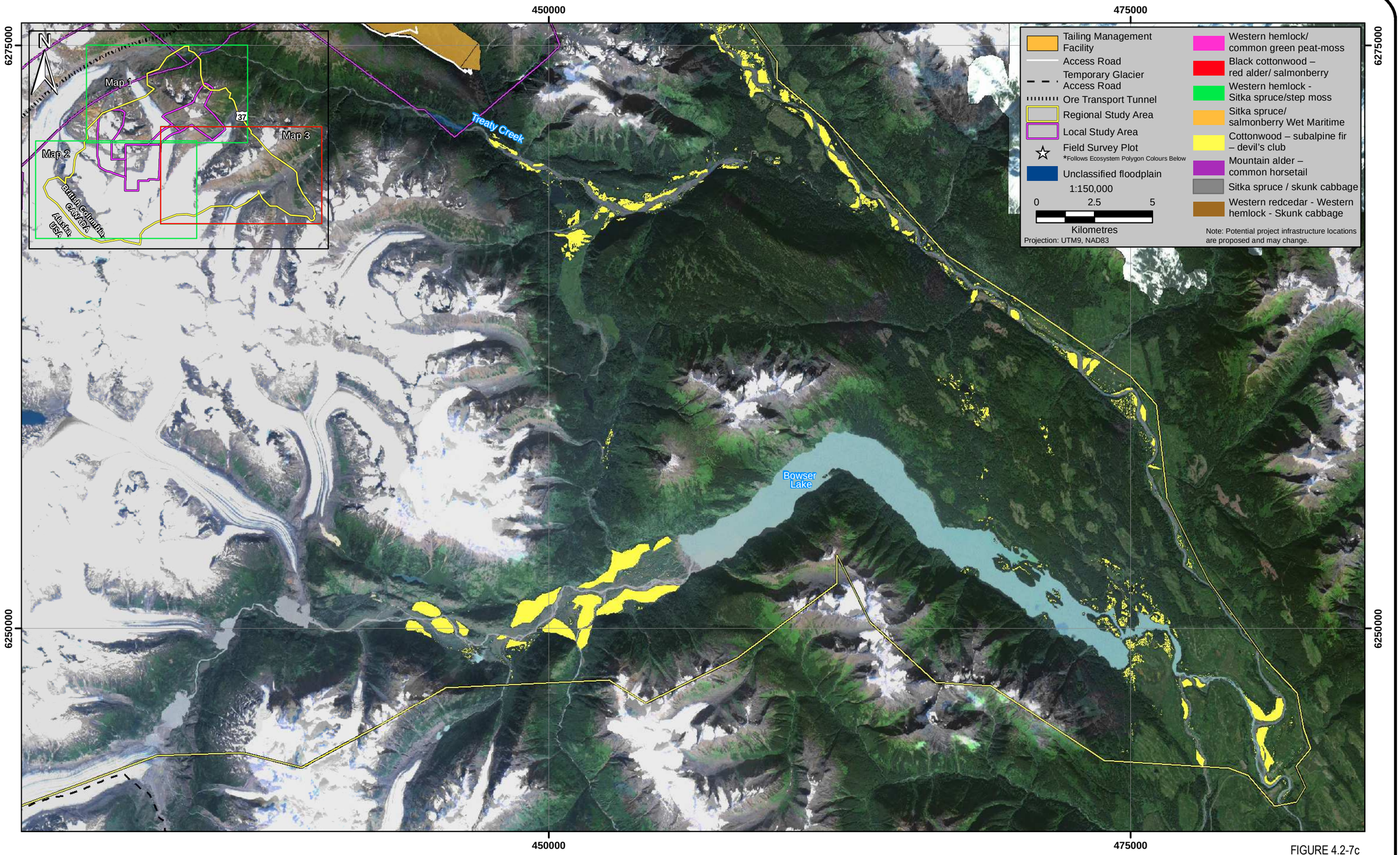


SEABRIDGE GOLD

KSM Project - Location of Listed Ecosystems, Map 2

FIGURE 4.2-7b

Rescan™



SEABRIDGE GOLD

KSM Project - Location of Listed Ecosystems, Map 3

FIGURE 4.2-7c

Rescan™

CWHwm/06: Black cottonwood – red alder/salmonberry (Populus balasamifera ssp. trichocarpa – Alnus rubra/Rubus spectabilis)

This forested ecosystem is found on middle bench floodplain sites and experiences prolonged elevated water tables during the growing season. Forests are dominated by black cottonwood (*P. balsamifera* ssp. *trichocarpa*) and red alder (*Alnus rubra*), with conifers occurring only on elevated microsites (Banner et al. 1993). Understories are dominated by thickets of salmonberry, devil's club, red-osier dogwood, and stink currant (Banner et al. 1993).

CWHwm/08: Western hemlock/common green peat-moss (Tsuga heterophylla/Sphagnum girgensohnii)

This wetter forested ecosystem is found in moisture-receiving areas of poor drainage and dominated by western hemlock. Tree growth is relatively poor and stand structure is open and scrubby (Banner et al. 1993).

CWHwm/09: Sitka spruce skunk cabbage (Picea sitchensis/Lysichiton americanus)

This ecosystem is a swamp forest occurring on level sites in receiving areas and depressions. Sitka spruce dominates the tree layer, often found only on elevated microsites. A lush understory is dominated by rich site indicators such as skunk cabbage (*Lysichiton americanus*) and lady fern (*Athyrium filix-femina*).

ICHvc/52 (Ws01, Fl02): $Mountain alder - lady fern (Alnus incana - Athyrium filix)

This ecosystem is found in wet depressions in the bottoms of gullies and adjacent to creeks and lakes. Mountain alder dominates the canopy, and the understory is lush and dense with ferns. It is maintained as a shrub structural stage at climax, therefore, is named with a dollar sign ($) in front of the name, by convention of the regional field guide (Banner et al. 1993).

This listed community is also called Ws01 - Mountain alder - Skunk cabbage - Lady fern (*Alnus incana* – *Lysichiton americanus* – *Athyrium filix-femina*) and Fl02 - Mountain alder - Red-osier dogwood – Lady fern (Alnus incana – Cornus stolonifera – Athyrium filix-femina) in the classification by Mackenzie and Moran 2004. The Fl02 and the Ws01 are distinguished in the BC Wetland Classification system (Mackenzie and Moran 2004) but the two are considered roughly equivalent by the BC CDC, as well as the BEC system which groups them together as ICHvc/52.

4.2.5 Sensitive Ecosystems

4.2.5.1 Riparian and Floodplain Ecosystems

A 30 m buffer around streams indicates that riparian zones cover 7,670 ha of the LSA and 40,476 ha in the RSA. These are estimates based on an assumed standard width on both sides of TRIM rivers and streams and do not include the particular floodplain ecosystems identified via TEM or PEM (Table 4.2-6). Riparian and floodplain ecosystems that are listed by the BC CDC are not included in Table 4.2-6, but rather in Table 4.2-5.

4.2.5.2 Wetland Ecosystems

Non-listed wetland ecosystems occupy 2,016 ha (<0.1%) of the LSA and up to 8,971 ha (<3%) of the RSA (Table 4.2-7). Wetland ecosystems that are listed by the BC CDC are not included in Table 4.2-7, but rather in Table 4.2-5. Wetlands are further described in the wetlands baseline report (Rescan 2010d).

Table 4.2-6. Extent of Riparian and Floodplain Ecosystems (non-listed)

English Ecosystem Name	Scientific Ecosystem Name	LSA (ha) (TEM)	RSA (ha) (PEM)	# of Field Plots
Generic Riparian Buffer	N/A	7,670	40,476	N/A
Sx-devil's club – dogwood (ICHvc/04)	*Picea* spp. – *Oploplanax horridus* – *Cornus stolonifera*	47	0.3	2
Act - willow (CWHwm/07) (Fl50 - Sitka willow - false lily-of-the-valley)	*Populus balsamifera* ssp. *trichocarpa* – *Salix* spp. (*Salix sitchensis* - *Maianthemum dilatatum*)	74	0.03	1

Table 4.2-7. Extent of Wetland Ecosystems (non-listed)

Ecosystem	LSA (ha) (TEM)	RSA (ha) (PEM)	#of Field Plots[1]
Non-forested wetland (ESSFwv/31; MHmm2/31; ICHvc/31)	89	N/A	2
Wetland Herb (GW)[2]	N/A	265	N/A
Wetland Shrub (WE) [2]	25	4,145	N/A
Shallow Open Water (OW)	41	N/A	1
Wetland – swamp (Ws)	30	1,866	1
Wetland – fen (Wf)	1,424	0	3
Wetland – marsh (Wm)	143	1,262	0
CWHwm/10 - Pl - Sphagnum	8	183[3]	0
ESSFwv/09 - Bl - Lady fern - Horsetail (Ws08 - Bl - Sitka valerian - Common horsetail)	84	357	2
ICHvc/06 - Sx - Horsetail (Ws07 - Sxw - Common horsetail - Leafy moss)	7	677	0
MHmm2/08 - HmYc - Sphagnum	142	216[4]	3
MHmm2/09 - YcHm - Skunk cabbage (Ws55 - YcHm - Skunkcabbage)	23	0[4]	0
Wf50 - Narrow-leaved cotton-grass – Peat-moss	N/A	N/A	16
Wf04 - Barclay's willow – Water sedge – Glow moss	N/A	N/A	11
Wm06 - Great bulrush	N/A	N/A	1
Wf01 - Water sedge – Beaked sedge	N/A	N/A	1
Wf03 - Water sedge – Peat-moss	N/A	N/A	21
Wf08 - Shore sedge – Buckbean – Hook-moss	N/A	N/A	2
Wf12 - Narrow-leaved cotton-grass – Marsh-marigold	N/A	N/A	26
Wf13 - Narrow-leaved cotton-grass – Shore sedge	N/A	N/A	6
Wf51 - Sitka sedge – Peat-moss	N/A	N/A	1
Wm01 - Beaked sedge – Water sedge	N/A	N/A	3
Wm02 - Swamp horsetail – Beaked sedge	N/A	N/A	1
Wm50 - Sitka sedge – Hemlock-parsley	N/A	N/A	1
Ws02 - Mountain alder – Pink spirea – Sitka sedge	N/A	N/A	1
Total	**2,016**	**Up to 8,971**	**103**

[1] Includes field data from wetland surveys (Rescan 2010d).
[2] Generic units only mapped by PEM since in the field and on the TEM it was possible to classify to a finer scale. Wetlands only identified to site association in the field.
[3] Reported area is duplication of results presented in Table 4.2-5 because the CWHwm/10 was lumped with CWHwm/09 as a PEM output.
[4] MHmm/08 and 09 were predicted as one in the PEM, therefore, the resulting area (ha) for 08/09 is only presented once (for 08) to reduce the amount of duplication.

Note that the total extent of wetlands indicated in Table 4.2-7 differs from the total extent of wetlands indicated in the wetlands baseline report (Rescan 2010d). There are several reasons for this difference. Firstly, a slightly different study area was used for each report. Secondly, the wetlands baseline study delineated wetlands based on TRIM and field surveys. TRIM does not map all types of wetlands (including bogs and forested swamps); therefore those would not be included in the wetland survey if they were not surveyed in the field. This report delineated wetlands during TEM and PEM (i.e., not based solely on TRIM), including bogs and forested swamps where possible. Finally, wetlands mapped in TEM and PEM refer to a general wetland area (e.g., may include transitional vegetation), while the wetland study is largely based on specific wetland communities mapped within that area.

4.2.5.3 Alpine Ecosystems

The alpine within the LSA is dominated by heather heath and krummholz vegetation (Table 4.2-8). Within the RSA, the barren/sparse ecosystem type (contains up to 10% vegetation cover) dominates the alpine zone. The mesic shrub covers the next greatest proportion of the alpine within the RSA. Areas mapped as cliffs, exposed soil, rock outcrops, glacier, snow, and rivers are not included. The ecosystems summarized in Table 4.2-8 may be overlapping in their extent. For example, the barren/sparse and the drier herb classes mapped by the PEM would include the more specific alpine classes mapped by the TEM (Fescue-lichen, Cryptogram-Altai fescue). In addition, some of the alpine ecosystems summarized can occur in parkland and forested areas as well, but only the extent within the alpine areas is included.

Table 4.2-8. Extent of Alpine Ecosystems

Ecosystem[1]	LSA Extent (ha) (TEM)	RSA Extent (ha) (PEM)	# of Field Plots
Fescue-lichen (FC)	911	N/A	1
Cryptogam - altai fescue (CG)	628	N/A	1
Heather heath (MP)	2,792	3,976	18
Krummholz (KH)	2,702	3,327	12
Herb meadow (AM)	1,563	1,608	7
Barren / Sparse (BA)	N/A	71,222	1
Drier herb (DH)	N/A	97	N/A
Wetter herb (VW)	N/A	674	N/A
Dry shrub (DS)	N/A	131	N/A
Wetter shrub (VS)	N/A	3,667	N/A
Mesic shrub (VF)	N/A	8,342	N/A

[1] Some of these ecosystems can occur in parkland and forested areas as well, but only the extent within the alpine areas is included in this table.

4.3 FINE SCALE ECOLOGY: PLANT SPECIES OVERVIEW AND SPECIES OF INTEREST

4.3.1 Species Richness

A total of 321 plant species, belonging to 68 different families (including those that were identified to genus only), were identified within the Project study area. The complete list of species and plant types is summarized in Appendix 10.

4.3.2 Listed Plant Species

The BC CDC currently tracks 137 plant species (64 vascular plants, 70 nonvascular plants, and 3 fungus species) that can potentially occur within the BEC units present in the Kitimat-Stikine Regional District

and within the RSA (Appendix 4). Two of these species are also listed by SARA. None of these listed plant species were identified in the Project study area during field surveys.

4.3.3 Invasive Plants

No noxious weeds were identified in the area. Common horsetail (*Equisetum arvense*), which is listed as a nuisance weed by the Province, was identified at 32 sites within the proposed Project. However, this species is native to the ecosystems in which it was found and thus is not considered an invasive plant in this report.

4.4 METAL CONCENTRATIONS IN PLANT TISSUE

One-hundred plant tissue samples were collected at the KSM Project in July 2008, August 2009 and September 2009 to establish baseline metal concentrations in local vegetation (Figure 4.4-1). Leaves of willow, red raspberry, blueberry (*Vaccinium* spp.), black huckleberry (*Vaccinium membranaceum*) and Sitka valerian were collected. The fruits (berries) of blueberry were also collected.

Tables 4.4-1 to 4.4-2 summarize the metal concentrations for each plant / tissue type for both "control" (samples >500 m from proposed infrastructure) and "infrastructure" samples (samples <500 m of proposed infrastructure). Raw results of the laboratory analysis are presented in Appendices 11 and 12. For all species and locations, metal concentrations were consistently highest for four key plant mineral nutrients (potassium, phosphorous, calcium and magnesium) (Tables 4.4-1 to 4.4-2). Concentrations of heavy metals such as arsenic, chromium, lead, and mercury were very low (many below detection limits) for all species and locations, including in the vicinity of the pits. There are no provincial or federal guidelines for metal limits in vegetation. Analysis of plant tissue concentrations of metals of concern to human health is provided in the Country Foods Baseline Report (Rescan 2010a).

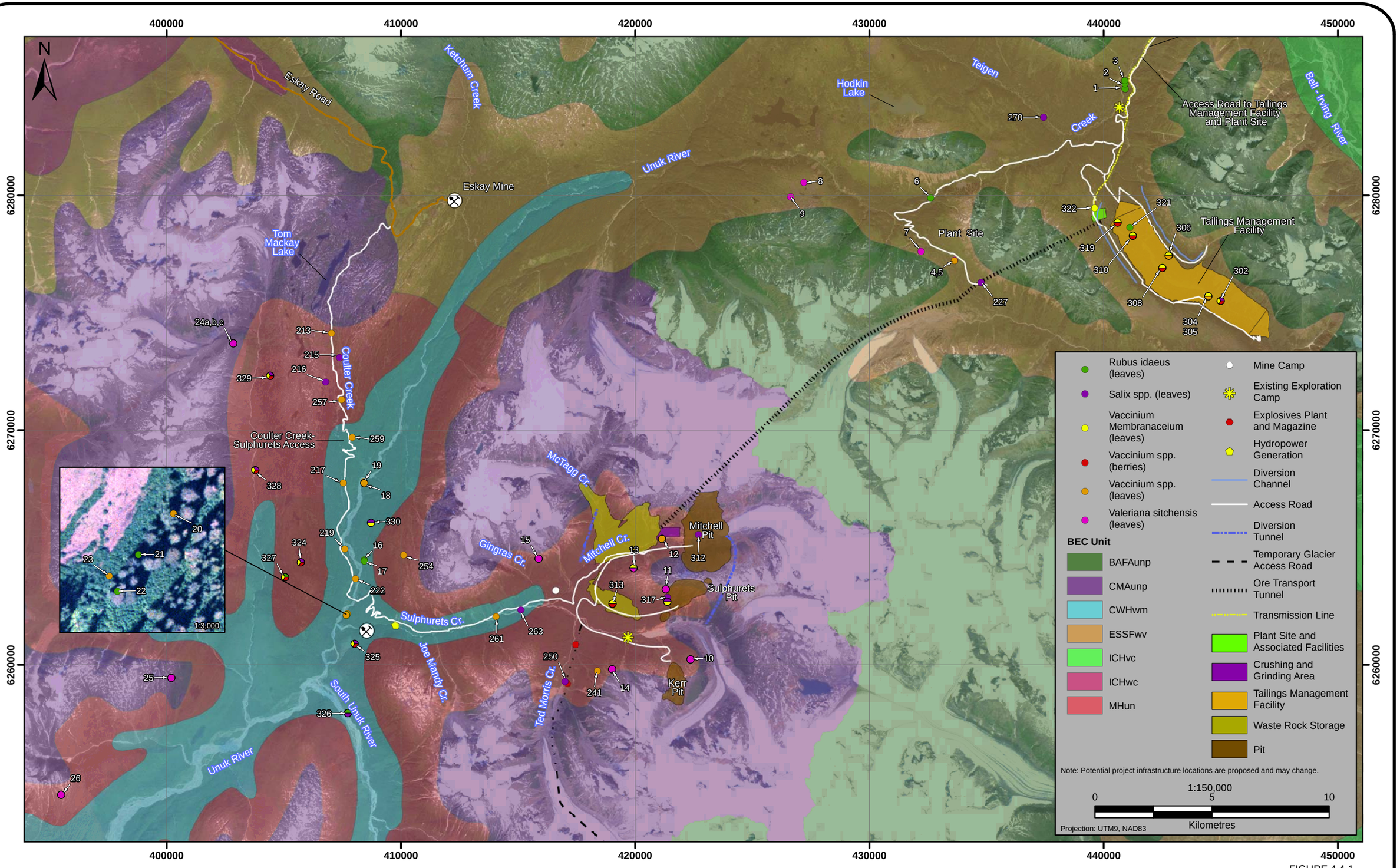


FIGURE 4.4-1

SEABRIDGE GOLD

KSM Project - Sampling Locations for Metal Analyses of Plant Tissues

Rescan™

Table 4.4-1. Measured Plant Tissue Concentrations (mg/kg wet weight) - Infrastructure Sites

	Blueberry (*Vaccinium* spp.) - berries		Sitka Valerian (*Valeriana sitchensis*)		*Blueberry* (*Vaccinium* spp.) - leaves		Black Huckleberry (*Vaccinium membranaceum*)		Willow (*Salix* spp.)		Red Raspberry (*Rubus idaeus*)	
	n = 5		n = 5		n = 13		n = 9		n = 7		n = 5	
	Range	Median	Range	Median	Range	Median	Range	Median	Range	Median	range	Median
Aluminum (Al)-Total	2.1 - 24.7	5.51	1.00 - 4.60	3.60	2.00 - 64.58	40.50	31.71 - 134.55	76.84	7.6 - 49.4	15.11	4.5 - 145.0	6.40
Antimony (Sb)-Total	0.0 - 0.0	0.00	0.01 - 0.01	0.01	0.01 - 0.01	0.01	0.00 - 0.01	0.01	0.0 - 0.0	0.01	0.0 - 0.0	0.01
Arsenic (As)-Total	0.0 - 0.0	0.00	0.01 - 0.02	0.01	0.01 - 0.01	0.01	0.00 - 0.03	0.01	0.0 - 0.1	0.03	0.0 - 0.1	0.01
Barium (Ba)-Total	1.2 - 3.3	1.88	1.37 - 7.99	5.61	1.63 - 32.80	23.10	13.26 - 33.23	20.57	3.4 - 8.9	7.58	1.9 - 12.1	5.62
Beryllium (Be)-Total	0.0 - 0.0	0.03	0.05 - 0.05	0.05	0.05 - 0.10	0.05	0.03 - 0.07	0.04	0.0 - 0.1	0.05	0.0 - 0.1	0.05
Bismuth (Bi)-Total	0.0 - 0.0	0.03	0.02 - 0.02	0.02	0.02 - 0.05	0.02	0.03 - 0.07	0.04	0.0 - 0.0	0.03	0.0 - 0.0	0.02
Cadmium (Cd)-Total	0.0 - 0.0	0.00	0.00 - 0.00	0.00	0.00 - 0.02	0.01	0.00 - 0.01	0.01	0.1 - 2.4	0.69	0.0 - 0.1	0.02
Calcium (Ca)-Total	75.1 - 260.1	139.20	88.60 - 1740.00	927.00	176.00 - 2510.00	1680.00	1050.50 - 2007.00	1771.46	2190.0 - 4460.0	3583.60	1280.0 - 3110.0	2984.10
Chromium (Cr)-Total	0.0 - 0.2	0.05	0.05 - 0.05	0.05	0.05 - 0.60	0.08	0.04 - 0.87	0.09	0.1 - 0.4	0.05	0.1 - 1.6	0.10
Cobalt (Co)-Total	0.0 - 0.0	0.01	0.01 - 0.03	0.01	0.01 - 0.06	0.02	0.01 - 0.23	0.02	0.1 - 0.3	0.19	0.0 - 0.1	0.02
Copper (Cu)-Total	0.7 - 1.3	0.93	0.07 - 0.76	0.61	0.15 - 3.64	1.54	1.29 - 2.45	1.59	0.8 - 4.0	1.52	1.1 - 2.2	1.60
Iron (Fe)-Total	1.8 - 27.7	3.14	4.96 - 7.34	5.46	6.87 - 46.18	11.40	7.30 - 70.74	15.22	15.2 - 105.8	25.20	10.5 - 191.0	15.90
Lead (Pb)-Total	0.0 - 0.0	0.01	0.01 - 0.01	0.01	0.01 - 0.02	0.01	0.01 - 0.03	0.01	0.0 - 0.1	0.02	0.0 - 0.0	0.01
Lithium (Li)-Total	0.0 - 0.1	0.04	0.05 - 0.05	0.05	0.05 - 0.10	0.05	0.04 - 0.12	0.07	0.1 - 0.1	0.05	0.1 - 0.1	0.05
Magnesium (Mg)-Total	82.7 - 136.9	102.72	28.30 - 426.00	278.00	49.70 - 1300.00	622.00	410.65 - 977.51	681.19	499.0 - 1230.0	689.85	562.0 - 1640.0	1390.00
Manganese (Mn)-Total	3.8 - 71.1	16.15	0.88 - 6.32	5.03	17.50 - 564.72	153.00	66.08 - 1131.76	233.00	11.8 - 94.2	28.40	8.7 - 129.3	16.50
Mercury (Hg)-Total	0.0 - 0.0	0.00	0.00 - 0.00	0.00	0.00 - 0.02	0.01	0.00 - 0.00	0.00	0.0 - 0.0	0.00	0.0 - 0.0	0.01
Molybdenum (Mo)-Total	0.0 - 0.2	0.05	0.02 - 0.17	0.03	0.01 - 0.18	0.03	0.01 - 0.27	0.04	0.0 - 0.3	0.08	0.1 - 0.3	0.11
Nickel (Ni)-Total	0.1 - 0.4	0.14	0.05 - 2.37	0.51	0.05 - 1.02	0.33	0.10 - 1.84	0.46	0.6 - 2.2	0.94	0.6 - 2.2	1.71
Phosphorus (P)-Total	102.1 - 283.9	189.12	353.00 - 536.00	455.00	197.00 - 675.00	374.00	284.41 - 601.38	388.81	438.0 - 3307.2	731.46	332.0 - 751.0	382.00
Potassium (K)-Total	790.1 - 1144.0	916.75	1640.00 - 3280.00	3040.00	1470.00 - 4643.40	2070.00	1360.59 - 2866.88	2007.16	2230.0 - 5374.2	3381.30	2670.0 - 3560.0	2830.00
Selenium (Se)-Total	0.0 - 0.1	0.09	0.10 - 0.10	0.10	0.10 - 0.20	0.10	0.09 - 0.23	0.13	0.1 - 0.2	0.11	0.1 - 0.2	0.10
Sodium (Na)-Total	4.3 - 15.6	9.50	10.00 - 10.00	10.00	10.00 - 78.00	20.00	8.75 - 78.87	12.85	10.0 - 20.0	14.45	10.0 - 10.2	10.00
Strontium (Sr)-Total	0.4 - 1.1	0.54	0.45 - 10.40	4.23	0.25 - 30.60	4.91	3.08 - 8.87	5.26	15.0 - 70.3	23.30	9.6 - 34.7	21.80
Thallium (Tl)-Total	0.0 - 0.0	0.00	0.01 - 0.01	0.01	0.00 - 0.02	0.01	0.00 - 0.01	0.00	0.0 - 0.0	0.01	0.0 - 0.0	0.01
Tin (Sn)-Total	0.0 - 0.0	0.02	0.03 - 0.03	0.03	0.03 - 0.05	0.03	0.02 - 0.05	0.03	0.0 - 0.1	0.03	0.0 - 0.1	0.03
Titanium (Ti)-Total	0.0 - 0.3	0.08	0.11 - 0.23	0.16	0.05 - 1.07	0.10	0.10 - 0.95	0.30	0.1 - 1.2	0.53	0.3 - 5.1	0.32
Uranium (U)-Total	0.0 - 0.0	0.00	0.00 - 0.00	0.00	0.00 - 0.00	0.00	0.00 - 0.00	0.00	0.0 - 0.0	0.00	0.0 - 0.0	0.00
Vanadium (V)-Total	0.0 - 0.1	0.04	0.05 - 0.05	0.05	0.05 - 0.10	0.05	0.04 - 0.21	0.07	0.1 - 0.2	0.05	0.1 - 0.5	0.05
Zinc (Zn)-Total	1.0 - 2.2	1.26	0.31 - 3.94	2.34	0.54 - 14.00	3.93	3.48 - 9.01	5.17	14.3 - 64.6	29.90	4.5 - 18.9	8.10

Table 4.4-2. Measured Plant Tissue Concentrations (mg/kg wet weight) - Control Sites

	Blueberry (*Vaccinium* spp.) - berries		Sitka Valerian (*Valeriana sitchensis*)		*Blueberry* (*Vaccinium* spp.) - leaves		Black Huckleberry (*Vaccinium membranaceum*)		Willow (*Salix* spp.)		Red Raspberry (*Rubus idaeus*)	
	n = 5		n = 22		n = 7		n = 10		n = 8		n = 6	
	Range	Median	Range	Median	Range	Median	Range	Median	Range	Median	Range	Median
Aluminum (Al)-Total	0.71 - 3.90	2.53	1.00 - 8.20	4.40	2.00 - 36.60	4.90	2.4 - 83.2	66.01	1.0 - 22.6	4.50	5.5 - 9.2	7.04
Antimony (Sb)-Total	0.00 - 0.00	0.00	0.01 - 0.01	0.01	0.01 - 0.01	0.01	0.0 - 0.0	0.01	0.0 - 0.0	0.01	0.0 - 0.0	0.01
Arsenic (As)-Total	0.00 - 0.00	0.00	0.01 - 0.04	0.01	0.01 - 0.05	0.01	0.0 - 0.0	0.01	0.0 - 0.1	0.01	0.0 - 0.0	0.01
Barium (Ba)-Total	0.96 - 2.28	1.54	0.49 - 11.00	4.35	1.92 - 32.60	4.47	2.8 - 37.2	30.43	3.9 - 67.1	8.64	3.1 - 21.5	6.82
Beryllium (Be)-Total	0.01 - 0.02	0.02	0.05 - 0.05	0.05	0.05 - 0.10	0.10	0.0 - 0.1	0.05	0.0 - 0.2	0.05	0.0 - 0.1	0.05
Bismuth (Bi)-Total	0.01 - 0.02	0.02	0.02 - 0.02	0.02	0.02 - 0.03	0.02	0.0 - 0.0	0.04	0.0 - 0.2	0.04	0.0 - 0.0	0.02
Cadmium (Cd)-Total	0.00 - 0.00	0.00	0.00 - 0.01	0.00	0.00 - 0.06	0.01	0.0 - 0.0	0.01	0.0 - 0.8	0.41	0.0 - 0.2	0.02
Calcium (Ca)-Total	136.29 - 259.91	176.79	87.80 - 1440.00	904.00	129.00 - 2880.00	244.00	207.0 - 3238.5	2434.10	2082.9 - 6878.0	5062.70	1460.0 - 4273.1	1990.00
Chromium (Cr)-Total	0.02 - 0.04	0.04	0.05 - 0.05	0.05	0.05 - 0.10	0.05	0.1 - 0.1	0.08	0.1 - 0.4	0.08	0.1 - 0.1	0.05
Cobalt (Co)-Total	0.00 - 0.01	0.01	0.01 - 0.07	0.03	0.01 - 0.07	0.02	0.0 - 0.1	0.04	0.0 - 0.3	0.20	0.0 - 0.0	0.02
Copper (Cu)-Total	0.23 - 1.27	0.74	0.06 - 0.90	0.63	0.15 - 2.27	0.20	0.2 - 3.6	2.50	0.3 - 2.2	1.36	1.5 - 2.4	1.74
Iron (Fe)-Total	1.98 - 2.27	2.19	3.84 - 10.50	5.40	9.31 - 29.50	13.20	9.5 - 23.1	12.90	11.1 - 53.2	17.80	12.2 - 28.2	18.96
Lead (Pb)-Total	0.00 - 0.01	0.01	0.01 - 0.01	0.01	0.01 - 0.02	0.01	0.0 - 0.1	0.02	0.0 - 0.1	0.01	0.0 - 0.0	0.01
Lithium (Li)-Total	0.02 - 0.04	0.04	0.05 - 0.05	0.05	0.05 - 0.10	0.05	0.1 - 0.1	0.08	0.1 - 0.4	0.07	0.1 - 0.1	0.05
Magnesium (Mg)-Total	50.62 - 109.81	77.94	40.60 - 775.00	421.00	40.10 - 1110.00	71.50	62.6 - 1198.8	825.31	562.0 - 1625.2	1024.60	473.0 - 1768.5	996.50
Manganese (Mn)-Total	4.52 - 16.35	10.55	0.74 - 17.80	7.24	7.44 - 166.00	32.80	32.8 - 906.0	329.16	24.6 - 3792.6	67.05	8.7 - 62.9	33.15
Mercury (Hg)-Total	0.00 - 0.00	0.00	0.00 - 0.00	0.00	0.00 - 0.02	0.01	0.0 - 0.0	0.00	0.0 - 0.0	0.00	0.0 - 0.0	0.01
Molybdenum (Mo)-Total	0.03 - 0.38	0.04	0.01 - 0.10	0.03	0.01 - 0.07	0.01	0.0 - 0.3	0.09	0.0 - 0.4	0.15	0.0 - 1.7	0.07
Nickel (Ni)-Total	0.04 - 0.05	0.04	0.05 - 1.15	0.55	0.05 - 0.45	0.10	0.1 - 0.6	0.33	0.1 - 2.2	0.29	0.2 - 2.0	1.20
Phosphorus (P)-Total	129.93 - 188.41	160.93	373.00 - 627.00	489.00	258.00 - 561.00	343.00	257.0 - 636.0	420.99	365.0 - 725.8	454.75	249.0 - 350.3	297.50
Potassium (K)-Total	559.48 - 916.40	708.40	2160.00 - 4150.00	3080.00	1340.00 - 2720.00	2010.00	1053.0 - 3116.5	2170.03	1777.9 - 3700.0	2186.62	1840.0 - 4176.0	2440.00
Selenium (Se)-Total	0.04 - 0.08	0.08	0.10 - 0.10	0.10	0.10 - 0.20	0.10	0.1 - 0.2	0.16	0.1 - 0.8	0.14	0.1 - 0.7	0.12
Sodium (Na)-Total	7.10 - 8.30	7.90	10.00 - 10.00	10.00	10.00 - 143.00	22.00	10.0 - 369.4	48.53	10.0 - 174.6	16.35	10.0 - 148.2	96.50
Strontium (Sr)-Total	0.42 - 0.75	0.60	0.45 - 22.00	4.86	0.27 - 30.20	0.67	0.4 - 11.5	5.75	8.1 - 34.8	28.25	3.2 - 22.5	7.02
Thallium (Tl)-Total	0.00 - 0.00	0.00	0.01 - 0.01	0.01	0.01 - 0.01	0.01	0.0 - 0.0	0.00	0.0 - 0.0	0.01	0.0 - 0.0	0.01
Tin (Sn)-Total	0.01 - 0.08	0.02	0.03 - 0.03	0.03	0.03 - 0.05	0.03	0.0 - 0.1	0.03	0.0 - 0.2	0.03	0.0 - 0.0	0.03
Titanium (Ti)-Total	0.04 - 0.04	0.04	0.12 - 0.39	0.17	0.05 - 0.34	0.20	0.1 - 0.6	0.22	0.1 - 0.4	0.20	0.3 - 0.4	0.33
Uranium (U)-Total	0.00 - 0.00	0.00	0.00 - 0.00	0.00	0.00 - 0.00	0.00	0.0 - 0.0	0.00	0.0 - 0.0	0.00	0.0 - 0.0	0.00
Vanadium (V)-Total	0.02 - 0.04	0.04	0.05 - 0.05	0.05	0.05 - 0.10	0.05	0.1 - 0.1	0.08	0.1 - 0.4	0.07	0.1 - 0.1	0.05
Zinc (Zn)-Total	0.97 - 1.82	1.32	0.27 - 3.38	2.72	0.58 - 7.92	2.15	1.5 - 17.6	7.99	19.9 - 64.7	34.83	4.5 - 7.9	7.31

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Appendix 1

Terrestrial and Predictive Ecosystem Mapping Legend

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Appendix 1. Terrestrial and Predictive Ecosystem Mapping Legend

BEC Unit	Site Series	Code	Site Unit Name	Description	General Ecosystem Type	Typical Structural Stage	Soil Moisture Regime	Soil Nutrient Regime	Mapping Methodology
CWHwm	01	HB	HwSs - Blueberry	Moderate forest productivity. Herb layer reduced, few rich-site indicators.	Mesic Forest	3,4,5,6,7	submesic-subhygric	poor-medium	TEM and PEM
CWHwm	01/03	HB/SO	HwSs - Blueberry / SsHw - Oak fern	Site series 01 and 03 were modelled together for the PEM	Mesic Forest	3,4,5,6,7	submesic-subhygric	poor-very rich	PEM
CWHwm	02	HM	HwSs - Step moss	Forest found on dry upper slopes and ridge crests. Poor productivity. Herb layer sparse/absent.	Drier Forest	3,4,5,6,7	xeric-subxeric	very poor-medium	TEM and PEM
CWHwm	03	SO	SsHw - Oak fern	Above-average tree growth; herb layer well developed and dominated by ferns	Mesic Forest	3,4,5,6,7	submesic-subhygric	rich-very rich	TEM and PEM
CWHwm	04	SD	SsHw - Devil's club	Good tree growth; Herb layer well developed, dominated by ferns.	Moist Forest	3,4,5,6,7	subhygric-hygric	rich-very rich	TEM and PEM
CWHwm	05	SS	Ss - Salmonberry	Productive coniferous forest found on high bench floodplains.	Floodplain Forest	3,4,5,6,7	subhygric-hygric	rich-very rich	TEM and PEM
CWHwm	06	CD	Act - Red-osier dogwood	Middle bench floodplain forest; deciduous trees dominate canopy.	Floodplain Forest	3,4,5,6,7	subhygric-hygric	rich-very rich	TEM and PEM
CWHwm	07	CW	Act - Willow (Fl50 - SitkA willow - False lily-of-the-valley)	Low bench floodplain forest; conifers absent.	Floodplain Forest	3,4,5,6,7	hygric-subhydric	medium-very rich	TEM and PEM
CWHwm	06/07	CD/CW	Act - Red-osier dogwood / Act-Willow	The 06 and 07 Site Series were modelled together in the PEM.	Floodplain Forest	3,4,5,6,7	subhygric-subhydric	medium-very rich	PEM
CWHwm	08	HS	Hw - Sphagnum	Open, scrubby forest growing in areas with poor drainage.	Wetter Forest	3,4,5,6,7	subhygric-hygric	very poor-medium	TEM and PEM
CWHwm	09	SC	Ss - Skunk cabbage (Ws54 - CwHw - Skunk cabbage)	Swamp forests with diverse herb layer dominated by ferns and skunk cabbage.	Wetland Forest	3,4,5,6,7	hygric-subhydric	medium-very rich	TEM and PEM
CWHwm	10	LS	Pl - Sphagnum	Bog woodlands growing in areas with poor drainage. Tree growth stunted.	Wetland Forest	3,4,5,6,7	subhydric+	very poor-medium	TEM and PEM
CWHwm	09/10	SC / LS	Ss - Skunk cabbage / Pl - Sphagnum	The 09 and 10 Site Series were modelled together in the PEM.	Wetland Forest	3,4,5,6,7	hygric-subhydric+	very poor-very rich	PEM
CWHwm	51	51	Avalanche Track	Areas where recent/recurring avalanches result in non-forested, usually lush vegetation.	Avalanche Track	2,3	submesic-subhygric	rich-very rich	TEM

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BEC Unit	Site Series	Code	Site Unit Name	Description	General Ecosystem Type	Typical Structural Stage	Soil Moisture Regime	Soil Nutrient Regime	Mapping Methodology
ESSFwv	01	FA	BlHm - Azalea	Moderately productive forests. Herb layer moderately developed, few ferns.	Mesic Forest	3,4,5,6,7	mesic-subhygric	poor-medium	TEM and PEM
ESSFwv	02	LC	BlPl - Cladonia	Stunted forests with sparse understory; occur on upper slopes and crests.	Drier Forest	3,4,5,6,7	very xeric-subxeric	very poor-medium	TEM and PEM
ESSFwv	03	FF	BlHm - Feathermoss	Scrubby trees and shrubs, sparse herb layer; found on upper slopes and crests	Drier Forest	3,4,5,6,7	subxeric-submesic	poor-medium	TEM and PEM
ESSFwv	04	MH	BlHm - Heron's-bill	Scrubby forest found on upper slopes and crests; herb layer almost absent	Mesic Forest	3,4,5,6,7	submesic-mesic	very poor-poor	TEM and PEM
ESSFwv	05	FO	Bl - Oak fern - Heron's-bill	Productive forest; ferns common in understory; found on toe to lower slopes	Mesic Forest	3,4,5,6,7	mesic-subhygric	(medium)-very rich	TEM and PEM
ESSFwv	06	FD	Bl - Devil's club - Lady fern	Forests with good growth found on seepage slopes	Wetter Forest	3,4,5,6,7	subhygric-hygric	rich-very rich	TEM and PEM
ESSFwv	07	FV	Bl - Valerian - Sickle moss	poor productivity; trees in clumps surrounded by herbaceous meadows	Wetter Forest	3,4,5,6,7	subhygric-hygric	medium-rich	TEM and PEM
ESSFwv	08	FH	Bl - Horsetail - Glow moss	Scrubby forest often found surrounding wetlands	Wetter Forest	3,4,5,6,7	hygric-subhydric	very poor-poor	TEM and PEM
ESSFwv	09	FL	Bl - Lady fern - Horsetail (Ws08 - Bl - Sitka valerian - Common horsetail)	Moderately productive forests, found on gradual lower slopes.	Wetland Forest	3,4,5,6,7	subhydric	medium-very rich	TEM and PEM
ESSFwv	31	WE	non-forested wetland	Wetland dominated by willows and sedges; High diversity of subalpine/alpine herbs.	Wetland Shrub/Herb	2,3	subhydric+	very poor-very rich	TEM
ESSFwv	51	51	Avalanche Track	Non-forested; Sitka alder, Indian hellebore, cow·parsnip, or ferns predominate.	Avalanche Track	2,3	subhygric-hygric	rich-very rich	TEM
ESSFwv	00	FP	Undescribed floodplain forest	Floodplain forests not described by current forest region guide	Floodplain Forest	3,4,5,6,7	mesic - subhydric	medium to very rich	TEM
ICHvc	01	HD	HwBl - Devil's club	Productive forests with moisture-loving species such as Devil's club	Mesic Forest	3,4,5,6,7	(mesic)-subhygric	poor-rich	TEM and PEM
ICHvc	02	HM	Hw - Step moss	Forests with poor to moderate growth occuring on upper slopes and ridges; sparse herb layer	Drier Forest	3,4,5,6,7	xeric-submesic (mesic)	very poor-medium	TEM and PEM

Appendix 1. Terrestrial and Predictive Ecosystem Mapping Legend

BEC Unit	Site Series	Code	Site Unit Name	Description	General Ecosystem Type	Typical Structural Stage	Soil Moisture Regime	Soil Nutrient Regime	Mapping Methodology
ICHvc	03	SD	Sx - Devil's club	Productive forests found on seepage slopes and level, receiving areas	Moist Forest	3,4,5,6,7	mesic-subhygric	medium-very rich	TEM and PEM
ICHvc	04	DD	Sx - Devil's club - Dogwood	Productive forests found in valley bottoms on high-bench floodplains	Floodplain Forest	3,4,5,6,7	mesic-hygric	rich-very rich	TEM and PEM
ICHvc	05	CD	ActSx - Dogwood (Fm03 - Cottonwood – Subalpine fir – Devil's club)	Deciduous-dominated middle to low bench floodplain forests	Floodplain Forest	3,4,5,6,7	mesic-hygric	very rich	TEM and PEM
ICHvc	04/05	DD/CD	Sx - Devil's club - Dogwood / ActSx - Dogwood	Site series 04 and 05 were modelled together for the PEM	Floodplain Forest	3,4,5,6,7	mesic-hygric	rich-very rich	PEM
ICHvc	06	SH	Sx - Horsetail (Ws07 - Sxw - Common horsetail - Leafy moss)	Moderately to highly productive forests found on level and depressional sites	Wetland Forest	3,4,5,6,7	hygric-subhydric	medium-very rich	TEM and PEM
ICHvc	31	WE	non-forested fen/marsh	Wetland dominated by willows and sedges	Wetland Shrub/Herb	2,3	subhydric+	medium-very rich	TEM
ICHvc	51	51	$Sitka alder - Devil's club	Highly-productive shrubby ecosystems occurring in areas of recurring avalanches, or in areas where deep, long-lasting snow-packs occur	Avalanche Track	3	mesic-hygric	rich-very rich	TEM
ICHvc	52	52	$Mountain alder - Lady fern (Fl02 - Mountain alder - Red-osier dogwood - Lady fern and Ws01 - Mountian alder - Skunk cabbage - Lady fern)	Shrubby ecosystems occuring in wet depressions in the bottoms of gullies and adjacent to creeks and lakes	Wetland Shrub/Herb	3	hygric-subhydric	medium-very rich	TEM
MHun (mm2)	01	MB	HmBa - Blueberry	Low productivity closed forests with a continuous blueberry/huckleberry understory; herb layer usually sparse	Mesic Forest	3,4,5,6,7	subxeric-mesic	very poor-medium	TEM and PEM
MHun (mm2)	02	MM	HmBa - Mountain-heather	Very scrubby stands occuring on exposed, rocky knolls.	Drier Forest	3,4,5,6,7	very xeric-xeric	very poor-medium	TEM and PEM

Appendix 1. Terrestrial and Predictive Ecosystem Mapping Legend

BEC Unit	Site Series	Code	Site Unit Name	Description	General Ecosystem Type	Typical Structural Stage	Soil Moisture Regime	Soil Nutrient Regime	Mapping Methodology
MHun (mm2)	03	MO	BaHm - Oak fern	Productive forest occuring on moderate slopes with some seasonal seepage; understory dominated by rich-site indicators such as ferns	Mesic Forest	3,4,5,6,7	subxeric-mesic	rich-very rich	TEM and PEM
MHun (mm2)	04	AB	HmBa - Bramble	Poor productivity forests with moderately well developed herb layer; found on steep seepage slopes	Moist Forest	3,4,5,6,7	subhygric	very poor-medium	TEM and PEM
MHun (mm2)	05	MT	BaHm - Twistedstalk	Poor to medium productivity forests occuring on lower slopes with abundant seepage	Moist Forest	3,4,5,6,7	subhygric	rich-very rich	TEM and PEM
MHun (mm2)	06	MD	HmYc - Deer cabbage	Low productivity forests in late snow areas	Wetter Forest	3,4,5,6,7	hygric	very poor-medium	TEM and PEM
MHun (mm2)	07	YH	YcHm - Hellebore	Forests with poor productivity found on steep seepage slopes	Wetter Forest	3,4,5,6,7	hygric	rich-very rich	TEM and PEM
MHun (mm2)	08	YS	HmYc - Sphagnum	Nutrient-poor bog forests	Wetland Forest	3,4,5,6,7	subhydric	very poor-poor	TEM and PEM
MHun (mm2)	09	YC	YcHm - Skunk cabbage (Ws55 - YcHm - Skunkcabbage)	Mineral-rich swamp forests	Wetland Forest	3,4,5,6,7	subhydric	medium-very rich	TEM and PEM
MHun (mm2)	08/09	YS/YC	HmYc - Sphagnum / YcHm - Skunk cabbage	Site series 08 and 09 were modelled together for the PEM	Wetland Forest	3,4,5,6,7	subhydric	very poor-very rich	PEM
MHun (mm2)	31	WE	Non-forested wetland	Ericaceous shrubs, deer-cabbage, sedges and sphagnum common	Wetland Shrub/Herb	2,3	subhydric	very poor-very rich	TEM
MHun (mm2)	51	51	Avalanche track	Sitka Alder, willow and salmonberry thickets on colluvial slopes on steep terrain. Ferns, twistetstalk and Sitka valerian common.	Avalanche Track	2,3	subhygric	rich-very rich	TEM
MHun (mm2)	00	FP	Undescribed floodplain forest	Floodplain forests not described by current forest region guide	Floodplain Forest	3,4,5,6,7	mesic - subhydric	medium to very rich	TEM
Alpine and Others	00	RI	River	Water flowing between continuous, definable banks.	Non-vegetated	n/a	n/a	n/a	TEM and PEM

Appendix 1. Terrestrial and Predictive Ecosystem Mapping Legend

BEC Unit	Site Series	Code	Site Unit Name	Description	General Ecosystem Type	Typical Structural Stage	Soil Moisture Regime	Soil Nutrient Regime	Mapping Methodology
Alpine and Others	00	LA	Lake	Naturally occurring static body of water > 2 m deep	Non-vegetated	n/a	n/a	n/a	TEM and PEM
Alpine and Others	00	WA	Water	generic term used for PEM refers to all rivers, streams, ponds and lakes.	Non-vegetated	n/a	n/a	n/a	PEM
Alpine and Others	00	PN	Permanent Snow/Ice	Snow or ice that is not part of a glacier but is found during summer months on the landscape.	Non-vegetated	n/a	n/a	n/a	TEM
Alpine and Others	00	GL	Glacier	A mass of perennial snow and ice with definite lateral limits. It typically flows in a particular direction.	Non-vegetated	n/a	n/a	n/a	TEM
Alpine and Others	00	GI	Glacier/Snow	combined class of glacier/permanent snow/ice utilized for PEM	Non-vegetated	n/a	n/a	n/a	PEM
Alpine and Others	00	PD	Pond	A small body of water greater than 2 m deep, but not large enough to be classified as a lake (e.g., less than 50 ha).	Non-vegetated	n/a	n/a	n/a	TEM
Alpine and Others	00	RZ	Road Surface	An area cleared of vegetation - gravel or paved surface.	Non-vegetated	n/a	n/a	n/a	TEM
Alpine and Others	00	MI	Mine site	An unvegetated area used for the extrac-tion of mineral ore and other materials.	Non-vegetated	n/a	n/a	n/a	TEM
Alpine and Others	00	RO	Rock Outcrop	A gentle to steep, bedrock escarpment or outcropping, with little soil development and sparse vegetative cover.	Sparsely Vegetated	1	very xeric - mesic	very poor	TEM
Alpine and Others	00	RU	Rubble	Rubble in and adjacent to alpine areas, on ridgetops, gentle slopes and flat areas due to the effects of frost heaving.	Sparsely Vegetated	1	very xeric - mesic	very poor	TEM
Alpine and Others	00	MN	Morraine	An largely unvegetated landform consisting of unstratified glacial drift that is usually till and taking a variety of shapes, ranging from plains to mounds and ridges	Sparsely Vegetated	1	very xeric - mesic	very poor - medium	TEM

Appendix 1. Terrestrial and Predictive Ecosystem Mapping Legend

BEC Unit	Site Series	Code	Site Unit Name	Description	General Ecosystem Type	Typical Structural Stage	Soil Moisture Regime	Soil Nutrient Regime	Mapping Methodology
Alpine and Others	00	TA	Talus	Angular rock fragments accumulated at the foot of steep rock slopes as a result of successive rock falls. It is a type of colluvium.	Sparsely Vegetated	1	very xeric - mesic	very poor	TEM
Alpine and Others	00	BA	Barren / Sparse	Land largely devoid of vegetation due to extreme climatic or edaphic conditions. Patches of lichens, grasses, dwarf shrubs and other forbs are present, but rarely extensive. This general class is from the PEM only, and would include the more specific alpine classes mapped by the TEM included FC, CG, ES, CL etc.	Sparsely Vegetated	1, 2	very xeric - mesic	very poor to poor	PEM
Alpine and Others	00	ES	Exposed Soil	Exposed soil that is not included in any of the other definitions.	Sparsely Vegetated	1	very xeric - mesic	very poor to medium	TEM
Alpine and Others	00	CL	Cliff	A steep, vertical or overhanging rock face	Sparsely Vegetated	1	very xeric - mesic	very poor	TEM
Alpine and Others	00	ET	Escape Terrain	Barren or sparsely vegetated areas with a slope gradient greater than 70% (35 degrees) used by mountain goats to flee from predators	Sparsely Vegetated	1,2	very xeric - mesic	very poor to poor	PEM
Alpine and Others	00	WT	Willow Thicket	Shrubs established on newly formed sand/gravel bars, or various slope positions where envirnmental factors prevent succession.	Wetter Shrub/Herb	3	mesic - hygric	medium to very rich	TEM
Alpine and Others	00	OW	Shallow Open Water	A wetland composed of permanent open water <2 m deep, with submerged aquatic vegetation and some emergent plant cover.	Wetland Shrub/Herb	2	n/a	n/a	TEM
Alpine and Others	00	GW	Wetland herb	Generic herb dominated wetland	Wetland Shrub/Herb	2	subhydric	variable / undefined	PEM
Alpine and Others	00	WE	Wetland Shrub	Generic shrub dominated wetland	Wetland Shrub/Herb	3	subhydric	variable / undefined	TEM and PEM

Appendix 1. Terrestrial and Predictive Ecosystem Mapping Legend

BEC Unit	Site Series	Code	Site Unit Name	Description	General Ecosystem Type	Typical Structural Stage	Soil Moisture Regime	Soil Nutrient Regime	Mapping Methodology
Alpine and Others	00	MP	Heather heath	Plant communities dominated by dwarf woody plants, found in subalpine and alpine regions	Mesic Shrub/Herb	2	subxeric - mesic	variable / undefined	TEM and PEM
Alpine and Others	00	KH	Krummholz	Small clusters of stunted, crooked trees <3 m high, growing at high elevations; their growth form is a result of wind and short growing seasons. Often found growing in "tree islands" surrounded by heather heath.	Parkland Forest / Krummholz	3	subxeric - subhygric	variable / undefined	TEM and PEM
Alpine and Others	00	PK	Parkland Forest	Patchy tree communities (may include some krummholz) growing in parkland and subalpine regions, often adjacent to herb meadows or fens. Vaccinium spp.prevalent.	Parkland Forest / Krummholz	3,5	submesic - mesic	medium	TEM and PEM
Alpine and Others	00	FC	fescue-lichen	Non-forested ecosystem found on upper slopes to crests on southern or warm western aspects at high elevations. Patchy and rarely extensive. Dominated by fescue and various lichens, with minor components of various herbs and dwarf shrubs.	Drier Herb	2	subxeric - submesic	poor - medium	TEM
Alpine and Others	00	CG	Cryptogam - Altai Fescue	Non-forested ecosystem found on the crests of rock outcrops or weathered bedrock at high elevation on exposed or very thin soil. Very patchy. All aspects, but more on south and west. Mainly lichens, but small component of dwarf shrubs and herbs.	Drier Herb	2	xeric - subxeric	very poor - poor	TEM
Alpine and Others	00	DH	Dry herb	Non-forested areas dominated by herbaceous species; includes forested site series in early succesional stages	Drier Herb	2	xeric - submesic	variable / undefined	PEM
Alpine and Others	00	DS	Dry shrub	Non-forested areas dominated by shrubs; includes forested site series in early succesional stages	Drier Shrub/Herb	3	xeric - submesic	variable / undefined	PEM

Appendix 1. Terrestrial and Predictive Ecosystem Mapping Legend

BEC Unit	Site Series	Code	Site Unit Name	Description	General Ecosystem Type	Typical Structural Stage	Soil Moisture Regime	Soil Nutrient Regime	Mapping Methodology
Alpine and Others	00	VF	Mesic Shrub	Non-forested areas dominated by shrubs; includes forested site series in early succesional stages	Mesic Shrub/Herb	3	submesic-subhygric	variable / undefined	PEM
Alpine and Others	00	AM	Herb Meadow	Non-forested areas dominated by herbaceous species; includes climax herbaceous meadows, as well as forested site series in early succesional stages	Mesic Herb	2	submesic-subhygric	rich - very rich	TEM and PEM
Alpine and Others	00	VS	Wetter shrub	Non-forested areas dominated by shrubs; includes forested site series in early succesional stages	Wetter Shrub/Herb	3	subhygric-hygric	variable / undefined	PEM
Alpine and Others	00	VW	Wetter herb	Non-forested areas dominated by herbaceous species; includes forested site series in early succesional stages	Wetter Herb	2	subhygric-hygric	variable / undefined	PEM
Alpine and Others	00	FP	Undescribed floodplain forest	Floodplain forests not described by current forest region guide	Floodplain Forest	3,4,5,6,7	mesic - subhydric	medium to very rich	TEM
Alpine and Others	00	GTm	avalanche Track - herb - moderately sloping	Herb dominated avalanche track, slope 30% to 60%	Avalanche Track	2	submesic - hygric	rich-very rich	PEM
Alpine and Others	00	GTs	avalanche Track - herb - steeply sloping	Herb dominated avalanche track, slope > 60%	Avalanche Track	2	submesic - hygric	rich-very rich	PEM
Alpine and Others	00	AVm	avalanche Track - shrub - moderately sloping	Shrub dominated avalanche track, slope 30% to 60%	Avalanche Track	3	submesic - hygric	rich-very rich	PEM
Alpine and Others	00	Avs	avalanche Track - shrub - steeply sloping	Shrub dominated avalanche track, slope > 60%	Avalanche Track	3	submesic - hygric	rich-very rich	PEM
Alpine and Others	00	Ws	wetland - swamp	nutrient-rich wetland with large trees or tall shrubs	Wetland Shrub/Herb	3	subhydric	medium - very rich	TEM and PEM
Alpine and Others	00	Wm	wetland - marsh	permanently to seasonally flooded non-tidal mineral wetland dominated by emergent grass-like vegetation	Wetland Shrub/Herb	2	subhydric	rich - very rich	TEM and PEM
Alpine and Others	00	Wf	wetland - fen	nutrient-medium peatland dominated by sedges and brown mosses - minerotrophic plant species are common	Wetland Shrub/Herb	2,3	subhydric	poor - rich	TEM

Appendix 2

Predictive Ecosystem Mapping (PEM) Rule Sets

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Appendix 2a. Predictive Ecosystem Mapping Rules for BAFAunp

CRULE1000					
F_NAME	**FUZATTR**	**ATTRWT**	**FACET_NO**	**F_CODE**	**Predicting**
FH1001	Shrub/Herb	80	1	1001	dry shrub
FH1001	Dry	20	1	1001	dry shrub
FH1002	Shrub/Herb	80	2	1002	wet shrub
FH1002	Wet	20	2	1002	wet shrub
FH1002	Prof_cv	10	2	1002	wet shrub
FH1003	Shrub/Herb	80	3	1003	mesic shrub
FH1003	Mesic	20	3	1003	mesic shrub
FH1004	herb	80	4	1004	herb meadow
FH1004	Mesic	20	4	1004	herb meadow
FH1005	herb	80	5	1005	dry herb
FH1005	Dry	20	5	1005	dry herb
FH1006	herb	80	6	1006	wetter herb
FH1006	Wet	20	6	1006	wetter herb
FH1006	Prof_cv	10	6	1006	wetter herb
FH1007	rock/barren	80	7	1007	barren/sparse
FH1007	SlopeLT70	30	7	1007	barren/sparse
FH1008	snow/ice	90	8	1008	glacier/snow
FH1009	DWshrb/hrb	90	9	1009	heather heath
FH1010	Forest	80	10	1010	krummholz
FH1011	water	90	11	1011	water
FH1012	rock/barren	80	12	1012	escape terrain
FH1012	SlopeGT70	30	12	1012	escape terrain
FH1012	Prof_cx	10	12	1012	escape terrain

Appendix 2a. Predictive Ecosystem Mapping Rules for BAFAunp

ARULE1000										
SORTORDER	**FILE_IN**	**ATTR_IN**	**CLASS_OUT**	**MODEL_NO**	**B**	**B_LOW**	**B_HI**	**B1**	**B2**	**D**
1	formfile	LNQAREA	LnUp	5	8.00	8.00	8.00	0.00	8.10	0.10
2	formfile	LNQAREA	LnMid	1	8.75	8.75	8.75	8.00	9.50	0.75
3	formfile	LNQAREA	LnLow	4	9.50	9.50	9.50	8.50	18.14	1.00
4	formfile	QWETI	Dry	5	5.00	5.00	5.00	0.00	5.01	0.1
5	formfile	QWETI	Mesic	1	6.00	6.00	6.00	5.00	7.00	2.00
6	formfile	QWETI	Wet	4	7.00	7.00	7.00	6.00	27.79	1.00
7	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
8	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
9	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
10	geofile	Classify	Forest	1	51.00	51.00	51.00	50.99	51.01	0.01
11	geofile	Classify	Shrub/Herb	1	1.00	1.00	1.00	0.99	1.01	0.01
12	geofile	Classify	snow/ice	1	50.00	50.00	50.00	49.99	50.01	0.01
13	geofile	Classify	rock/barren	1	52.00	52.00	52.00	51.99	52.01	0.01
14	geofile	Classify	herb	1	55.00	55.00	55.00	54.99	55.01	0.01
15	geofile	Classify	water	1	58.00	58.00	58.00	57.99	58.01	0.01
16	geofile	Classify	DWshrb/hrb	1	54.00	54.00	54.00	53.99	54.01	0.01
17	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.50	0.50
18	formfile	SLOPE	SlopeGT30	4	31.00	31.00	31.00	30.00	277.00	1.00
19	formfile	SLOPE	SlopeLT10	5	10.00	10.00	10.00	0.00	10.50	0.50
20	formfile	SLOPE	SlopeGT10	4	11.00	11.00	11.00	10.00	277.00	1.00
21	formfile	SLOPE	SlopeLT70	5	70.00	70.00	70.00	0.00	70.50	0.50
22	formfile	SLOPE	SlopeGT70	4	71.00	71.00	71.00	70.00	277.00	1.00
23	formfile	PROF	Prof_cv	5	-8.00	-8.00	-8.00	-80.00	-7.00	1.00
24	formfile	PROF	Prof_st	1	4.50	4.50	4.50	-8.00	17.00	12.50
25	formfile	PROF	Prof_cx	4	17.00	17.00	17.00	16.00	84.00	1.00
26	formfile	SLOPE	SlopeLT60	5	60.00	60.00	60.00	0.00	60.50	0.50
27	formfile	SLOPE	SlopeGT60	4	61.00	61.00	61.00	60.00	277.00	1.00

Appendix 2b. Predictive Ecosystem Mapping Rules for CMAunp

CRULE2000					
F_NAME	**FUZATTR**	**ATTRWT**	**FACET_NO**	**F_CODE**	**Predicting**
FH2001	Shrub/Herb	80	1	2001	dry shrub
FH2001	Dry	20	1	2001	dry shrub
FH2002	Shrub/Herb	80	2	2002	wet shrub
FH2002	Wet	20	2	2002	wet shrub
FH2002	Prof_cv	10	2	2002	wet shrub
FH2003	Shrub/Herb	80	3	2003	mesic shrub
FH2003	Mesic	20	3	2003	mesic shrub
FH2004	herb	80	4	2004	herb meadow
FH2004	Mesic	20	4	2004	herb meadow
FH2005	herb	80	5	2005	dry herb
FH2005	Dry	20	5	2005	dry herb
FH2006	herb	80	6	2006	wetter herb
FH2006	Wet	20	6	2006	wetter herb
FH2006	Prof_cv	10	6	2006	wetter herb
FH2007	rock/barren	80	7	2007	barren/sparse
FH2007	SlopeLT70	30	7	2007	barren/sparse
FH2008	snow/ice	90	8	2008	glacier/snow
FH2009	DWshrb/hrb	90	9	2009	heather heath
FH2010	Forest	80	10	2010	krummholz
FH2011	water	90	11	2011	water
FH2012	rock/barren	80	12	2012	escape terrain
FH2012	SlopeGT70	30	12	2012	escape terrain
FH2012	Prof_cx	10	12	2012	escape terrain

Appendix 2b. Predictive Ecosystem Mapping Rules for CMAunp

ARULE2000										
SORTORDER	**FILE_IN**	**ATTR_IN**	**CLASS_OUT**	**MODEL_NO**	**B**	**B_LOW**	**B_HI**	**B1**	**B2**	**D**
1	formfile	LNQAREA	LnUp	5	8.00	8.00	8.00	0.00	8.10	0.10
2	formfile	LNQAREA	LnMid	1	8.75	8.75	8.75	8.00	9.50	0.75
3	formfile	LNQAREA	LnLow	4	9.50	9.50	9.50	8.50	18.14	1.00
4	formfile	QWETI	Dry	5	5.00	5.00	5.00	0.00	5.01	0.1
5	formfile	QWETI	Mesic	1	6.00	6.00	6.00	5.00	7.00	2.00
6	formfile	QWETI	Wet	4	7.00	7.00	7.00	6.00	27.79	1.00
7	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
8	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
9	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
10	geofile	Classify	Forest	1	51.00	51.00	51.00	50.99	51.01	0.01
11	geofile	Classify	Shrub/Herb	1	1.00	1.00	1.00	0.99	1.01	0.01
12	geofile	Classify	snow/ice	1	50.00	50.00	50.00	49.99	50.01	0.01
13	geofile	Classify	rock/barren	1	52.00	52.00	52.00	51.99	52.01	0.01
14	geofile	Classify	herb	1	55.00	55.00	55.00	54.99	55.01	0.01
15	geofile	Classify	water	1	58.00	58.00	58.00	57.99	58.01	0.01
16	geofile	Classify	DWshrb/hrb	1	54.00	54.00	54.00	53.99	54.01	0.01
17	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.50	0.50
18	formfile	SLOPE	SlopeGT30	4	31.00	31.00	31.00	30.00	277.00	1.00
19	formfile	SLOPE	SlopeLT10	5	10.00	10.00	10.00	0.00	10.50	0.50
20	formfile	SLOPE	SlopeGT10	4	11.00	11.00	11.00	10.00	277.00	1.00
21	formfile	SLOPE	SlopeLT70	5	70.00	70.00	70.00	0.00	70.50	0.50
22	formfile	SLOPE	SlopeGT70	4	71.00	71.00	71.00	70.00	277.00	1.00
23	formfile	PROF	Prof_cv	5	-8.00	-8.00	-8.00	-80.00	-7.00	1.00
24	formfile	PROF	Prof_st	1	4.50	4.50	4.50	-8.00	17.00	12.50
25	formfile	PROF	Prof_cx	4	17.00	17.00	17.00	16.00	84.00	1.00
26	formfile	SLOPE	SlopeLT60	5	60.00	60.00	60.00	0.00	60.50	0.50
27	formfile	SLOPE	SlopeGT60	4	61.00	61.00	61.00	60.00	277.00	1.00

Appendix 2c. Predictive Ecosystem Mapping Rules for CWHwm

CRULE3000					
F_NAME	**FUZATTR**	**ATTRWT**	**FACET_NO**	**F_CODE**	**Predicting**
FH3021	Dry	30	1	3021	02
FH3021	prof_knoll	30	1	3021	02
FH3021	LnUpr2crst	20	1	3021	02
FH3021	Forest	30	1	3021	02
FH3031	Fresh2Moist	30	2	3031	01/03
FH3031	LnMost	20	2	3031	01/03
FH3031	Forest	30	2	3031	01/03
FH3041	LT70	20	3	3041	04
FH3041	moist2VMoist	30	3	3041	04
FH3041	Lnmid2low	20	3	3041	04
FH3041	Forest	30	3	3041	04
FH3061	valley	30	4	3061	06
FH3061	LnMid	20	4	3061	06
FH3061	LT6	30	4	3061	06
FH3061	Moist2Wet	30	4	3061	06
FH3061	Forest	30	4	3061	06
FH3051	valley	30	5	3051	05
FH3051	LnUpr2crst	20	5	3051	05
FH3051	LT6	30	5	3051	05
FH3051	Moist2Wet	30	5	3051	05
FH3051	Forest	30	5	3051	05
FH3071	LnToe/Valley	30	6	3071	07
FH3071	valley	30	6	3071	07
FH3071	LT6	30	6	3071	07
FH3071	Moist2Wet	30	6	3071	07
FH3071	Forest	30	6	3071	07
FH3082	moist2VMoist2	30	8	3082	08
FH3082	NE_Aspect	30	8	3082	08
FH3082	LT20	20	8	3082	08
FH3082	LnToe/Valley2	20	8	3082	08
FH3082	Forest	30	8	3082	08
FH3093	pitLT1	30	11	3093	09/10
FH3093	Vmoist2Wet	20	11	3093	09/10
FH3093	LT6	20	11	3093	09/10
FH3093	Forest	30	11	3093	09/10
FH9050	rck/barren	80	12	9050	barren/sparse
FH9050	LT70	20	12	9050	barren/sparse
FH9051	water	90	13	9051	water

Appendix 2c. Predictive Ecosystem Mapping Rules for CWHwm

CRULE3000					
F_NAME	**FUZATTR**	**ATTRWT**	**FACET_NO**	**F_CODE**	**Predicting**
FH9053	shrub/herb	80	14	9052	avalanche track (shrub) - Steep
FH9053	GT60	20	14	9052	avalanche track (shrub) - Steep
FH9055	shrub/herb	80	17	9055	wetland shrub
FH9055	Vmoist2Wet	30	17	9055	wetland shrub
FH9055	LT6	20	17	9055	wetland shrub
FH9055	pitLT1	20	17	9055	wetland shrub
FH9056	herb	80	18	9056	wetland herb
FH9056	Vmoist2Wet	30	18	9056	wetland herb
FH9056	LT6	20	18	9056	wetland herb
FH9056	pitLT1	20	18	9056	wetland herb
FH9057	Fresh2Moist	30	19	9057	mesic shrub
FH9057	shrub/herb	80	19	9057	mesic shrub
FH9057	LT30	20	19	9057	mesic shrub
FH9059	Dry	30	21	9059	dry shrub
FH9059	shrub/herb	80	21	9059	dry shrub
FH9059	LT30	20	21	9059	dry shrub
FH9061	herb	80	23	9061	avalanche track (herb) - Moderately sloping
FH9061	LT60	30	23	9061	avalanche track (herb) - Moderately sloping
FH9061	GT30	30	23	9061	avalanche track (herb) - Moderately sloping
FH9062	herb	80	24	9062	avalanche track (herb) - Steep
FH9062	GT60	30	24	9062	avalanche track (herb) - Steep
FH9063	shrub/herb	80	25	9063	wetter shrub
FH9063	moist2VMoist	30	25	9063	wetter shrub
FH9063	LT30	20	25	9063	wetter shrub
FH9064	herb	80	26	9064	wetter herb
FH9064	moist2VMoist	30	26	9064	wetter herb
FH9064	LT30	20	26	9064	wetter herb

Appendix 2d. Predictive Ecosystem Mapping Rules for ESSFwv

CRULE4000					
F_NAME	**FUZATTR**	**ATTRWT**	**FACET_NO**	**F_CODE**	**Predicting**
FH4021	dry	20	1	4021	02
FH4021	Prof_cx	20	1	4021	02
FH4021	SW_Aspect	30	1	4021	02
FH4021	Forest	30	1	4021	02
FH4021	LT1250	30	1	4021	02
FH4031	dry	20	2	4031	03
FH4031	SW_Aspect	30	2	4031	03
FH4031	Forest	30	2	4031	03
FH4031	LT1250	30	2	4031	03
FH4041	dry	20	3	4041	04
FH4041	Forest	30	3	4041	04
FH4041	LT1250	30	3	4041	04
FH4041	SlopeLT30	20	3	4041	04
FH4011	Fr2VMoist	30	4	4011	01
FH4011	Forest	30	4	4011	01
FH4011	LT1250	30	4	4011	01
FH4051	Fr2VMoist	20	5	4051	05
FH4051	Forest	30	5	4051	05
FH4051	LT1250	30	5	4051	05
FH4051	SlopeLT20	20	5	4051	05
FH4051	LnLow	20	5	4051	05
FH4052	Wet	20	6	4052	05
FH4052	Forest	30	6	4052	05
FH4052	LT1250	30	6	4052	05
FH4052	SlopeGT15	20	6	4052	05
FH4052	SlopeLT30	20	6	4052	05
FH4052	LnLow	20	6	4052	05
FH4061	Wet	20	7	4061	06
FH4061	Forest	30	7	4061	06
FH4061	LT1050	30	7	4061	06
FH4061	Prof_cv	20	7	4061	06
FH4061	SlopeGT30	20	7	4061	06
FH4061	SlopeLT70	20	7	4061	06
FH4071	Wet	30	8	4071	07
FH4071	GT1050	20	8	4071	07
FH4071	Forest	30	8	4071	07
FH4071	LT1250	30	8	4071	07
FH4071	SlopeLT30	20	8	4071	07
FH4071	Prof_cv	20	8	4071	07
FH4081	Wet	30	9	4081	08
FH4081	Forest	30	9	4081	08

Appendix 2d. Predictive Ecosystem Mapping Rules for ESSFwv

CRULE4000					
F_NAME	**FUZATTR**	**ATTRWT**	**FACET_NO**	**F_CODE**	**Predicting**
FH4081	LT1250	30	9	4081	08
FH4081	SlopeLT15	20	9	4081	08
FH4081	LnLow	20	9	4081	08
FH4091	Wet	30	10	4091	09
FH4091	Forest	30	10	4091	09
FH4091	SlopeLT5	20	10	4091	09
FH4091	LT1250	30	10	4091	09
FH4091	LnLow	20	10	4091	09
FH9027	dry	20	11	9027	parkland forest / woodland
FH9027	Forest	30	11	9027	parkland forest / woodland
FH9027	GT1250	30	11	9027	parkland forest / woodland
FH9028	Fr2VMoist	20	12	9028	parkland forest / woodland
FH9028	Forest	30	12	9028	parkland forest / woodland
FH9028	GT1250	30	12	9028	parkland forest / woodland
FH9029	Wet	20	13	9029	parkland forest / woodland
FH9029	Forest	30	13	9029	parkland forest / woodland
FH9029	GT1250	30	13	9029	parkland forest / woodland
FH9030	Shrub/Herb	80	14	9030	mesic shrub
FH9030	SlopeGT10	20	14	9030	mesic shrub
FH9031	Shrub/Herb	80	15	9031	wetter shrub
FH9031	LnLow	20	15	9031	wetter shrub
FH9031	SlopeGT10	30	15	9031	wetter shrub
FH9032	Shrub/Herb	80	16	9032	wetland shrub
FH9032	LnLow	20	16	9032	wetland shrub
FH9032	SlopeLT10	30	16	9032	wetland shrub
FH9034	rock/barren	80	17	9034	barren/sparse
FH9034	SlopeLT70	30	17	9034	barren/sparse
FH9035	water	90	18	9035	water
FH9036	herb	90	19	9036	wetland herb
FH9036	LnLow	20	19	9036	wetland herb
FH9036	SlopeLT10	30	19	9036	wetland herb
FH9037	herb	80	20	9037	herb meadow
FH9037	SlopeGT10	20	20	9037	herb meadow
FH9038	DWshrub/herb	80	21	9038	heather heath
FH9038	GT1250	30	21	9038	heather heath
FH9039	Shrub/Herb	80	22	9039	avalanche track (shrub) - Moderately sloping
FH9039	SlopeGT30	30	22	9039	avalanche track (shrub) - Moderately sloping
FH9039	SlopeLT60	30	22	9039	avalanche track (shrub) - Moderately sloping
FH9040	Shrub/Herb	80	23	9040	avalanche track (shrub) - Steep
FH9040	SlopeGT60	30	23	9040	avalanche track (shrub) - Steep
FH9041	snow/ice	90	24	9041	glacier/snow

Appendix 2d. Predictive Ecosystem Mapping Rules for ESSFwv

CRULE4000					
F_NAME	**FUZATTR**	**ATTRWT**	**FACET_NO**	**F_CODE**	**Predicting**
FH9042	rock/barren	80	25	9042	escape terrain
FH9042	SlopeGT70	30	25	9042	escape terrain
FH9043	herb	80	26	9043	wetter herb
FH9043	LnLow	20	26	9043	wetter herb
FH9043	SlopeGT10	30	26	9043	wetter herb
FH9044	herb	80	27	9044	avalanche track (herb) - Moderately sloping
FH9044	SlopeGT30	30	27	9044	avalanche track (herb) - Moderately sloping
FH9044	SlopeLT60	30	27	9044	avalanche track (herb) - Moderately sloping
FH9045	herb	80	28	9045	avalanche track (herb) - Steep
FH9045	SlopeGT60	30	28	9045	avalanche track (herb) - Steep
FH9046	DWshrub/herb	80	29	9046	heather heath
FH9046	LT1250	30	29	9046	heather heath

Appendix 2d. Predictive Ecosystem Mapping Rules for ESSFwv

ARULE4000										
SORTORDER	**FILE_IN**	**ATTR_IN**	**CLASS_OUT**	**MODEL_NO**	**B**	**B_LOW**	**B_HI**	**B1**	**B2**	**D**
1	formfile	LNQAREA	LnUp	5	6.00	6.00	6.00	0.00	6.10	0.10
2	formfile	LNQAREA	LnMid	1	8.00	8.00	8.00	6.00	10.00	2.00
3	formfile	LNQAREA	LnLow	4	10.00	10.00	10.00	9.50	18.00	1.00
4	formfile	QWETI	dry	5	5.00	5.00	5.00	0.00	5.01	0.1
5	formfile	QWETI	Fr2VMoist	1	7.50	7.50	7.50	6.00	9.00	1.50
6	formfile	QWETI	Vmoist	1	9.00	9.00	9.00	8.00	10.00	1.00
7	formfile	QWETI	Wet	4	10.00	10.00	10.00	9.00	27.79	1.00
8	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
9	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
10	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
11	geofile	Classify	Forest	1	51.00	51.00	51.00	50.99	51.01	0.01
12	geofile	Classify	Shrub/Herb	1	1.00	1.00	1.00	0.99	1.01	0.01
13	geofile	Classify	snow/ice	1	50.00	50.00	50.00	49.99	50.01	0.01
14	geofile	Classify	rock/barren	1	52.00	52.00	52.00	51.99	52.01	0.01
15	geofile	Classify	herb	1	55.00	55.00	55.00	54.99	55.01	0.01
16	geofile	Classify	water	1	58.00	58.00	58.00	57.99	58.01	0.01
17	geofile	Classify	DWshrub/herb	1	54.00	54.00	54.00	53.99	54.01	0.01
18	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.50	0.50
19	formfile	SLOPE	SlopeGT30	4	31.00	31.00	31.00	30.00	277.00	1.00
20	formfile	SLOPE	SlopeLT5	5	5.00	5.00	5.00	0.00	5.50	0.50
21	formfile	SLOPE	SlopeGT5	4	6.00	6.00	6.00	5.00	277.00	1.00
22	formfile	SLOPE	SlopeLT10	5	10.00	10.00	10.00	0.00	10.50	0.50
23	formfile	SLOPE	SlopeGT10	4	11.00	11.00	11.00	10.00	277.00	1.00
24	formfile	SLOPE	SlopeLT15	5	15.00	15.00	15.00	0.00	15.50	0.50
25	formfile	SLOPE	SlopeGT15	4	16.00	16.00	16.00	15.00	277.00	1.00
26	formfile	SLOPE	SlopeLT20	5	20.00	20.00	20.00	0.00	20.50	0.50
27	formfile	SLOPE	SlopeGT20	4	21.00	21.00	21.00	20.00	277.00	1.00
28	formfile	SLOPE	SlopeLT70	5	70.00	70.00	70.00	0.00	70.50	0.50
29	formfile	SLOPE	SlopeGT70	4	71.00	71.00	71.00	70.00	277.00	1.00
30	formfile	SLOPE	SlopeLT60	5	60.00	60.00	60.00	0.00	60.50	0.50
31	formfile	SLOPE	SlopeGT60	4	61.00	61.00	61.00	60.00	277.00	1.00
32	formfile	PROF	Prof_cv	5	-6.00	-6.00	-6.00	-80.00	-5.00	1.00
33	formfile	PROF	Prof_cx	4	17.00	17.00	17.00	16.00	88.00	1.00
34	geofile	Elev	LT1250	5	1250.00	1250.00	1250.00	0.00	1250.50	0.50
35	geofile	Elev	GT1250	4	1251.00	1251.00	1251.00	1250.00	2715.00	1.00
36	geofile	Elev	LT1050	5	1050.00	1050.00	1050.00	0.00	1050.50	0.50
37	geofile	Elev	GT1050	4	1051.00	1051.00	1051.00	1050.00	2715.00	1.00

Appendix 2e. Predictive Ecosystem Mapping Rules for ICHvc

CRULE5000					
F_NAME	**FUZATTR**	**ATTRWT**	**FACET_NO**	**F_CODE**	**Predicting**
FH5021	Dry	20	1	5021	02
FH5021	Forest	30	1	5021	02
FH5011	Fresh	20	2	5011	01
FH5011	Forest	30	2	5011	01
FH5012	SlopeGT30	20	3	5012	01
FH5012	Fresh2Moist	30	3	5012	01
FH5012	Forest	30	3	5012	01
FH5013	Low2Valley	30	4	5013	01
FH5013	Fresh2Moist	20	4	5013	01
FH5013	Forest	30	4	5013	01
FH5014	Floodplain	30	10	5014	01
FH5014	SlopeLT5	20	10	5014	01
FH5014	LnCrest	30	10	5014	01
FH5014	Vmoist	20	10	5014	01
FH5014	Forest	30	10	5014	01
FH5031	Low2Valley	30	5	5031	03
FH5031	Moist	30	5	5031	03
FH5031	SlopeLT30	20	5	5031	03
FH5031	Forest	30	5	5031	03
FH5032	NoFlood	30	6	5032	03
FH5032	SlopeLT5	30	6	5032	03
FH5032	Fresh	20	6	5032	03
FH5032	Forest	30	6	5032	03
FH5033	Floodplain	30	7	5033	03
FH5033	Vmoist	20	7	5033	03
FH5033	Forest	30	7	5033	03
FH5034	Floodplain	30	9	5034	03
FH5034	SlopeLT5	20	9	5034	03
FH5034	LnM2L	30	9	5034	03
FH5034	Vmoist	20	9	5034	03
FH5034	Forest	30	9	5034	03
FH5041	Floodplain	30	8	5041	04/05
FH5041	SlopeLT5	20	8	5041	04/05
FH5041	M2Vmoist	20	8	5041	04/05
FH5041	Forest	30	8	5041	04/05
FH5061	Vmoist2Wet	20	11	5061	06
FH5061	SlopeLT5	30	11	5061	06
FH5061	Forest	30	11	5061	06

Appendix 2e. Predictive Ecosystem Mapping Rules for ICHvc

CRULE5000					
F_NAME	**FUZATTR**	**ATTRWT**	**FACET_NO**	**F_CODE**	**Predicting**
FH9014	Shrub/Herb	80	12	9014	dry shrub
FH9014	Dry	20	12	9014	dry shrub
FH9015	Shrub/Herb	80	13	9015	mesic shrub
FH9015	Fresh2Moist	20	13	9015	mesic shrub
FH9015	SlopeLT30	30	13	9015	mesic shrub
FH9016	Shrub/Herb	80	14	9016	wetter shrub
FH9016	Vmoist2Wet	20	14	9016	wetter shrub
FH9016	SlopeGT5	30	14	9016	wetter shrub
FH9016	SlopeLT30	30	14	9016	wetter shrub
FH9017	Shrub/Herb	80	15	9017	wetland shrub
FH9017	Vmoist2Wet	20	15	9017	wetland shrub
FH9017	SlopeLT5	30	15	9017	wetland shrub
FH9018	rock/barren	80	16	9018	barren/sparse
FH9018	SlopeLT70	30	16	9018	barren/sparse
FH9019	water	90	17	9019	water
FH9020	herb	90	18	9020	wetland herb
FH9020	Vmoist2Wet	20	18	9020	wetland herb
FH9020	SlopeLT5	30	18	9020	wetland herb
FH9021	herb	80	19	9021	herb meadow
FH9021	Fresh	20	19	9021	herb meadow
FH9022	herb	80	20	9022	dry herb
FH9022	Dry	20	20	9022	dry herb
FH9023	Shrub/Herb	80	22	9023	wetter shrub
FH9023	Moist	30	22	9023	wetter shrub
FH9024	Shrub/Herb	80	23	9024	avalanche track (shrub) - moderately sloping
FH9024	SlopeGT30	30	23	9024	avalanche track (shrub) - moderately sloping
FH9024	SlopeLT60	30	23	9024	avalanche track (shrub) - moderately sloping
FH9025	Shrub/Herb	80	24	9025	avalanche track (shrub) - steep
FH9025	SlopeGT60	30	24	9025	avalanche track (shrub) - steep
FH9026	herb	80	25	9026	avalanche track (herb) - moderately sloping
FH9026	SlopeGT30	30	25	9026	avalanche track (herb) - moderately sloping
FH9026	SlopeLT60	30	25	9026	avalanche track (herb) - moderately sloping
FH9090	herb	80	26	9090	avalanche track (herb) - steep
FH9090	SlopeGT60	30	26	9090	avalanche track (herb) - steep
FH9091	rock/barren	80	27	9091	escape terrain
FH9091	SlopeGT70	30	27	9091	escape terrain
FH9022	herb	80	28	9092	wetter herb
FH9022	Moist	20	28	9092	wetter herb

Appendix 2e. Predictive Ecosystem Mapping Rules for ICHvc

ARULE5000										
SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	LNQAREA	LnCrest	5	6.00	6.00	6.00	0.00	6.10	0.10
2	formfile	LNQAREA	LnM2L	1	7.50	7.50	7.50	6.00	9.00	1.50
3	formfile	LNQAREA	LnL2V	4	9.00	9.00	9.00	8.00	70.00	1.00
4	formfile	QWETI	Dry	5	5.00	5.00	5.00	0.00	5.01	0.1
5	formfile	QWETI	Fresh	1	6.00	6.00	6.00	5.00	7.00	1.00
6	formfile	QWETI	Moist	1	8.50	8.50	8.50	7.00	10.00	1.50
7	formfile	QWETI	Fresh2Moist	1	7.50	7.50	7.50	5.00	10.00	2.50
8	formfile	QWETI	Vmoist2Wet	1	18.50	18.50	18.50	10.00	27.00	8.50
9	formfile	QWETI	Vmoist	1	13.00	13.00	13.00	10.00	16.00	3.00
10	formfile	QWETI	M2Vmoist	1	12.00	12.00	12.00	8.00	16.00	4.00
11	formfile	QWETI	Wet	4	16.00	16.00	16.00	15.00	27.00	1.00
12	relzfile	PCTZ2ST	Up2Crest	4	80.00	80.00	80.00	79.00	100.00	1.00
13	relzfile	PCTZ2ST	Up2Mid	1	70.00	70.00	70.00	69.00	100.00	15.50
14	relzfile	PCTZ2ST	Low2Valley	1	5.50	5.50	5.50	1.00	10.00	4.50
15	relzfile	PCTZ2ST	Valley	5	1.00	1.00	1.00	0.00	1.50	0.50
16	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
17	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
18	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
19	geofile	Classify	Forest	1	51.00	51.00	51.00	50.99	51.01	0.01
20	geofile	Classify	Shrub/Herb	1	1.00	1.00	1.00	0.99	1.01	0.01
21	geofile	Classify	rock/barren	1	52.00	52.00	52.00	51.99	52.01	0.01
22	geofile	Classify	herb	1	55.00	55.00	55.00	54.99	55.01	0.01
23	geofile	Classify	water	1	58.00	58.00	58.00	57.99	58.01	0.01
24	geofile	Classify	DWShrub/Herb	1	54.00	54.00	54.00	53.99	54.01	0.01
25	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.50	0.50
26	formfile	SLOPE	SlopeGT30	4	31.00	31.00	31.00	30.00	277.00	1.00
27	formfile	SLOPE	SlopeLT5	5	5.00	5.00	5.00	0.00	5.50	0.50
28	formfile	SLOPE	SlopeGT5	4	6.00	6.00	6.00	5.00	277.00	1.00
29	formfile	SLOPE	SlopeLT10	5	10.00	10.00	10.00	0.00	10.50	0.50
30	formfile	SLOPE	SlopeGT10	4	11.00	11.00	11.00	10.00	277.00	1.00
31	formfile	SLOPE	SlopeLT70	5	70.00	70.00	70.00	0.00	70.50	0.50
32	formfile	SLOPE	SlopeGT70	4	71.00	71.00	71.00	70.00	277.00	1.00
33	formfile	SLOPE	SlopeLT60	5	60.00	60.00	60.00	0.00	60.50	0.50
34	formfile	SLOPE	SlopeGT60	4	61.00	61.00	61.00	60.00	277.00	1.00
35	formfile	PROF	Prof_cv	5	-15.00	-15.00	-15.00	0.00	-80.00	1.00
36	formfile	PROF	Prof_cx	4	17.00	17.00	17.00	16.00	88.00	1.00
37	relzfile	Z2St	Floodplain	5	20.00	20.00	20.00	0.00	20.50	0.50
38	relzfile	Z2St	NoFlood	4	21.00	21.00	21.00	20.00	1703.00	1.00

Appendix 2f. Predictive Ecosystem Mapping Rules for MHun

CRULE7000					
F_NAME	**FUZATTR**	**ATTRWT**	**FACET_NO**	**F_CODE**	**Predicting**
FH7011	LnMost	20	1	7011	01
FH7011	Fresh	30	1	7011	01
FH7011	lt1150	20	1	7011	01
FH7011	Forest	20	1	7011	01
FH7021	Dry	30	2	7021	02
FH7021	LnUpr2crst	20	2	7021	02
FH7021	prof_knoll	20	2	7021	02
FH7021	gt750	20	2	7021	02
FH7021	lt1150	20	2	7021	02
FH7021	Forest	20	2	7021	02
FH7061	Vmoist	30	3	7061	06
FH7061	LT30	20	3	7061	06
FH7061	lt1150	20	3	7061	06
FH7061	Forest	20	3	7061	06
FH7081	LT12	20	4	7081	08/09
FH7081	Wet	30	4	7081	08/09
FH7081	pit	20	4	7081	08/09
FH7081	lt1150	20	4	7081	08/09
FH7081	Forest	20	4	7081	08/09
FH7041	Moist	30	5	7041	04
FH7041	LnMost	20	5	7041	04
FH7041	lt1150	20	5	7041	04
FH7041	Forest	20	5	7041	04
FH7041	GT10	20	5	7041	04
FH7051	Lnmid2low	20	6	7051	05
FH7051	Moist	30	6	7051	05
FH7051	lt1150	20	6	7051	05
FH7051	Forest	20	6	7051	05
FH7031	Fresh	30	7	7031	03
FH7031	Lnmid2low	20	7	7031	03
FH7031	lt1150	20	7	7031	03
FH7031	Forest	20	7	7031	03
FH7071	Vmoist	30	8	7071	07
FH7071	lt1150	20	8	7071	07
FH7071	LT60	20	8	7071	07
FH7071	GT30	20	8	7071	07
FH7071	Forest	20	8	7071	07

Appendix 2f. Predictive Ecosystem Mapping Rules for MHun

CRULE7000					
F_NAME	**FUZATTR**	**ATTRWT**	**FACET_NO**	**F_CODE**	**Predicting**
FH9065	Shrb/Hrb	80	10	9065	avalanche track (shrub) - Steep
FH9065	GT60	20	10	9065	avalanche track (shrub) - Steep
FH9066	Shrb/Hrb	80	11	9066	avalanche track (shrub) - Moderately Sloping
FH9066	LT60	20	11	9066	avalanche track (shrub) - Moderately Sloping
FH9066	GT30	20	11	9066	avalanche track (shrub) - Moderately Sloping
FH9067	herb	80	12	9067	avalanche track (herb) - Moderately Sloping
FH9067	LT60	30	12	9067	avalanche track (herb) - Moderately Sloping
FH9067	GT30	30	12	9067	avalanche track (herb) - Moderately Sloping
FH9068	herb	80	13	9068	avalanche track (herb) - Steep
FH9068	GT60	30	13	9068	avalanche track (herb) - Steep
FH9069	rck/barren	80	14	9069	escape terrain
FH9069	GT70	20	14	9069	escape terrain
FH9070	DWshrb/hrb	80	15	9070	heather heath
FH9071	Shrb/Hrb	80	16	9071	wetland shrub
FH9071	Vmoist2Wet	20	16	9071	wetland shrub
FH9071	LT6	30	16	9071	wetland shrub
FH9072	herb	80	17	9072	wetland herb
FH9072	Vmoist2Wet	20	17	9072	wetland herb
FH9072	LT6	30	17	9072	wetland herb
FH9073	Fresh	20	18	9073	mesic shrub
FH9073	Shrb/Hrb	80	18	9073	mesic shrub
FH9073	LT30	20	18	9073	mesic shrub
FH9074	Fresh	20	19	9074	herb meadow
FH9074	herb	80	19	9074	herb meadow
FH9074	LT30	20	19	9074	herb meadow
FH9075	Dry	20	20	9075	dry shrub
FH9075	Shrb/Hrb	80	20	9075	dry shrub
FH9076	Dry	20	21	9076	dry shrub
FH9076	herb	80	21	9076	dry shrub
FH9077	rck/barren	80	22	9077	barren/sparse
FH9077	LT70	30	22	9077	barren/sparse
FH9078	snow/ice	90	23	9078	glacier/snow
FH9079	Dry	20	24	9079	parkland forest / woodland
FH9079	Forest	30	24	9079	parkland forest / woodland
FH9079	gt1150	30	24	9079	parkland forest / woodland
FH9080	Fresh2	20	25	9080	parkland forest / woodland
FH9080	Forest	30	25	9080	parkland forest / woodland
FH9080	gt1150	30	25	9080	parkland forest / woodland

Appendix 2f. Predictive Ecosystem Mapping Rules for MHun

CRULE7000					
F_NAME	**FUZATTR**	**ATTRWT**	**FACET_NO**	**F_CODE**	**Predicting**
FH9081	Vmoist2Wet	20	26	9081	parkland forest / woodland
FH9081	Forest	30	26	9081	parkland forest / woodland
FH9081	gt1150	30	26	9081	parkland forest / woodland
FH9082	water	80	27	9082	water
FH9083	Shrb/Hrb	80	28	9083	wetter shrub/herb
FH9083	moist	30	28	9083	wetter shrub/herb
FH9083	LT30	20	28	9083	wetter shrub/herb
FH9084	herb	80	29	9084	wetter herb
FH9084	moist	30	29	9084	wetter herb
FH9084	LT30	20	29	9084	wetter herb

Appendix 2f. Predictive Ecosystem Mapping Rules for Mhun

ARULE7000										
SORTORDER	**FILE_IN**	**ATTR_IN**	**CLASS_OUT**	**MODEL_NO**	**B**	**B_LOW**	**B_HI**	**B1**	**B2**	**D**
1	formfile	LNQAREA	LnUpr2crst	5	6.80	6.80	6.80	0.00	6.90	0.10
2	formfile	LNQAREA	LnMid	1	8.65	7.20	7.20	7.80	9.50	0.85
3	formfile	LNQAREA	LnMost	1	8.15	8.15	8.15	6.80	9.50	1.35
4	formfile	LNQAREA	Lnmid2low	1	10.10	10.10	10.10	9.20	11.00	0.90
5	formfile	QWETI	Dry	5	4.25	4.25	4.25	1.26	4.35	0.10
6	formfile	QWETI	Fresh	1	5.88	5.88	5.88	4.25	7.50	1.63
7	formfile	QWETI	Fresh2	1	6.25	6.25	6.25	4.50	8.00	1.75
8	formfile	QWETI	Moist	1	8.00	8.00	8.00	7.50	8.50	0.50
9	formfile	QWETI	Vmoist	1	9.00	9.00	9.00	8.50	9.50	0.50
10	formfile	QWETI	Wet	1	11.00	11.00	11.00	9.50	12.50	1.50
11	formfile	QWETI	Vmoist2Wet	1	10.50	10.50	10.50	8.50	12.50	2.00
12	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
13	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
14	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
15	geofile	Classify	Forest	1	51.00	51.00	51.00	50.99	51.01	0.01
16	geofile	Classify	Shrb/Hrb	1	1.00	1.00	1.00	0.99	1.01	0.01
17	geofile	Classify	snow/ice	1	50.00	50.00	50.00	49.99	50.01	0.01
18	geofile	Classify	rck/barren	1	52.00	52.00	52.00	51.99	52.01	0.01
19	geofile	Classify	herb	1	55.00	55.00	55.00	54.99	55.01	0.01
20	geofile	Classify	water	1	58.00	58.00	58.00	57.99	58.01	0.01
21	geofile	Classify	DWshrb/hrb	1	54.00	54.00	54.00	53.99	54.01	0.01
22	formfile	SLOPE	LT86	5	86.00	86.00	86.00	0.00	86.50	0.50
23	formfile	SLOPE	GT20	4	20.00	20.00	20.00	19.00	363.30	1.00
24	formfile	SLOPE	GT70	4	70.00	70.00	70.00	69.00	363.30	1.00
25	formfile	SLOPE	LT75	4	75.00	75.00	75.00	74.00	363.30	1.00
26	formfile	SLOPE	GT10	4	10.00	10.00	10.00	9.00	363.30	1.00
27	formfile	SLOPE	LT20	5	20.00	20.00	20.00	0.00	20.50	0.50
28	formfile	SLOPE	LT30	5	30.00	30.00	30.00	0.00	30.50	0.50
29	formfile	SLOPE	GT5	5	5.00	5.00	5.00	0.00	5.50	0.50
30	formfile	SLOPE	LT60	5	60.00	60.00	60.00	0.00	60.50	0.50
31	formfile	SLOPE	GT30	4	30.00	30.00	30.00	29.00	363.30	1.00
32	formfile	SLOPE	GT60	4	60.00	60.00	60.00	59.00	363.30	1.00
33	formfile	SLOPE	LT12	5	12.00	12.00	12.00	0.00	12.50	0.50
34	formfile	PROF	prof_knoll	4	40.00	40.00	40.00	39.00	86.00	1.00
35	relzfile	Z2PIT	pit	5	20.00	20.00	20.00	0.00	20.10	0.10
36	geofile	Elev	gt750	4	750.00	750.00	750.00	749.00	2571.00	1.00
37	geofile	Elev	lt1200	5	1150.00	1150.00	1150.00	54.00	1150.50	0.50
38	geofile	Elev	gt1200	4	1150.00	1150.00	1150.00	1149.00	2571.00	1.00

Appendix 3

Ground Inspection Form

BRITISH COLUMBIA — GROUND INSPECTION FORM

G ☐ vs V ☐	PHOTO	X:	Y:	DATE
PROJECT ID.		SURV.		
MAP SHEET		PLOT #		POLY. #
UTM ZONE	LAT. / NORTH	LONG. / EAST		
ASPECT °		ELEVATION m		
SLOPE %	SMR	SNR		

MESO SLOPE POSTION	☐ Crest	☐ Mid slope	☐ Depression
	☐ Upper slope	☐ Lower slope	☐ Level
		☐ Toe	
DRAINAGE - MINERAL SOILS	☐ Very rapidly	☐ Well	☐ Poorly
	☐ Rapidly	☐ Mod. well	☐ Very poorly
		☐ Imperfectly	
MOISTURE SUBCLASSES - ORGANIC SOILS	☐ Aqueous	☐ Aquic	☐ Perhumid
	☐ Peraquic	☐ Subaquic	☐ Humid
MINERAL SOIL TEXTURE	☐ Sandy (LS,S)	☐ Silty (SiL,Si)	
	☐ Loamy (SL,L,SCL,FSL)	☐ Clayey (SiCL,CL,SC,SiC,C)	

ORGANIC SOIL TEXTURE ☐ Fibric ☐ Mesic ☐ Humic	SURF. ORGANIC HORIZON THICKNESS ☐ 0–40 cm ☐ > 40 cm
HUMUS FORM ☐ Mor ☐ Moder ☐ Mull	ROOT RESTRICTING LAYER Depth _____ cm Type _____

COARSE FRAGMENT CONTENT
☐ < 20% ☐ 20–35% ☐ 35–70% ☐ > 70%

TERRAIN

COMPONENT: TC1 ☐ TC2 ☐ TC3 ☐

TERRAIN TEXTURE	SURFICIAL MATERIAL	SURFACE EXPRESSION	GEOMORPH PROCESS
1	1	1	1
2	2	2	2

ECOSYSTEM

COMPONENT: EC1 ☐ EC2 ☐ EC3 ☐

BGC UNIT	ECOSECTION
SITE SERIES	SITE MODIFIERS
STRUCTURAL STAGE	CROWN CLOSURE %

ECOSYSTEM POLYGON SUMMARY

	%	SS	SM	ST
EC1				
EC2				
EC3				

TERRAIN POLYGON SUMMARY

	%	Classification
TC1		
TC2		
TC3		

DOMINANT / INDICATOR PLANT SPECIES

TOTAL %	A:	B:	C:	D:

L.	SPECIES	%	L.	SPECIES	%	L.	SPECIES	%

COMPLETE ☐ PARTIAL ☐

Tree Mensuration

Spp.	DBH	Ht. Calculation to DBH						Ht. to DBH	Total HT	BH Age	Path Y/N
		Top	Bot	SD	SL	HD	HT				

NOTES (site diagram, exposure, gleying, etc.)

Appendix 4

Listed Plant Species Potentially Occurring within the KSM Regional Study Area

SEABRIDGE GOLD

Rescan™
Engineers and Scientists

Appendix 4. Listed Plant Species Potentially Occuring within the KSM Regional Study Area

Scientific Name	English Name	Global Status	Prov Status	BC List	SARA	Name Category	BEC Unit
Amphidium mougeotii		G5	S2S3	Blue		Nonvascular Plant	BAFA; CMA; CWH; ESSF; ICH; MH
Andreaea rupestris var. *papillosa*		G5TNR	S1S3	Red		Nonvascular Plant	BAFA; CMA; CWH; ESSF; SWB
Aongstroemia longipes		G3G5	S2S3	Blue		Nonvascular Plant	BAFA; BWBS; ESSF; ICH; IDF; IMA; MS
Apocynum x *floribundum*	western dogbane	GNA	S2S3	Blue		Vascular Plant	BGxh; BWBSdk; CWHdm; CWHxm; ICHmc; ICHmk; IDFdm; IDFww; IDFxh; IDFxm; PPxh; SBSwk
Arabis lignifera	woody-branched rockcress	G5	S2S3	Blue		Vascular Plant	BAFAunp; BGxh; BGxw; BWBSdk; ESSFdc; ESSFmw; ESSFxcp; ICHmk; IDFdk; IDFdw; IDFxh; SBSdw; SBSun; SBSwk
Bistorta plumosa	meadow bistort	G5T5	S1S3	Red		Vascular Plant	BAFA; CMA
Botrychium ascendens	upswept moonwort	G2G3	S2	Red		Vascular Plant	BAFA; CMA; CWHxm; ESSFdk; ESSFmm; IDFdk; IDFxh; IMA
Botrychium crenulatum	dainty moonwort	G3	S2S3	Blue		Vascular Plant	BWBSmw; ESSFdk; ICHwk
Botrychium montanum	mountain moonwort	G3	S1	Red		Vascular Plant	ICHmc; ICHmw; ICHwk
Botrychium pedunculosum	stalked moonwort	G2G3	S2	Red		Vascular Plant	CWHws; SBSmh; SBSmw
Brachythecium groenlandicum		G3G5	S2S3	Blue		Nonvascular Plant	BAFA; ESSF; ICH; IMA; MS; SWB
Bryhnia hultenii		G4	S1	Red		Nonvascular Plant	CWH; MH
Bryoerythrophyllum ferruginascens		G3G4	S1S3	Red		Nonvascular Plant	BAFA; CMA
Calliergon richardsonii		G4	S2S3	Blue		Nonvascular Plant	BAFA; BWBS; ESSF; ICH; MS; SBS
Callitriche heterophylla ssp. *heterophylla*	two-edged water-starwort	G5T5	S2S3	Blue		Vascular Plant	BAFAunp; CDFmm; CWHvm; CWHwh; CWHxm
Caltha palustris var. *palustris*	yellow marsh-marigold	G5T5	S2S3	Blue		Vascular Plant	CDFmm; CWHvm; CWHwm; CWHws
Campylium hispidulum		G4G5	S2S3	Blue		Nonvascular Plant	BAFA; CWH; ESSF; ICH; IDF
Carex adusta	lesser brown sedge	G5	S1	Red		Vascular Plant	ICHmc; ICHmw
Carex gmelinii	Gmelin's sedge	G4G5	S2S3	Blue		Vascular Plant	CWHvh; CWHwh; CWHwm
Carex krausei	Krause's sedge	G4	S2S3	Blue		Vascular Plant	ESSFwm; ESSFwv
Carex lenticularis var. *dolia*	Enander's sedge	G5T3	S2S3	Blue		Vascular Plant	ESSFmc; ESSFmk; ESSFvc; ESSFwk; ESSFwv; ICHwc; IDFxk; MHmm; SBSmc
Carex tenera	tender sedge	G5	S2S3	Blue		Vascular Plant	BWBSdk; ESSFmv; ESSFwm; ICHmk; ICHwk; SBSmh
Cinclidium arcticum		G4G5	S1S3	Red		Nonvascular Plant	BAFA; SWB
Cnestrum alpestre		G3G5	S2S3	Blue		Nonvascular Plant	BAFA; SWB
Cnestrum schisti		G3G5	S1S3	Red		Nonvascular Plant	BAFA; SWB
Cornus suecica	dwarf bog bunchberry	G5	S1S3	Red		Vascular Plant	CMA; CWHvh; CWHwm
Cynodontium tenellum		G3G5Q	S2S3	Blue		Nonvascular Plant	BAFA; CWH; ESSF; ICH; SBS; SWB
Cyrtomnium hymenophylloides		G5?	S2S3	Blue		Nonvascular Plant	BAFA; BWBS; ESSF; ICH; MS; SWB
Cyrtomnium hymenophyllum		G3G5	S2S3	Blue		Nonvascular Plant	BAFA; ICH; MH; SWB
Desmatodon obtusifolius		G5	S2S3	Blue		Nonvascular Plant	BG; CDF; ICH; IDF
Dicranella cerviculata		G5?	S2S3	Blue		Nonvascular Plant	CDF; CWH; ESSF; ICH; SWB
Dicranum fragilifolium		G4G5	S2S3	Blue		Nonvascular Plant	BWBS; ESSF; MS; SWB
Dicranum spadiceum		G5?	S2S3	Blue		Nonvascular Plant	BAFA; CWH; ICH; MH; SBS; SWB
Didymodon nigrescens		G3G5	S2S3	Blue		Nonvascular Plant	BAFA; CWH; SWB
Diphyscium foliosum		G5	S2S3	Blue		Nonvascular Plant	CWH
Draba cinerea	gray-leaved draba	G5	S2S3	Blue		Vascular Plant	BAFA; BWBSdk; CMA; IMA; SBSdh; SWBun

Appendix 4. Listed Plant Species Potentially Occuring within the KSM Regional Study Area

Scientific Name	English Name	Global Status	Prov Status	BC List	SARA	Name Category	BEC Unit
Draba corymbosa	Baffin Bay draba	G4G5	S2S3	Blue		Vascular Plant	BAFA; CMA
Draba fladnizensis	Austrian draba	G4	S2S3	Blue		Vascular Plant	BAFA; CMA; IMA; SBSmk; SWBun
Draba lactea	milky draba	G4	S2S3	Blue		Vascular Plant	BAFA; BWBS; CMA; ESSFmv; ESSFvcp; ESSFwm; ESSFwmp; ESSFwv; ESSFxv; IMAun; SWBmk; SWBun
Draba lonchocarpa var. *thompsonii*	lance-fruited draba	G5T3T4	S2S3	Blue		Vascular Plant	BAFA; CMA; IMA
Draba lonchocarpa var. *vestita*	lance-fruited draba	G5T3	S2S3	Blue		Vascular Plant	BAFA; CMA; ESSFwm; ESSFwv; IMA; MHmm; MHwh
Draba ruaxes	coast mountain draba	G4	S2S3	Blue		Vascular Plant	BAFA; CMA; IMA; SBSdk
Draba stenopetala	star-flowered draba	G3G4	S1	Red		Vascular Plant	BAFA; CMA
Draba ventosa	Wind River draba	G3	S2S3	Blue		Vascular Plant	BAFA; CMA; IMA
Drepanocladus crassicostatus		G3G5	S2S3	Blue		Nonvascular Plant	ICH; IDF; MH; MS; SBPS
Drepanocladus lapponicus		GU	S1S3	Red		Nonvascular Plant	BAFA
Drepanocladus sendtneri		G5?	S2S3	Blue		Nonvascular Plant	ESSF; ICH; IDF; MS; PP; SBS; SWB
Drepanocladus tundrae		GU	S1S3	Red		Nonvascular Plant	BAFA; BWBS; ICH; SWB
Drepanocladus uncinatus var. *symmetricus*		G5TNR	S2S3	Blue		Nonvascular Plant	CWH; ICH; IDF
Dryopteris cristata	crested wood fern	G5	S2S3	Blue		Vascular Plant	ESSFwc; ICHdw; ICHmc; ICHmw; ICHvk; ICHwk; ICHxw; IDFmw; IDFxh; SBSmk
Eleocharis kamtschatica	Kamchatka spike-rush	G4	S2S3	Blue		Vascular Plant	CWHvh; CWHvm; CWHwh; CWHwm
Encalypta alpina		G5?	S2S3	Blue		Nonvascular Plant	BAFA; ESSF; SWB
Encalypta brevipes		G3	S2S3	Blue		Nonvascular Plant	BAFA; SBS
Epilobium hornemannii ssp. *behringianum*	Hornemann's willowherb	G5T4	S2S3	Blue		Vascular Plant	CWHwh; ICHmm; ICHvc; SWBmk; SWBun
Epilobium leptocarpum	small-fruited willowherb	G5	S2S3	Blue		Vascular Plant	BAFA; CMA; CWHdm; CWHds; CWHvm; CWHwh; CWHxm; ESSFmw; ESSFwc; ESSFwk; ESSFxv; ICHmc; ICHmw; ICHwk; IMA; MSdk; SBSwk; SWBmk
Erigeron uniflorus ssp. *eriocephalus*	northern daisy	G5T4	S2S3	Blue		Vascular Plant	BAFA; CMA; SWBun
Erysimum pallasii	Pallas' wallflower	G4	S1S3	Red		Vascular Plant	BAFA; CMA
Eutrema edwardsii	Edwards wallflower	G4	S2S3	Blue		Vascular Plant	BAFA; CMA; SWBmk; SWBun
Festuca minutiflora	little fescue	G5	S2S3	Blue		Vascular Plant	BAFA; CMAunp; ESSFdkp; ESSFdkw; IMA
Geum rossii var. *rossii*	Ross' avens	G5T5	S2S3	Blue		Vascular Plant	BAFA; ESSFwvp
Grimmia affinis		G4G5	S2S3	Blue		Nonvascular Plant	BAFA; BWBS; ESSF; MH; MS; SWB
Gymnocarpium jessoense ssp. *parvulum*	Nahanni oak fern	G5T4	S3	Blue		Vascular Plant	BWBSdk; BWBSmw; BWBSwk; ESSFvc; ESSFvcp; ESSFwcp; SWBmk
Hygrohypnum alpestre		G3G5	S1S3	Red		Nonvascular Plant	BAFA; SWB
Hygrohypnum duriusculum		G3G5	S2S3	Blue		Nonvascular Plant	BAFA; ESSF; ICH; IMA
Hygrohypnum polare		G5?	S1S3	Red		Nonvascular Plant	BAFA; SBS
Hygrohypnum styriacum		GU	S2S3	Blue		Nonvascular Plant	BAFA; CMA; CWH; ESSF; ICH; IDF; SBS
Hypnum plicatulum		G5	S2S3	Blue		Nonvascular Plant	BAFA; SWB
Hypnum pratense		G5	S2S3	Blue		Nonvascular Plant	BAFA; BWBS; CWH; ESSF; ICH; IDF; MS; SBPS; SBS; SWB
Juncus albescens	whitish rush	G5	S2S3	Blue		Vascular Plant	BAFA; BWBSdk; CMA; ESSFdk; IMA; MSdc; SBPSxc; SWBdk; SWBmk

Appendix 4. Listed Plant Species Potentially Occuring within the KSM Regional Study Area

Scientific Name	English Name	Global Status	Prov Status	BC List	SARA	Name Category	BEC Unit
Juncus arcticus ssp. *alaskanus*	arctic rush	G5T4T5	S2S3	Blue		Vascular Plant	BWBSdk; BWBSmw; CWHvh; ESSFdk; ESSFwk; SBSun; SWBdk; SWBmk; SWBun
Juncus stygius	bog rush	G5	S2S3	Blue		Vascular Plant	CWHvh; CWHvm; CWHws; ICHmw; SBSdw; SBSmh; SBSmk; SBSvk; SBSwk
Koenigia islandica	Iceland koenigia	G4	S2S3	Blue		Vascular Plant	BAFA; CMA; IMA; SBPSmc; SWBdk; SWBun
Lescuraea saxicola		G4G5	S1S3	Red		Nonvascular Plant	BAFA; CWH; ESSF; SWB
Leucanthemum arcticum	arctic daisy	G5	SH	Red		Vascular Plant	CWHwm
Loeskypnum badium		G4G5	S2S3	Blue		Nonvascular Plant	BAFA; CWH; SBS
Lupinus kuschei	Yukon lupine	G3G4	S2S3	Blue		Vascular Plant	BAFA; BWBSdk; BWBSvk; CMA; SWBmk
Luzula confusa	northern wood-rush	G5	S2S3	Blue		Vascular Plant	BAFA; BWBSwk; CMA
Luzula nivalis	arctic wood-rush	G5	S2S3	Blue		Vascular Plant	BAFA; BWBSdk; CMA; SWBmk; SWBun
Malaxis brachypoda	white adder's-mouth orchid	G4Q	S2S3	Blue		Vascular Plant	BWBSdk; BWBSmw; CDFmm; CWHdm; CWHvm; CWHwh; CWHws; CWHxm; SBSvk
Malaxis paludosa	bog adder's-mouth orchid	G4	S2S3	Blue		Vascular Plant	CWHvh; CWHvm; CWHwh; SBSdw; SBSwk
Myurella sibirica		G4?	S1S3	Red		Nonvascular Plant	CWH; SWB
Nephroma occultum	Cryptic Paw	G4	S2S3	Blue	1	Fungus	CWH; ICH
Oreas martiana		G5?	S1S3	Red		Nonvascular Plant	BAFA; ICH
Orthothecium strictum		G5?	S2S3	Blue		Nonvascular Plant	BAFA; SWB
Orthotrichum affine		G3G5	S2S3	Blue		Nonvascular Plant	BAFA; BG; CWH; ESSF; IDF; MS
Orthotrichum alpestre		G4G5	S2S3	Blue		Nonvascular Plant	BWBS; CWH; ESSF; ICH; IDF; SBS
Orthotrichum pallens		G5	S2S3	Blue		Nonvascular Plant	ESSF; ICH; SWB
Oxytropis maydelliana	Maydell's locoweed	G5	S2S3	Blue		Vascular Plant	BAFA; BWBSdk; BWBSmw; BWBSvk; CMA; SWBmk
Pedicularis parviflora ssp. *parviflora*	small-flowered lousewort	G4T4	S3	Blue		Vascular Plant	CWHvh; ICHmk; ICHwk; MHwh; MSxv; SBSmh; SBSmk; SBSwk; SWBun
Pedicularis verticillata	whorled lousewort	G4	S2S3	Blue		Vascular Plant	BAFA; BWBSdk; CMA; CWHvh; CWHwh; MHwh
Pinguicula villosa	hairy butterwort	G4	S2S3	Blue		Vascular Plant	BWBSdk; CWHvh; CWHwh
Pinus albicaulis	whitebark pine	G3G4	S3?	Blue		Vascular Plant	BAFAun; BAFAunp; CMAunp; CWHdm; CWHds; CWHms; CWHun; CWHvm; CWHws; ESSFdc; ESSFdcp; ESSFdcw; ESSFdk; ESSFdkp; ESSFdku; ESSFdkw; ESSFdm; ESSFdmp; ESSFdmw; ESSFdv; ESSFdvp; ESSFdvw; ESSFmc; ESSFmcp; ESSFmk; ESSFmkp; ESSFmm; ESSFmmp; ESSFmv; ESSFmvp; ESSFmw; ESSFmwp; ESSFmww; ESSFvc; ESSFvcp; ESSFvcw; ESSFwc; ESSFwcp; ESSFwcw; ESSFwk; ESSFwm; ESSFwmp; ESSFwmu; ESSFwmw; ESSFwv; ESSFwvp; ESSFxc; ESSFxcp; ESSFxcw; ESSFxv; ESSFxvp; ESSFxvw; ICHdm; ICHdw; ICHmc; ICHmk; ICHmm; ICHmw; ICHvk; ICHwk; IDFdc; IDFdk; IDFdm; IDFdw; IDFww; IDFxc; IDFxh; IMAun; IMAunp; MHmm; MHmmp; MSdc; MSdk; MSdm; MSdv; MSmw; MSxk; MSxv; SBPSxc; SBSdh; SBSmc; SBSvk; SBSwk
Plagiomnium ciliare		G5	S1S3	Red		Nonvascular Plant	BAFA; BWBS; CDF; ICH; SBS

Appendix 4. Listed Plant Species Potentially Occuring within the KSM Regional Study Area

Scientific Name	English Name	Global Status	Prov Status	BC List	SARA	Name Category	BEC Unit
Plantago eriopoda	alkali plantain	G5	S3	Blue		Vascular Plant	BWBSdk; ESSFdk; IDFdm; IDFun; MSdk
Pleuroziopsis ruthenica		G3	S1S3	Red		Nonvascular Plant	CWH
Poa eminens	eminent bluegrass	G5	S2S3	Blue		Vascular Plant	CWHvm
Pohlia atropurpurea		G4G5	S2S3	Blue		Nonvascular Plant	BWBS; CWH; ICH; IMA; MS
Pohlia camptotrachela		G3G5	S1S3	Red		Nonvascular Plant	CWH; ESSF; MH
Pohlia elongata		G4G5	S2S3	Blue		Nonvascular Plant	BAFA; CWH; ESSF; ICH; IMA
Pohlia sphagnicola		G2G3	S2S3	Blue		Nonvascular Plant	BWBS; CWH; ESSF; ICH
Pohlia tundrae		G2G3	S1S3	Red		Nonvascular Plant	MH
Pohlia vexans		G3G5	S2S3	Blue		Nonvascular Plant	ESSF; SWB
Polemonium boreale	northern Jacob's-ladder	G5	S2S3	Blue		Vascular Plant	BAFA; BWBSdk; BWBSvk; CMA; ESSFmv; IMA
Polemonium occidentale ssp. *occidentale*	western Jacob's-ladder	G5?T5?	S2S3	Blue		Vascular Plant	BGxh; BWBSmw; BWBSwk; ESSFmv; ESSFmw; ESSFwc; ICHdw; ICHmc; IDFdk; IDFxh; MSdm; SBPSxc; SBSmc; SWBun
Polystichum setigerum	Alaska holly fern	G3	S2S3	Blue		Vascular Plant	CWHvm; CWHwh; CWHws
Polytrichum longisetum		G5	S2S3	Blue		Nonvascular Plant	CDF; CWH; ESSF; ICH; MH; MS; SBS; SWB
Pseudobryum cinclidioides		G5	S1S3	Red		Nonvascular Plant	BAFA
Pseudocyphellaria rainierensis	Oldgrowth Specklebelly	G3G4	S1	Red	3	Fungus	CWHms; CWHvh; CWHvm; CWHwh
Psilopilum cavifolium		GU	S1S3	Red		Nonvascular Plant	BAFA
Ranunculus pedatifidus ssp. *affinis*	birdfoot buttercup	G5T5	S2S3	Blue		Vascular Plant	BAFA; BWBSdk; BWBSmw; CMA; ESSFxv; ICHwk; IDFdk; IMA; SBPSxc
Ranunculus sulphureus	sulphur buttercup	G5	S2S3	Blue		Vascular Plant	BAFA; CMA
Rhizomnium gracile		G4G5	S2S3	Blue		Nonvascular Plant	BAFA; ESSF; SBS; SWB
Rhizomnium punctatum		G5	S1S3	Red		Nonvascular Plant	BAFA; BWBS; CWH; ESSF; ICH; IDF; MH; MS; SBPS; SBS
Rhynchostegium serrulatum		G5	S1S3	Red		Nonvascular Plant	BAFA
Rumex arcticus	arctic dock	G5	S3	Blue		Vascular Plant	BAFA; BWBSdk; CMA; ESSFmv; SBSmk; SWBun
Sagina nivalis	snow pearlwort	G5	S2S3	Blue		Vascular Plant	BAFA; CMA; SBSmc
Saxifraga nelsoniana ssp. *carlottae*	dotted saxifrage	G5T3?	S3	Blue		Vascular Plant	BAFA; BWBSdk; CMA; CWHds; CWHvh; CWHwh; IMA; MHwh; SWBdk; SWBmk; SWBun
Saxifraga serpyllifolia	thyme-leaved saxifrage	G5	S2S3	Blue		Vascular Plant	BAFA; CMA
Schistidium agassizii		G3G5	S2S3	Blue		Nonvascular Plant	BAFA; ESSF; ICH; IDF; MS; PP
Schistidium boreale		GNR	S2S3	Blue		Nonvascular Plant	BAFA; SWB
Schistidium frigidum		GNR	S2S3	Blue		Nonvascular Plant	BAFA; BG; ESSF; MH; PP
Schistidium pulvinatum		G5	S1S3	Red		Nonvascular Plant	BAFA; PP
Sclerophora peronella	Frosted Glass-whiskers	GNR	S1	Red		Fungus	CWHws
Senecio ogotorukensis	Ogotoruk Creek butterweed	G3G5	S1S3	Red		Vascular Plant	BAFA; BWBSvk; CMA
Senecio sheldonensis	Mount Sheldon butterweed	G3	S2S3	Blue		Vascular Plant	BAFA; BWBSdk; CMA; IMA; SBSun; SWBdk; SWBmk; SWBun

Appendix 4. Listed Plant Species Potentially Occuring within the KSM Regional Study Area

Scientific Name	English Name	Global Status	Prov Status	BC List	SARA	Name Category	BEC Unit
Silene drummondii var. *drummondii*	Drummond's campion	G5T5	S3	Blue		Vascular Plant	BGxh; BGxw; BWBSmw; ICHmc; IDFdk; IDFxm; MSdk; MSxv; SBPSmk; SBSdk
Silene involucrata ssp. *involucrata*	arctic campion	G5T5	S2S3	Blue		Vascular Plant	BAFA; CMA
Sphagnum contortum		G5	S2S3	Blue		Nonvascular Plant	CWH; SBS
Tayloria froelichiana		G3G5	S1S3	Red		Nonvascular Plant	BAFA; SWB
Tayloria lingulata		G3G5	S2S3	Blue		Nonvascular Plant	BAFA; CDF; ESSF; SWB
Tetraplodon angustatus		G4	S2S3	Blue		Nonvascular Plant	BWBS; CWH; IDF; IMA; SBS; SWB
Tetraplodon pallidus		GU	S1S3	Red		Nonvascular Plant	BAFA
Tetrodontium brownianum		G3G4	S2S3	Blue		Nonvascular Plant	CWH
Timmia megapolitana		G5	S2S3	Blue		Nonvascular Plant	BWBS; CWH; ESSF; ICH; IDF; MS; SBS; SWB
Tomentypnum falcifolium		G3G5	S2S3	Blue		Nonvascular Plant	BAFA; ESSF; IDF; MS; SBS
Trematodon ambiguus		G5	S2S3	Blue		Nonvascular Plant	CWH
Ulota curvifolia		G3G5	S1S3	Red		Nonvascular Plant	BAFA; ICH; IDF

Appendix 5

Potentially Occurring Listed Ecosystems

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Appendix 5. Potentially Occuring Listed Ecosystems

Scientific Name	English Name	Global Status	Prov Status	BC List	Biogeoclimatic Units	Ecosystem Type
Abies amabilis - Picea sitchensis / Oplopanax horridus	amabilis fir - Sitka spruce / devil's club	GNR	S3	Blue	CWHvm1/08; CWHvm2/08	Riparian, Forest
Abies amabilis - Thuja plicata / Gymnocarpium dryopteris	amabilis fir - western redcedar / oak fern	GNR	S3	Blue	CWHms1/04; CWHms2/04; CWHws1/04; CWHws2/04	Forest
Abies amabilis - Thuja plicata / Oplopanax horridus Moist Submaritime	amabilis fir - western redcedar / devil's club Moist Submaritime	G3G4	S3	Blue	CWHms1/06; CWHms2/06; CWHws1/06	Forest
Alnus incana / Cornus stolonifera / Athyrium filix-femina	mountain alder / red-osier dogwood / lady fern	G3G4	S3	Blue	ICHmc2/Fl02; ICHvc/52; ICHvc/Fl02; ICHwc/52; ICHwc/Fl02; ICHwk1/Fl02; ICHwk4/Fl02; SBSdk/Fl02; SBSmk2/Fl02; SBSvk/Fl02; SBSwk1/Fl02	Riparian, Shrub, Wetland
Alnus incana / Equisetum arvense	mountain alder / common horsetail	G3	S3	Blue	BWBSdk1/Fl01; CWHwm/Fl01; ICHvc/Fl01; ICHvk1/Fl01; MSxv/Fl01; SBSvk/Fl01	Riparian, Shrub, Wetland
Alnus rubra / Rubus spectabilis / Equisetum arvense	red Alder / salmonberry / common horsetail	GNR	S3	Blue	CWHvh/Fl51; CWHvh1/10; CWHvh2/10	Riparian, Forest, Shrub
Calamagrostis purpurascens Herbaceous Vegetation	purple reedgrass Herbaceous Vegetation	G2	S2	Red	BAFA; CMA; MHmmp/00	Alpine, Grassland, Herbaceous
Carex lasiocarpa / Drepanocladus aduncus	slender sedge / common hook-moss	G3	S3	Blue	BWBSdk1/Wf05; ICHdk/Wf05; ICHmc1/Wf05; ICHmc2/Wf05; ICHmw1/Wf05; ICHmw3/Wf05; ICHvk1/Wf05; ICHwk1/Wf05; ICHwk2/Wf05; IDFdk1/Wf05; IDFdk3/Wf05; IDFdk4/Wf05; IDFdm2/Wf05; MSdk/Wf05; MSdm1/Wf05; MSdm2/Wf05; MSdm3/Wf05; MSdm3w/Wf05; SBPSdc/Wf05; SBPSmk/Wf05; SBPSxc/Wf05; SBSdk/Wf	Wetland, Herbaceous
Carex limosa - Menyanthes trifoliata / Drepanocladus spp.	shore sedge - buckbean / hook-mosses	G3	S3	Blue	ESSFwc3/Wf08; ESSFxc/Wf08; ESSFxv1/Wf08; MSdc1/Wf08; MSdc1d/Wf08; MSdm3/Wf08; MSdm3w/Wf08; MSmw1/Wf08; MSxk/Wf08; MSxv/Wf08; SBPSdc/Wf08; SBSdk/Wf08; SBSmc2/Wf08; SBSmk2/Wf08; SBSwk1/Wf08	Wetland, Herbaceous
Carex limosa - Menyanthes trifoliata / Sphagnum spp.	shore sedge - buckbean / peat-mosses	G3	S3	Blue	CWHws1/Wb13; CWHws2/Wb13; ICHmc1/Wb13; ICHvc/Wb13; ICHwk2/Wb13; SBSmk1/Wb13	Wetland, Herbaceous

Appendix 5. Potentially Occuring Listed Ecosystems

Scientific Name	English Name	Global Status	Prov Status	BC List	Biogeoclimatic Units	Ecosystem Type
Carex lyngbyei Herbaceous Vegetation	Lyngbye's sedge herbaceous vegetation	GNR	S3	Blue	CDFmm/Em05; CWH/Em05	Estuarine, Herbaceous, Wetland
Carex sitchensis - Oenanthe sarmentosa	Sitka sedge - Pacific water parsley	G3	S3	Blue	CWHvh2/Wm50; CWHwm/Wm50; CWHxm1/Wm50	Wetland, Herbaceous
Carex sitchensis / Sphagnum spp.	Sitka sedge / peat-mosses	G2	S2	Red	CWHvh2/Wf51; CWHvm1/Wf51; CWHvm2/Wf51; CWHwh1/Wf51; CWHwm/Wf51; CWHws2/Wf51; ICHvc/Wf51; ICHwc/Wf51; MHmm1/Wf51	Wetland, Herbaceous
Chamaecyparis nootkatensis - Tsuga mertensiana / Streptopus lanceolatus	yellow-cedar - mountain hemlock / rosy twistedstalk	G3G4	S3	Blue	MHwh1/05; MHwh2/05	Forest, Shrub
Deschampsia cespitosa ssp. beringensis - Aster subspicatus	tufted hairgrass - Douglas' aster	G3	S3	Blue	CDFmm/Ed02; CWH/Ed02	Estuarine, Herbaceous, Wetland
Deschampsia cespitosa ssp. *beringensis - Hordeum brachyantherum*	tufted hairgrass - meadow barley	G3	S3	Blue	CDFmm/Ed01; CWH/Ed01	Estuarine, Herbaceous, Wetland
Eleocharis palustris Herbaceous Vegetation	common spike-rush	GNR	S3	Blue	BGxw2/Wm04; CDFmm/Wm04; CWH/Wm04; ESSFdv d/Wm04; ESSFdv/Wm04; IDFxm/Wm04; SBSdk/Wm04; SBSmk2/Wm04	Wetland, Herbaceous
Eleocharis quinqueflora / Drepanocladus spp.	few-flowered spike-rush / hook-mosses	GNR	S2	Red	ESSFmc/Wf09; ESSFxc/Wf09; ESSFxv1/Wf09; MSdm2/Wf09; MSxv/Wf09; SBPSxc/Wf09; SBSmc2/Wf09	Wetland, Herbaceous
Equisetum fluviatile - Carex utriculata	swamp horsetail - beaked sedge	G4	S3	Blue	BGxh2/Wm02; BWBSdk1/Wm02; ESSFmw/Wm02; ICHmw3/Wm02; ICHwk4/Wm02; IDFdm2/Wm02; MSdc2/Wm02; MSdm3/Wm02; MSdm3w/Wm02; MSmw2/Wm02; MSxk/Wm02; MSxv/Wm02; SBPSdc/Wm02; SBPSmk/Wm02; SBPSxc/Wm02; SBSdk/Wm02; SBSdw3/Wm02; SBSmk2/Wm02; SBSwk1/Wm02	Wetland, Herbaceous
Eriophorum angustifolium - Carex limosa	narrow-leaved cotton-grass - shore sedge	G3	S3	Blue	ESSFdc1/Wf13; ESSFdc3/Wf13; ESSFmc/Wf13; ESSFmw/Wf13; ESSFwc2/Wf13; ESSFxc/Wf13; MSdm1/Wf13; SBSwk2/Wf13	Wetland, Herbaceous
Glyceria borealis Fen	northern mannagrass Fen	G4	S3	Blue	CWHvh2; ESSFdv; MSxv; SBPSxc	Wetland, Herbaceous, Grassland

Appendix 5. Potentially Occuring Listed Ecosystems

Scientific Name	English Name	Global Status	Prov Status	BC List	Biogeoclimatic Units	Ecosystem Type
Ledum groenlandicum / Kalmia microphylla / Sphagnum spp.	Labrador tea / western bog-laurel / peat-mosses	G4	S3	Blue	CWHvm1/Wb50; CWHxm1/Wb50; CWHxm2/Wb50	Wetland, Shrub
Leymus mollis ssp. *mollis - Lathyrus japonicus*	dune wildrye - beach pea	GNR	S1S2	Red	CDFmm; CWHdm; CWHds1; CWHms2; CWHvh1; CWHvh2; CWHvm; CWHvm1; CWHwm; CWHws1; CWHxm1; CWHxm2	Sparsely Vegetated, Herbaceous
Menyanthes trifoliata - Carex lasiocarpa	buckbean - slender sedge	G3	S3	Blue	CDFmm/Wf06; CWHws1/Wf06; ICHwk1/Wf06; IDFdk2/Wf06; SBSdk/Wf06	Wetland, Herbaceous
Myrica gale / Carex sitchensis	sweet gale / Sitka sedge	G3	S2	Red	CDFmm/Wf52; CWHmm1/Wf52; CWHmm2/Wf52; CWHvh2/Wf52; CWHwm/Wf52; CWHxm1/Wf52; CWHxm2/Wf52	Wetland, Shrub, Herbaceous
Picea engelmannii x *glauca - Betula papyrifera / Oplopanax horridus*	hybrid white spruce - paper birch / devil's club	GNR	S3	Blue	ICHmc2/54; SBSmh/07	Forest, Riparian
Picea mariana / Lysichiton americanus / Sphagnum spp.	black spruce / skunk cabbage / peat-mosses	GNR	S2S3	Blue	ICHmc2/12; ICHmc2/Ws09; ICHvk2/10; ICHvk2/Ws09; SBSvk/13; SBSvk/Ws09; SBSwk1/17; SBSwk1/Ws09	Wetland, Forest
Picea mariana / Menyanthes trifoliata / Sphagnum spp.	black spruce / buckbean / peat-mosses	GNR	S3	Blue	ICHmc2/11; ICHmc2/Wb11; ICHmw3/Wb11; ICHvk2/09; ICHvk2/Wb11; ICHwk3/11; ICHwk3/Wb11; SBSdw2/12; SBSdw2/Wb11; SBSmc2/16; SBSmc2/Wb11; SBSwk1/16; SBSwk1/Wb11	Wetland, Forest
Picea sitchensis / Calamagrostis nutkaensis	Sitka spruce / Pacific reedgrass	G3G5	S3	Blue	CWHvh1/16; CWHvh2/16; CWHwh1/15	Forest
Picea sitchensis / Carex obnupta	Sitka spruce / slough sedge	G2G3	S2S3	Blue	CWHvh1/18; CWHvh2/18; CWHwh1/17	Forest, Estuarine, Wetland
Picea sitchensis / Eurhynchium oreganum	Sitka spruce / Oregon beaked-moss	GNR	S3	Blue	CWHvh1/15; CWHvh2/15; CWHwh1/14	Forest
Picea sitchensis / Lysichiton americanus	Sitka spruce / skunk cabbage	GNR	S3	Blue	CWHwm/09	Wetland, Forest
Picea sitchensis / Maianthemum dilatatum Wet Hypermaritime 1	Sitka spruce / false lily-of-the-valley Wet Hypermaritime 1	G2G3	S2	Red	CWHvh2/08; CWHwh1/07	Riparian, Forest
Picea sitchensis / Malus fusca	Sitka spruce / Pacific crab apple	GNR	S3	Blue	CWHvh1/19; CWHvh2/19; CWHwh1/18	Estuarine, Forest, Riparian
Picea sitchensis / Polystichum munitum	Sitka spruce / sword fern	G3	S3	Blue	CWHvh1/17; CWHvh2/17	Forest

Appendix 5. Potentially Occuring Listed Ecosystems

Scientific Name	English Name	Global Status	Prov Status	BC List	Biogeoclimatic Units	Ecosystem Type
Picea sitchensis / Rubus spectabilis Very Wet Maritime	Sitka spruce / salmonberry Very Wet Maritime	G3	S2	Red	CWHvm1/09	Riparian, Forest
Picea sitchensis / Rubus spectabilis Wet Maritime	Sitka spruce / salmonberry Wet Maritime	G3	S3	Blue	CWHwm/05	Riparian, Forest
Picea sitchensis / Rubus spectabilis Wet Submaritime 1	Sitka spruce / salmonberry Wet Submaritime 1	G3	S2	Red	CWHws1/07	Riparian, Forest
Picea sitchensis / Rubus spectabilis Wet Submaritime 2	Sitka spruce / salmonberry Wet Submaritime 2	G3	S3	Blue	CWHws2/07	Riparian, Forest
Picea sitchensis / Trisetum canescens	Sitka spruce / tall trisetum	G1G2	S1S2	Red	CWHvh1/09; CWHvh2/09; CWHwh1/08	Riparian, Forest
Picea sitchensis - Tsuga mertensiana / Calamagrostis nutkaensis	Sitka spruce - mountain hemlock / Pacific reedgrass	G3G4	S3	Blue	MHwh1/03; MHwh2/03	Forest
Pinus albicaulis / Cladonia spp. - Dicranum fuscescens	whitebark pine / clad lichens - curly heron's-bill moss	GNR	S3	Blue	ESSFmk/02; ESSFmk/03	Forest, Woodland
Pinus contorta / Arctostaphylos uva-ursi	lodgepole pine / kinnikinnick	GNR	S2	Red	CWHws1/02; CWHws2/02	Woodland, Forest
Pinus contorta / Carex aquatilis / Sphagnum spp.	lodgepole pine / water sedge / peat-mosses	G3	S3	Blue	ESSFdv d/Wb07; ESSFdv/07; ESSFdv/Wb07; ICHmk3/08; ICHmk3/Wb07; ICHwc/10; ICHwc/Wb07; ICHwk2/09; ICHwk2/Wb07; ICHwk3/08; ICHwk3/Wb07; MSxk/10; MSxk/Wb07	Wetland, Forest, Woodland
Pinus contorta / Carex pauciflora / Sphagnum spp.	lodgepole pine / few-flowered sedge / peat-mosses	G2G3	S2S3	Blue	ESSFmc/11; ESSFmc/Wb10; ESSFwc3/04; ESSFwc3/Wb10; ICHwk2/10; ICHwk2/Wb10; SBSmc2/15; SBSmc2/Wb10	Wetland, Forest, Woodland
Plantago maritima - Puccinellia pumila	sea plantain - dwarf alkaligrass	G2	S2	Red	CWH/Em04	Estuarine, Herbaceous, Wetland
Poa glauca ssp. *rupicola* Herbaceous Vegetation	glaucous bluegrass Herbaceous Vegetation	GNR	S3	Blue	BAFA	Grassland, Herbaceous, Alpine

Appendix 5. Potentially Occuring Listed Ecosystems

Scientific Name	English Name	Global Status	Prov Status	BC List	Biogeoclimatic Units	Ecosystem Type
Populus balsamifera (ssp. *balsamifera* , ssp. *trichocarpa*) - *Picea* spp. / *Cornus stolonifera*	(balsam poplar, black cottonwood) - spruces / red-osier dogwood	GNR	S2	Red	BWBSdk1/12; BWBSdk1/Fm02; BWBSmw1/09; BWBSmw1/Fm02; ICHwk4/10; ICHwk4/Fm02; SBSdk/08; SBSwk1/13; SBSwk1/Fm02	Riparian, Forest
Populus balsamifera ssp. *trichocarpa - Abies lasiocarpa / Oplopanax horridus*	black cottonwood - subalpine fir / devil's club	GNR	S2S3	Blue	ICHmc1/Fm03; ICHmc2/Fm03; ICHvc/Fm03; ICHwc/06; ICHwc/Fm03; SBSvk/12; SBSvk/Fm03	Riparian, Forest
Populus balsamifera ssp. *trichocarpa - Alnus rubra / Rubus spectabilis*	black cottonwood - red alder / salmonberry	GNR	S3	Blue	CWHdm/09; CWHds1/09; CWHds2/09; CWHmm1/09; CWHms1/08; CWHms2/08; CWHvm1/10; CWHwm/06; CWHws1/08; CWHws2/08; CWHxm1/09; CWHxm2/09	Riparian, Forest
Ruppia maritima Herbaceous Vegetation	beaked ditch-grass Herbaceous Vegetation	GNR	S2	Red	CDFmm/Em01; CWH/Em01	Estuarine, Herbaceous, Wetland
Salix maccalliana / Carex utriculata	MacCalla's willow / beaked sedge	G3	S3	Blue	ESSFdv d/Ws05; ESSFdv/Ws05; ESSFxc/Ws05; IDFdk1/Ws05; IDFdk3/Ws05; IDFdk4/Ws05; MSdm1/Ws05; SBPSmk/Ws05; SBPSxc/Ws05; SBSdh1/Ws05; SBSdk/Ws05	Wetland, Shrub, Herbaceous
Salix sitchensis / Carex sitchensis	Sitka willow / Sitka sedge	G3	S3	Blue	CWHvm1/Ws06; CWHvm2/Ws06; ICHvk1/Ws06; MSdc1/Ws06; MSdm1/Ws06; MSmw2/Ws06; SBSvk/Ws06; SBSwk1/Ws06	Wetland, Shrub, Riparian
Scheuchzeria palustris / Sphagnum spp.	scheuchzeria / peat-mosses	G3	S3	Blue	ICHmc2/Wb12; ICHmk3/Wb12; SBSdw3/Wb12; SBSmc2/Wb12; SBSvk/Wb12	Wetland, Herbaceous
Thuja plicata - Picea sitchensis / Lysichiton americanus	western redcedar - Sitka spruce / skunk cabbage	G3?	S3?	Blue	CWHdm/12; CWHds1/12; CWHds2/12; CWHmm1/12; CWHms1/11; CWHms2/11; CWHvh1/13; CWHvh2/13; CWHvm1/14; CWHwh1/12; CWHwh2/06; CWHws1/11; CWHxm1/12; CWHxm2/12	Wetland, Forest
Thuja plicata - Picea sitchensis / Oplopanax horridus Very Wet Hypermaritime 2	western redcedar - Sitka spruce / devil's club Very Wet Hypermaritime 2	GNR	S3	Blue	CWHvh2/07	Forest
Thuja plicata - Picea sitchensis / Polystichum munitum	western redcedar - Sitka spruce / sword fern	G3?	S2S3	Blue	CWHvh1/05; CWHvh2/05; CWHwh1/03	Forest
Thuja plicata - Tsuga heterophylla / Polystichum munitum	western redcedar - western hemlock / sword fern	GNR	S3?	Blue	CWHmm1/04; CWHmm2/04; CWHvm1/04; CWHvm2/04	Forest

Appendix 5. Potentially Occuring Listed Ecosystems

Scientific Name	English Name	Global Status	Prov Status	BC List	Biogeoclimatic Units	Ecosystem Type
Trichophorum cespitosum / Campylium stellatum	tufted clubrush / golden star-moss	G2G3	S2S3	Blue	BWBSdk1/Wf11; ESSFdc1/Wf11; ESSFdc2/Wf11; ESSFdc3/Wf11; ESSFdv d/Wf11; ESSFdv/Wf11; ESSFwc2/Wf11; ESSFwc3/Wf11; ESSFwk1/Wf11; ESSFxc/Wf11; ICHmc2/Wf11; ICHmw1/Wf11; ICHmw3/Wf11; ICHvk1/Wf11; MSdm2/Wf11; SBSdk/Wf11; SBSwk1/Wf11	Wetland, Herbaceous
Tsuga heterophylla / Arctostaphylos uva-ursi / Cladonia spp.	western hemlock / kinnikinnick / clad lichens	GNR	S3	Blue	ICHmc1/02; ICHmc2/02	Woodland, Forest
Tsuga heterophylla - Picea sitchensis / Hylocomium splendens	western hemlock - Sitka spruce / step moss	GNR	S3	Blue	CWHwm/02	Forest
Tsuga heterophylla - Picea sitchensis / Rhytidiadelphus loreus	western hemlock - Sitka spruce / lanky moss	GNR	S3	Blue	CWHvh1/04; CWHvh2/04; CWHwh1/01; CWHwh2/01	Forest
Tsuga heterophylla - Pinus contorta / Pleurozium schreberi	western hemlock - lodgepole pine / red-stemmed feathermoss	G2G3	S2S3	Blue	CWHws1/03; CWHws2/03	Forest
Tsuga heterophylla / Rubus chamaemorus / Sphagnum spp.	western hemlock / cloudberry / peat-mosses	GNR	S2	Red	ICHmc2/09; ICHmc2/Wb04; ICHvc/07; ICHvc/Wb04; ICHwc/09; ICHwc/Wb04	Wetland, Forest
Tsuga heterophylla / Sphagnum girgensohnii	western hemlock / common green peat-moss	GNR	S3	Blue	CWHwm/08	Forest, Shrub
Tsuga heterophylla - Thuja plicata / Gaultheria shallon Very Wet Maritime	western hemlock - western redcedar / salal Very Wet Maritime	G3	S3	Blue	CWHvm1/03; CWHvm2/03	Forest

Appendix 6

Ecosystem Mapping Field Survey Data

SEABRIDGE GOLD

Rescan™
Engineers and Scientists

Appendix 6. Ecosystem Mapping Field Survey Data

Plot	Date	UTM Zone	UTM Northing	UTM Easting	BEC unit	Site Series	Map Code	Moisture Regime	Nutrient Regime	Structural Stage	Elevation (m)	Slope (%)	Aspect (°)	Meso Slope Position	General Ecosystem Type
001	19-Jul-08	9N	6259462	421626	MHmm2	00	MP	3	C	2d	1396	30	300	UP	Mesic Herb
002	19-Jul-08	9N	6259553	421760	MHmm2	00	BA	2	B	1	1312	52	336	UP	sparsely vegetated
003	19-Jul-08	9N	6259707	421785	MHmm2	00	AM	4	C	2a	1287	47	22	MD	Mesic Herb
004	19-Jul-08	9N	6259805	421740	MHmm2	00	KH	4	C	3a	1237	52	8	MD	Parkland Forest/Krummholz
005	19-Jul-08	9N	6260168	421698	MHmm2	01	MB	6	D	3/b	1091	29	268	MD	Mesic Forest
006	19-Jul-08	9N	6260216	421735	MHmm2	03	MO	4	C	5/ic	1136	35	277	MD	Mesic Forest
007	19-Jul-08	9N	6260164	421605	MHmm2	00	MP	3	B	2d	1062	28	330	LW	Mesic Herb
008	19-Jul-08	9N	6260211	421467	MHmm2	03	MO	4	C	3b	1052	15	346	MD	Mesic Forest
009	20-Jul-08	9N	6258740	421651	CMAunp	00	RU	1	A	1	1746	15	130	CR	non-vegetated
010	20-Jul-08	9N	6258556	421677	CMAunp	00	MP	3	C	2d	1673	57	176	UP	Mesic Herb
011	20-Jul-08	9N	6258342	421551	CMAunp	00	AM	4	D	2a	1539	74	160	MD	Mesic Herb
012	20-Jul-08	9N	6258110	421652	CMAunp	00	MP	3	C	2d	1379	25	150	LW	Mesic Herb
013	20-Jul-08	9N	6258132	421757	CMAunp	00	KH	4	C	3a	1383	70	156	LW	Parkland Forest/Krummholz
014	21-Jul-08	9N	6263226	422383	MHmm2	00	RO	2	B	1	1655	16	152	CR	non-vegetated
015	21-Jul-08	9N	6263218	422178	MHmm2	00	MP	4	C	2d	1619	51	196	UP	Mesic Herb
016	21-Jul-08	9N	6263198	421943	MHmm2	00	MP	4	C	2d	1594	45	170	UP	Mesic Herb
017	21-Jul-08	9N	6262928	421835	MHmm2	00	KH	5	D	3a	1454	50	180	UP	Parkland Forest/Krummholz
018	21-Jul-08	9N	6262783	421807	MHmm2	00	WT	6	D	3a	1363	32	170	MD	Wetter Shrub/Herb
019	21-Jul-08	9N	6262709	421866	MHmm2	01	MB	4	C	3b	1344	58	190	UP	Mesic Forest
020	22-Jul-08	9N	6266628	422789	CMAunp	00	FC	2	B	1	1506	27	165	MD	Drier Herb
021	22-Jul-08	9N	6266168	422716	CMAunp	00	AM	4	C	2a	1290	65	176	MD	Mesic Herb
022	22-Jul-08	9N	6266168	422716	CMAunp	00	AM	4	C	2a	1290	65	176	MD	Mesic Herb
023	22-Jul-08	9N	6265980	422758	CMAunp	00	KH	5	D	3b	1176	68	176	TO	Parkland Forest/Krummholz
024	22-Jul-08	9N	6264688	423349	CMAunp	00	AM	4	C	2d	1304	47	355	UP	Mesic Herb
025	22-Jul-08	9N	6265007	423328	CMAunp	00	KH	4	C	3b	1182	30	355	LW	Parkland Forest/Krummholz
026	22-Jul-08	9N	6265049	423365	CMAunp	00	RO	2	B	1	1173	48	355	CR	non-vegetated
027	22-Jul-08	9N	6262132	419647	MHmm2	Wf50	Wf50	7	D	2b	876	180	3	LV	Wetland Shrub/Herb
028	22-Jul-08	9N	6262226	419436	MHmm2	03	MO	4	C	6/mc	889	5	190	LV	Mesic Forest
029	22-Jul-08	9N	6262325	419190	MHmm2	01	MB	4	C	6/tc	889	60	177	MD	Mesic Forest
030	23-Jul-08	9N	6262315	418837	MHmm2	03	MO	4	D	7/mc	866	25	205	LW	Mesic Forest
031	23-Jul-08	9N	6262336	418336	MHmm2	01	MB	3	C	6/mc	753	68	226	UP	Mesic Forest
032	23-Jul-08	9N	6262056	418143	MHmm2	03	MO	4	C	7/mc	614	40	216	LW	Mesic Forest
033	23-Jul-08	9N	6261892	417941	MHmm2	03	MO	4	C	6/mc	534	0	999	LV	Mesic Forest
034	24-Jul-08	9N	6278142	432803	ESSFwv	04	MH	5	D	5/ic	1195	7	300	CR	Mesic Forest
035	24-Jul-08	9N	6278496	432601	ESSFwv	Wf	Wf	6	D	2b	1117	32	290	MD	Wetland Shrub/Herb
036	24-Jul-08	9N	6278496	432601	ESSFwv	07	FV	6	D	5/ic	1117	32	290	MD	wetter forest
037	24-Jul-08	9N	6279041	432363	ESSFwv	04	MH	4	C	5/ic	118	27	330	UP	Mesic Forest
038	24-Jul-08	9N	6279043	432029	ESSFwv	05	FO	4	D	5/mc	962	3	330	TO	Mesic Forest
039	24-Jul-08	9N	6279306	431641	ESSFwv	05	FO	5	C	6/tc	930	32	4	MD	Mesic Forest
040	24-Jul-08	9N	6279560	431751	ESSFwv	01	FA	3	C	5/tc	912	25	345	UP	Mesic Forest
041	25-Jul-08	9N	6275409	441260	ESSFwv	00	AM	5	C	2a	1376	27	34	MD	Mesic Herb
042	25-Jul-08	9N	6275765	441631	ESSFwv	00	AM	4	C	2a	1255	48	34	UP	Mesic Herb

Appendix 6. Ecosystem Mapping Field Survey Data

Plot	Date	UTM Zone	UTM Northing	UTM Easting	BEC unit	Site Series	Map Code	Moisture Regime	Nutrient Regime	Structural Stage	Elevation (m)	Slope (%)	Aspect (°)	Meso Slope Position	General Ecosystem Type
043	25-Jul-08	9N	6276002	441324	ESSFwv	07	FV	4	C	5/ic	1136	55	28	UP	wetter forest
044	25-Jul-08	9N	6276313	441934	ESSFwv	04	MH	4	C	6/mc	994	28	74	MD	Mesic Forest
045	25-Jul-08	9N	6276633	442145	ESSFwv	05	FO	6	D	6/mc	910	15	26	MD	Mesic Forest
046	25-Jul-08	9N	6277006	442209	ESSFwv	Wf	Wf	7	D	3a	885	0	99	LV	Wetland Shrub/Herb
047	25-Jul-08	9N	6260905	420062	MHmm2	03	MO	4	C	6/tm	623	16	316	MD	Mesic Forest
048	25-Jul-08	9N	6260797	420041	MHmm2	51	51	5	C	3b	653	48	18	MD	Avalanche Track
049	25-Jul-08	9N	6264834	420460	MHmm2	51	51	4	C	3b	897	25	334	TO	Avalanche Track
051	25-Jul-08	9N	6277508	443882	ESSFwv	01	FA	4	C	5/tm	1287	46	9N	UP	Mesic Forest
050	26-Jul-08	9N	6265204	421193	MHmm2	51	51	5	D	3b	788	12	350	UP	Avalanche Track
052	26-Jul-08	9N	6277147	443982	ESSFwv	05	FO	4	D	6/mc	1094	62	162	MD	Mesic Forest
053	26-Jul-08	9N	6276864	443939	ESSFwv	05	FO	4	D	6/mc	999	20	162	LW	Mesic Forest
054	27-Jul-08	9N	6280506	430159	ESSFwv	Wf04	Wf04	7	C	2b	1200	18	166	UP	Wetland Shrub/Herb
055	27-Jul-08	9N	6280265	430202	ESSFwv	01	FA	4	C	5/tc	1154	22	106	MD	Mesic Forest
056	27-Jul-08	9N	6279926	430372	ESSFwv	05	FO	5	D	6tc	1042	38	180	MD	Mesic Forest
057	27-Jul-08	9N	6279450	430413	ESSFwv	03	FF	3	C	5/tc	977	32	78	CR	Drier Forest
058	27-Jul-08	9N	6279397	430503	ESSFwv	Fm03	Fm03	4	C	5/im	915	0	999	LV	Floodplain Forest
059	27-Jul-08	9N	6280503	433463	ESSFwv	51	51	5	D	3b	886	31	130	TO	Avalanche Track
060	27-Jul-08	9N	6261048	419676	MHmm2	51	51	5	C	3a	580	7	298	LW	Avalanche Track
063	27-Jul-08	9N	6266333	407594	CWHwm	04	SD	5	C	6/ic	234	3	119	LV	Moist Forest
061	28-Jul-08	9N	6266332	407336	CWHwm	01a	HB	4	C	6/mc	256	20	21	MD	Mesic Forest
062	28-Jul-08	9N	6266351	407378	CWHwm	01a	HB	4	C	6/mc	283	48	90	MD	Mesic Forest
064	28-Jul-08	9N	6269888	410333	CWHwm	01a	HB	4	D	6/mc	339	57	278	UP	Mesic Forest
065	28-Jul-08	9N	6269873	410216	CWHwm	05	SS	5	D	6/mc	299	6	20	LV	Floodplain Forest
066	28-Jul-08	9N	6270007	410086	CWHwm	Wm06	Wm06	6	D	2b	278	0	999	DP	Wetland Shrub/Herb
067	28-Jul-08	9N	6274645	411878	CWHwm	01b	HB	4	C	6/mc	352	82	126	LW	Mesic Forest
068	29-Jul-08	9N	6280045	459551	ESSFwv	00	Wf	7	D	2b	1082	0	999	LV	Wetland Shrub/Herb
069	29-Jul-08	9N	6280113	439754	ESSFwv	04	MH	4	C	6/ic	1076	35	20	UP	Mesic Forest
070	29-Jul-08	9N	6279061	439233	ESSFwv	02	LC	3	C	3a	1087	25	152	CR	Drier Forest
071	29-Jul-08	9N	6279504	458971	ESSFwv	04	MH	4	C	5/ic	1101	23	9N	MD	Mesic Forest
072	29-Jul-08	9N	6278846	439490	ESSFwv	07	FV	5	C	6/tc	1115	11	17	TO	wetter forest
073	29-Jul-08	9N	6279044	439819	ESSFwv	Wf50	Wf50	7	D	2b	1067	23	84	TO	Wetland Shrub/Herb
074	29-Jul-08	9N	6278865	440185	ESSFwv	02	LC	3	C	3b	1038	27	124	CR	Drier Forest
101	7-Jul-09	9N	6279390	442828	BAFAunp	00	MP	4	B	2d	1509	39	232	UP	Mesic Herb
102	7-Jul-09	9N	6279438	441993	BAFAunp	00	KH	3	B	3b	1153	35	288	MD	Parkland Forest/Krummholz
103	7-Jul-09	9N	6279376	441537	ESSFwv	01	FA	4	C	5/mc	967	25	226	MD	Mesic Forest
104	7-Jul-09	9N	6277703	442040	ESSFwv	06	FD	5	D	6/tm	894	30	220	LW	wetter forest
105	8-Jul-09	9N	6278106	443613	BAFAunp	00	MP	3	B	2d	1488	28	236	UP	Mesic Herb
106	8-Jul-09	9N	6277886	443554	ESSFwv	00	MP	3	C	3b	1386	44	264	MD	Mesic Herb
107	8-Jul-09	9N	6273937	444393	ESSFwv	00	AM	3	C	2	1270	20	242		Mesic Herb
108	8-Jul-09	9N	6274173	443705	ESSFwv	00	KH	4	C	3b	1247	18	210	UP	Parkland Forest/Krummholz
109	8-Jul-09	9N	6274552	443677	ESSFwv	31	WE	4	C	2d	1265	20	012	UP	Wetland Shrub/Herb
110	8-Jul-09	9N	6274775	443474	ESSFwv	31	WE	3	B	3b	1227	25	029	MD	Wetland Shrub/Herb

Appendix 6. Ecosystem Mapping Field Survey Data

Plot	Date	UTM Zone	UTM Northing	UTM Easting	BEC unit	Site Series	Map Code	Moisture Regime	Nutrient Regime	Structural Stage	Elevation (m)	Slope (%)	Aspect (°)	Meso Slope Position	General Ecosystem Type
111	8-Jul-09	9N	6275314	443322	ESSFwv	01	FA	4	C	5/mc	1116	28	040	MD	Mesic Forest
112	8-Jul-09	9N	6275834	445168	ESSFwv	05	FO	5	D	7mc	954	18	352	LW	Mesic Forest
113	9-Jul-09	9N	6274771	448941	BAFAunp	00	MP	4	B	2d	1473	45	132	UP	Mesic Herb
114	9-Jul-09	9N	6274346	447773	ESSFwv	51	51	2	C	3b	1124	58	230	MD	Avalanche Track
115	9-Jul-09	9N	6274817	447278	ESSFwv	51	51	3	D	3b	1028	50	254	MD	Avalanche Track
116	10-Jul-09	9N	6274461	446865	ESSFwv	51	51	3	D	3b	854	13	252	LW	Avalanche Track
117	10-Jul-09	9N	6274675	446574	ESSFwv	06	FD	3	D	6/tm	837	8	185	MD	wetter forest
118	10-Jul-09	9N	6274494	446488	ESSFwv	06	FD	4	D	6/mc	835	22	066	LW	wetter forest
119	10-Jul-09	9N	6274309	446412	ESSFwv	06	FD	4	D	6/tm	870	28	50	MD	wetter forest
120	10-Jul-09	9N	6274404	446977	ESSFwv	51	51	4	D	3b	871	18	224	LW	Avalanche Track
121	10-Jul-09	9N	6276047	444320	ESSFwv	01	FA	3	C	6/mc	909	0	999	LV	Mesic Forest
122	10-Jul-09	9N	6275746	444877	ESSFwv	08	FH	3	D	6/mc	880	10	210	LV	wetter forest
123	10-Jul-09	9N	6263924	420246	BAFAunp	00	MP	3	B	2d	1458	26	8	UP	Mesic Herb
124	11-Jul-09	9N	6263018	419800	BAFAunp	00	KH	3	C	3a	1308	30	228	UP	Parkland Forest/Krummholz
125	11-Jul-09	9N	6262905	419632	ESSFwv	01	FA	3+	D	6/tm	1170	74	222	MD	Mesic Forest
126	11-Jul-09	9N	6262629	419514	MHmm2	01	MB	3	C	6/mc	1011	42	198	MD	Mesic Forest
127	11-Jul-09	9N	6261665	417727	MHmm2	01	MB	3	C	7/tm	566	5	50	LV	Mesic Forest
128	11-Jul-09	9N	6262045	417136	MHmm2	01	MB	3	C	7/tm	559	3	32	LV	Mesic Forest
129	15-Jul-09	9N	6265570	421659	MHmm2	51	51	3	B	3b	764	15	200	LW	Avalanche Track
130	15-Jul-09	9N	6265625	421722	MHmm2	51	51	3	B	3b	790	43	196	MD	Avalanche Track
131	15-Jul-09	9N	6265674	421256	MHmm2	51	51	4	D	3b	804	28	200	LW	Avalanche Track
132	15-Jul-09	9N	6265667	420977	MHmm2	51	51	2	A	3b	818	35	154	MD	Avalanche Track
133	15-Jul-09	9N	6265701	420669	MHmm2	51	51	3	B	3b	849	28	192	MD	Avalanche Track
134	15-Jul-09	9N	6265440	420746	MHmm2	51	51	2	B	4/m	770	12	192	LW	Avalanche Track
135	15-Jul-09	9N	6265513	419654	MHmm2	51	51	4	C	2a	754	33	220	MD	Avalanche Track
136	15-Jul-09	9N	6265368	419595	MHmm2	05	MT	4	D	7/ic	705	12	220		Moist Forest
137	15-Jul-09	9N	6265232	419121	MHmm2	03	MO	4	D	7/ic	694	10	152	LW	Mesic Forest
138	16-Jul-09	9N	6273157	443609	ESSFwv	00	KH	4	D	4/c	1216	13	191	UP	Parkland Forest/Krummholz
139	16-Jul-09	9N	6273778	443802	ESSFwv	05	FO	4	D	4/tc	1187	36	189	MD	Mesic Forest
140	16-Jul-09	9N	6275152	445878	ESSFwv	05	FO	3	D	6/ic	878	12	230	LW	Mesic Forest
141	16-Jul-09	9N	6274870	445771	ESSFwv	01	FA	3	D	6/ic	853	10	209	LW	Mesic Forest
142	16-Jul-09	9N	6290013	443179	ICHvc	04	DD	5	D	7ic	581	0	999	LV	Floodplain Forest
143	16-Jul-09	9N	6290410	442778	ICHvc	03	SD	4	D	6/im	587	0	999	LV	Moist Forest
144	17-Jul-09	9N	6286311	441753	ICHvc	02	HM	2	B	3b	598	0	999	LV	Drier Forest
145	17-Jul-09	9N	6285911	441515	ICHvc	03	SD	4	D	5/tb	604	0	999	LV	Moist Forest
146	17-Jul-09	9N	6285498	441221	ESSFwv	00	FP	4	D	4/b	599	0	999	LV	Floodplain Forest
147	17-Jul-09	9N	6285159	441125	ESSFwv	00	FP	4	D	4/b	627	0	999	LV	Floodplain Forest
148	17-Jul-09	9N	6283912	440980	ICHvc	01b	HD	3	C	7/ic	710	15	62	UP	Mesic Forest
149	17-Jul-09	9N	6283692	440738	ICHvc	03	SD	4	C	6/mc	685	2	018	LV	Moist Forest
150	18-Jul-09	9N	6287525	442288	ICHvc	05	CD	3	B	3/b	584	0	999	LV	Floodplain Forest
151	18-Jul-09	9N	6287740	442395	ICHvc	04	DD	5	D	6/tc	583	0	999	LV	Floodplain Forest
152	18-Jul-09	9N	6289112	443010	ICHvc	01b	HD	3	C	7/ic	610	52	60	UP	Mesic Forest

Appendix 6. Ecosystem Mapping Field Survey Data

Plot	Date	UTM Zone	UTM Northing	UTM Easting	BEC unit	Site Series	Map Code	Moisture Regime	Nutrient Regime	Structural Stage	Elevation (m)	Slope (%)	Aspect (°)	Meso Slope Position	General Ecosystem Type
153	18-Jul-09	9N	6288966	442939	ICHvc	01b	HD	3	C	6/mc	626	35	9	MD	Mesic Forest
154	18-Jul-09	9N	6288691	442867	ICHvc	01b	HD	3	C	6/ic	638	42	124	MD	Mesic Forest
155	18-Jul-09	9N	6288443	442787	ICHvc	01	HD	4	C	6/tc	622	33	122	MD	Mesic Forest
156	18-Jul-09	9N	6288151	442647	ICHvc	01b	HD	3	C	7/ic	629	58	106	MD	Mesic Forest
157	18-Jul-09	9N	6287290	442278	ICHvc	51	51	4	D	3b	611	34	272	MD	Avalanche Track
158	19-Jul-09	9N	6287202	442063	ICHvc	00	FP	5	C	3b	585	0	999	LV	Floodplain Forest
159	19-Jul-09	9N	6281475	439373	ESSFwv	05	FO	4	C	6/mc	914	33	33	MD	Mesic Forest
160	19-Jul-09	9N	6281081	439753	ESSFwv	01	FA	3	C	6/mc	935	28	56	MD	Mesic Forest
161	19-Jul-09	9N	6281294	442150	BAFAunp	00	MP	2	C	2d	1471	22	310	UP	Mesic Herb
200	18-Aug-09	9N	6281456	435946	ESSFwv	03	FF	3	C	5/tc	857	60	160	MD	Drier Forest
201	18-Aug-09	9N	6280955	435007	ESSFwv	51	51	4	C	3b	855	15	60	MD	Avalanche Track
202	18-Aug-09	9N	6281114	435061	ESSFwv	00	FP	5	B	3b	822	0	999	LV	Floodplain Forest
203	18-Aug-09	9N	6280989	435289	ESSFwv	06	FD	3	B	3b	824	70	360		wetter forest
204	19-Aug-09	9N	6278198	409402	CMAunp	00	KH	4	C	3b	1058	0	999	CR	Parkland Forest/Krummholz
205	19-Aug-09	9N	6278399	409026	CMAunp	00	KH	4	C	3b	1087	20	40	UP	Parkland Forest/Krummholz
206	19-Aug-09	9N	6278154	408704	CMAunp	00	MP	4	C	2d	1107	15	220	LW	Mesic Herb
207	19-Aug-09	9N	6277386	408326	CMAunp	00	MP	4	C	2d	1139	5	300	CR	Mesic Herb
208	19-Aug-09	9N	6277253	408092	CMAunp	00	AM	6	B	2a	1105	0	999	LV	Mesic Herb
209	19-Aug-09	9N	6277462	407970	CMAunp	00	MP	4	C	2d	1151	15	160	MD	Mesic Herb
210	19-Aug-09	9N	6277081	407608	CMAunp	00	MP	4	D	2d	1160	25	280	MD	Mesic Herb
211	20-Aug-09	9N	6275579	407432	CMAunp	00	MP	4	C	2d	1205	80	105	MD	Mesic Herb
212	20-Aug-09	9N	6275132	407028	CMAunp	00	KH	4	C	3b	1159	15	190	UP	Parkland Forest/Krummholz
213	20-Aug-09	9N	6274128	407028	MHmm2	01	MB	4	C	5/ic	1065	40	90		Mesic Forest
214	20-Aug-09	9N	6273421	407077	MHmm2	00	AM	5	C	2a	985	10	130	MD	Mesic Herb
215	20-Aug-09	9N	6273089	407372	MHmm2	00	Sc03	4	C	2a	922	0	999	LV	Wetter Shrub/Herb
216	20-Aug-09	9N	6272049	406774	MHmm2	00	AV	6	D	2a	890	25	90	LW	Avalanche Track
217	21-Aug-09	9N	6267744	407534	CWHwm	03	SO	4	C	6/mc	304	25	310	MD	Mesic Forest
218	21-Aug-09	9N	6265273	407471	CWHwm	01b	HB	3	C	6/mc	289	10	85	CR	Mesic Forest
219	21-Aug-09	9N	6264943	407602	CWHwm	01a	HB	3	C	6/mc	270	35	120	MD	Mesic Forest
220	22-Aug-09	9N	6262938	407925	CWHwm	01b	HB	3	C	6/tc	232	10	90	UP	Mesic Forest
221	22-Aug-09	9N	6263945	408096	CWHwm	05	SS	6	C	6/tc	246	0	999		Floodplain Forest
222	22-Aug-09	9N	6263661	408062	CWHwm	01b	HB	3	C	6/tc	279	70	90	MD	Mesic Forest
223	22-Aug-09	9N	6262949	408404	CWHwm	04	SD	4	B	7/mc	255	5	90		Moist Forest
224	22-Aug-09	9N	6263163	408626	CWHwm	01b	HB	3	C	6/mc	264	40	140	MD	Mesic Forest
225	23-Aug-09	9N	6276993	436135	BAFAunp	00	TA	4	A	1	1549	75	220	MD	sparsely vegetated
226	23-Aug-09	9N	6276305	435182	ESSFwv	00	AM	4	B	2a	1270	30	180	MD	Mesic Herb
227	23-Aug-09	9N	6276294	434765	ESSFwv	03	FF	3	C	3b	1246	30	180		Drier Forest
228	23-Aug-09	9N	6276102	434407	ESSFwv	03	FF	4	C	3b	1187	60	180	MD	Drier Forest
229	23-Aug-09	9N	6275707	434034	ESSFwv	02	00	0	A	3b	1064	70	180		Drier Forest
230	23-Aug-09	9N	6275503	433847	ESSFwv	51	51	4	C	3b	987	5	220		Avalanche Track
232	23-Aug-09	9N	6267879	417440	CMAunp	00	WT	5	C	3b	884	10	40	UP	Wetter Shrub/Herb
200v	23-Aug-09	9N	6276326	435436	BAFAunp	00	AM	4	A	2d	1339	75	220	MD	Mesic Herb

Appendix 6. Ecosystem Mapping Field Survey Data

Plot	Date	UTM Zone	UTM Northing	UTM Easting	BEC unit	Site Series	Map Code	Moisture Regime	Nutrient Regime	Structural Stage	Elevation (m)	Slope (%)	Aspect (°)	Meso Slope Position	General Ecosystem Type
231	24-Aug-09	9N	6267800	417162	CMAunp	00	MN	0	A	1a	868	90	360	LW	sparsely vegetated
233	24-Aug-09	9N	6267684	417657	CMAunp	00	RI	0	A	1a	800	15	90	TO	non-vegetated
234	24-Aug-09	9N	6267073	418362	MHmm2	51	51	4	B	3b	789	40	180	MD	Avalanche Track
235	24-Aug-09	9N	6266886	418354	MHmm2	51	51	1	B	1a	754	25	220	LW	Avalanche Track
236	24-Aug-09	9N	6266857	418485	MHmm2	51	51	2	B	3b	796	80	220		Avalanche Track
237	24-Aug-09	9N	6267026	418925	MHmm2	01	MB	4	C	3b	1204	70	260	UP	Mesic Forest
238	25-Aug-09	9N	6258816	419242	CMAunp	00	TA		A	1a	1703	5	360	CR	sparsely vegetated
239	25-Aug-09	9N	6259311	419171	CMAunp	00	CG	4	A	2d	1566	70	360		Drier Herb
240	25-Aug-09	9N	6259680	410734	MHmm2	00	AM	4	C	2a	1355	60	315		Mesic Herb
241	25-Aug-09	9N	6259751	418390	MHmm2	03	MO	5	C	6/tc	1211	80	240	UP	Mesic Forest
242	25-Aug-09	9N	6260307	417909	MHmm2	01	MB	5	C	6/mc	780	60	280	MD	Mesic Forest
243	25-Aug-09	9N	6260704	417934	MHmm2	03	MO	4	C	7/mc	700	40	310	MD	Mesic Forest
244	26-Aug-09	9N	6257342	415994	CMAunp	00	CL	5	A	1a	791	110	80	TO	sparsely vegetated
245	26-Aug-09	9N	6257357	416155	CMAunp	00	MN	6	A	1a	759	20	30	MD	sparsely vegetated
246	26-Aug-09	9N	6258194	416719	CMAunp	00	51	5	A	3b	678	60	300	MD	Avalanche Track
247	26-Aug-09	9N	6258736	416810	MHmm2	00	RI	5	A	1a	639	0	999	LV	non-vegetated
248	26-Aug-09	9N	6258610	417030	MHmm2	01	MB	4	B	3b	670	50	320	MD	Mesic Forest
249	26-Aug-09	9N	6259188	417205	MHmm2	04	AB	6	B	5/ib	688	55	280		Moist Forest
250	26-Aug-09	9N	6259288	417005	MHmm2	05	MT	5	B	3b	630	0	999	LV	Moist Forest
251	27-Aug-09	9N	6263413	410960	CMAunp	00	MP	4	C	2d	1287	30	60	LW	Mesic Herb
252	27-Aug-09	9N	6264246	410963	CMAunp	00	AM	4	B	2a	1198	55	250	MD	Mesic Herb
253	27-Aug-09	9N	6264220	410739	MHmm2	Wf50	Wf50	7	D	2b	1155	0	999	LV	Wetland Shrub/Herb
254	27-Aug-09	9N	6264670	410107	MHmm2	03	MO	4	C	6/ic	961	40	230	MD	Mesic Forest
255	27-Aug-09	9N	6264602	409711	MHmm2	01	MB	4	C	5/ic	1008	45	330	UP	Mesic Forest
256	27-Aug-09	9N	6261768	407797	CWHwm	05	SS	3	B	7/mc	218	0	999	LV	Floodplain Forest
203v	27-Aug-09	9N	6261681	407702	CWHwm	06	CD	4	C	5/tb	216	0	999	LV	Floodplain Forest
257	28-Aug-09	9N	6271292	407464	MHmm2	01	MB	4	C	6/ic	830	25	200	UP	Mesic Forest
258	28-Aug-09	9N	6270716	407711	MHmm2	03	MO	5	D	6/tc	681	40	230	MD	Mesic Forest
259	28-Aug-09	9N	6269749	407978	CWHwm	01	HB	4	C	7/mc	599	45	260	LW	Mesic Forest
260	28-Aug-09	9N	6268646	408193	CWHwm	01	HB	4	C	7/mc	363	50	120	LW	Mesic Forest
261	29-Aug-09	9N	6262051	414058	CWHwm	05	SS	5	D	6/mc	453	12	180	TO	Floodplain Forest
262	29-Aug-09	9N	6262224	414194	CWHwm	01	HB	4	C	6/tc	494	60	130	MD	Mesic Forest
263	29-Aug-09	9N	6262337	415121	CWHwm	07	CW	4	A	3b	465	0	999	LV	Floodplain Forest
264	29-Aug-09	9N	6262484	415106	CWHwm	05	SS	6	B	6/mm	412	0	999	LV	Floodplain Forest
265	29-Aug-09	9N	6262666	415125	CWHwm	04	SD	4	D	7/mc	501	0	999	LV	Moist Forest
266	29-Aug-09	9N	6262721	415761	CWHwm	01	HB	4	C	7/mc	500	0	999	LV	Mesic Forest
267	30-Aug-09	9N	6283332	437575	ESSFwv	00	00	2	C	6/tc	696	45	240	LW	unknown
268	30-Aug-09	9N	6283453	437314	ESSFwv	Fl01	Fl01	4	B	3b	668	0	999	LV	Floodplain Forest
269	30-Aug-09	9N	6283285	437382	ESSFwv	Fm03	Fm03	2	B	6/mm	669	0	999	LV	Floodplain Forest
270	30-Aug-09	9N	6283326	437432	ESSFwv	00	RI	1	A	1a	667	0	999	LV	non-vegetated

Appendix 7

Distribution of Ecosystem Types in the Local Study Area

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Appendix 7. Distribution of Ecosystem Types in the Local Study Area

BEC Unit	Map Unit	General Ecosystem Type	Total Area (ha)
BAFAunp	51	Avalanche Track	26.51
	AM	Mesic Herb	899.38
	CG	Drier Herb	46.89
	CL	sparsely vegetated	76.67
	ES	sparsely vegetated	16.45
	FC	Drier Herb	447.07
	GL	non-vegetated	1,666.56
	KH	Parkland Forest/Krummholz	525.68
	LA	non-vegetated	8.19
	MN	sparsely vegetated	420.84
	MP	Mesic Herb	187.44
	PK	Parkland Forest/Krummholz	142.95
	PN	non-vegetated	333.05
	RI	non-vegetated	0.96
	RO	sparsely vegetated	574.68
	RU	sparsely vegetated	31.14
	RZ	non-vegetated	7.83
	TA	sparsely vegetated	2,293.65
	WE	Wetland Shrub/Herb	24.59
	Wf	Wetland Shrub/Herb	37.42
	Wm	Wetland Shrub/Herb	2.53
	WT	Wetter Shrub/herb	24.78
BAFAunp Total			**7,795.27**
CMAunp	51	Avalanche Track	238.14
	AM	Mesic Herb	666.30
	CG	Drier Herb	404.03
	CL	sparsely vegetated	135.04
	ES	sparsely vegetated	360.87
	FC	Drier Herb	353.35
	FP	Floodplain Forest	4.12
	GL	non-vegetated	3,714.13
	KH	Parkland Forest/Krummholz	720.25
	LA	non-vegetated	154.28
	MN	sparsely vegetated	1,119.97
	MP	Mesic Herb	1,113.73
	OW	Wetland Shrub/Herb	3.53
	PD	non-vegetated	46.01
	PK	Parkland Forest/Krummholz	402.39
	PN	non-vegetated	737.80
	RI	non-vegetated	58.07
	RO	sparsely vegetated	2,190.55
	RU	sparsely vegetated	147.41
	TA	sparsely vegetated	2,200.57
	Wf	Wetland Shrub/Herb	196.05
	Wm	Wetland Shrub/Herb	25.55
	WT	Wetter Shrub/Herb	41.26
CMAunp Total			**15,033.43**

Appendix 7. Distribution of Ecosystem Types in the Local Study Area

BEC Unit	Map Unit	General Ecosystem Type	Total Area (ha)
CWHwm	51	Avalanche Track	211.04
	CD	Floodplain Forest	46.86
	CL	Sparsely Vegetated	1.29
	CW	Floodplain Forest	73.73
	ES	Sparsely Vegetated	0.76
	HB	Mesic Forest	1,875.09
	HM	Drier Forest	105.16
	HS	Wetter Forest	3.01
	LS	Wetland Forest	7.87
	OW	Wetland Shrub/Herb	4.94
	PD	non-vegetated	9.13
	RI	non-vegetated	239.81
	RO	sparsely vegetated	4.32
	SC	Wetland Forest	38.71
	SD	Moist Forest	1,221.03
	SO	Mesic Forest	312.28
	SS	Floodplain Forest	251.75
	TA	sparsely vegetated	20.17
	Wf	Wetland Shrub/Herb	2.43
	Wm	Wetland Shrub/Herb	52.51
	Ws	Wetland Shrub/Herb	5.82
	WT	Wetland Shrub/Herb	5.36
CWHwm Total			**4,493.06**
ESSFwv	51	Avalanche Track	1,730.24
	AM	Mesic Herb	1,293.92
	CG	Drier Herb	26.29
	CL	Sparsely Vegetated	3.11
	ES	sparsely vegetated	54.38
	FA	Mesic Forest	1,954.22
	FC	Drier Herb	82.18
	FD	wetter forest	1,581.26
	FF	Drier Forest	513.03
	FH	wetter forest	412.72
	FL	Wetland Forest	83.70
	FO	Mesic Forest	1,447.47
	FP	Floodplain Forest	246.16
	FV	wetter forest	1,539.83
	GL	non-vegetated	153.08
	KH	Parkland Forest/Krummholz	705.38
	LA	non-vegetated	33.42
	LC	Drier Forest	351.45
	MH	Mesic Forest	53.34
	MI	non-vegetated	29.60
	MN	sparsely vegetated	536.78
	MP	Mesic Herb	301.20
	OW	Wetland Shrub/Herb	41.95
	PD	non-vegetated	52.14
	PK	Parkland Forest/Krummholz	98.63
	PN	non-vegetated	31.14
	RI	non-vegetated	184.33
	RO	sparsely vegetated	177.70
	RZ	non-vegetated	36.36
	TA	sparsely vegetated	483.13
	WE	Wetland Shrub/Herb	79.12
	Wf	Wetland Shrub/Herb	785.11
	Wm	Wetland Shrub/Herb	61.33
	WT	Wetter Shrub/Herb	350.87
ESSFwv Total			**15,514.58**

Appendix 7. Distribution of Ecosystem Types in the Local Study Area

BEC Unit	Map Unit	General Ecosystem Type	Total Area (ha)
ICHvc	51	Avalanche Track	78.76
	52	Wetland Shrub/Herb	11.98
	CD	Floodplain Forest	185.13
	DD	Floodplain Forest	46.80
	HD	Mesic Forest	170.87
	HM	Drier Forest	7.84
	OW	Wetland Shrub/Herb	6.21
	RI	non-vegetated	36.02
	RZ	non-vegetated	12.94
	SD	Moist Forest	307.45
	SH	Wetland Forest	7.46
	TA	sparsely vegetated	4.63
	WE	Wetland Shrub/Herb	7.63
	Ws	Wetland Shrub/Herb	24.21
ICHvc Total			**907.92**
MHun	51	Avalanche Track	1,303.53
	AB	Moist Forest	299.03
	AM	Mesic Herb	625.30
	CG	Drier Herb	150.61
	CL	sparsely vegetated	27.40
	ES	sparsely vegetated	64.97
	FC	Drier Herb	23.05
	FP	Floodplain Forest	39.71
	KH	Parkland Forest/Krummholz	753.47
	LA	non-vegetated	69.48
	MB	Mesic Forest	1,978.08
	MD	wetter forest	623.28
	MM	Drier Forest	53.91
	MN	sparsely vegetated	48.88
	MO	Mesic Forest	1,413.10
	MP	Mesic Herb	984.44
	MT	Moist Forest	547.96
	PD	non-vegetated	78.73
	PK	Parkland Forest/Krummholz	294.99
	PN	non-vegetated	68.25
	RI	non-vegetated	92.04
	RO	sparsely vegetated	225.13
	RU	sparsely vegetated	71.28
	TA	sparsely vegetated	536.88
	WE	Wetland Shrub/Herb	2.49
	Wf	Wetland Shrub/Herb	399.43
	Wm	Wetland Shrub/Herb	1.03
	WT	Wetter Shrub/Herb	84.14
	YC	Wetland Forest	22.79
	YH	wetter forest	417.57
	YS	Wetland Forest	142.24
MHun Total			**11,443.22**
Grand Total			**55,187.48**

Appendix 8

Terrestrial Ecosystem Maps

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KSM Project
Terrestrial Ecosystem Map
in the Western Local Study Area

General Ecosystem Type:

- Disturbed
- Sparse/Barren
- Drier Forest
- Mesic Forest
- Moist Forest
- Wetter Forest
- Parkland Forest/Krummholz
- Drier Herb
- Mesic Herb
- Wetter Shrub/Herb
- Avalanche Track
- Wetland Shrub/Herb
- Wetland Forest
- Floodplain Forest
- Water
- Snow/Ice

- Mine Camp
- Existing Exploration Camp
- Explosives Plant and Magazine
- Hydropower Generation
- 100 m Contour
- BEC Zone
- Diversion Channel
- Transmission Line
- Diversion Tunnel
- Access Road
- Temporary Glacier Access Road
- Ore Transport Tunnel
- Plant Site and Associated Facilities

1:25,000

0 1,000 2,000

Metres

Date: April 12, 2010
GIS no.: KSM-20-012
Job no.: 0868-006-12
Map projection: UTM 9, Nad 83

SEABRIDGE GOLD

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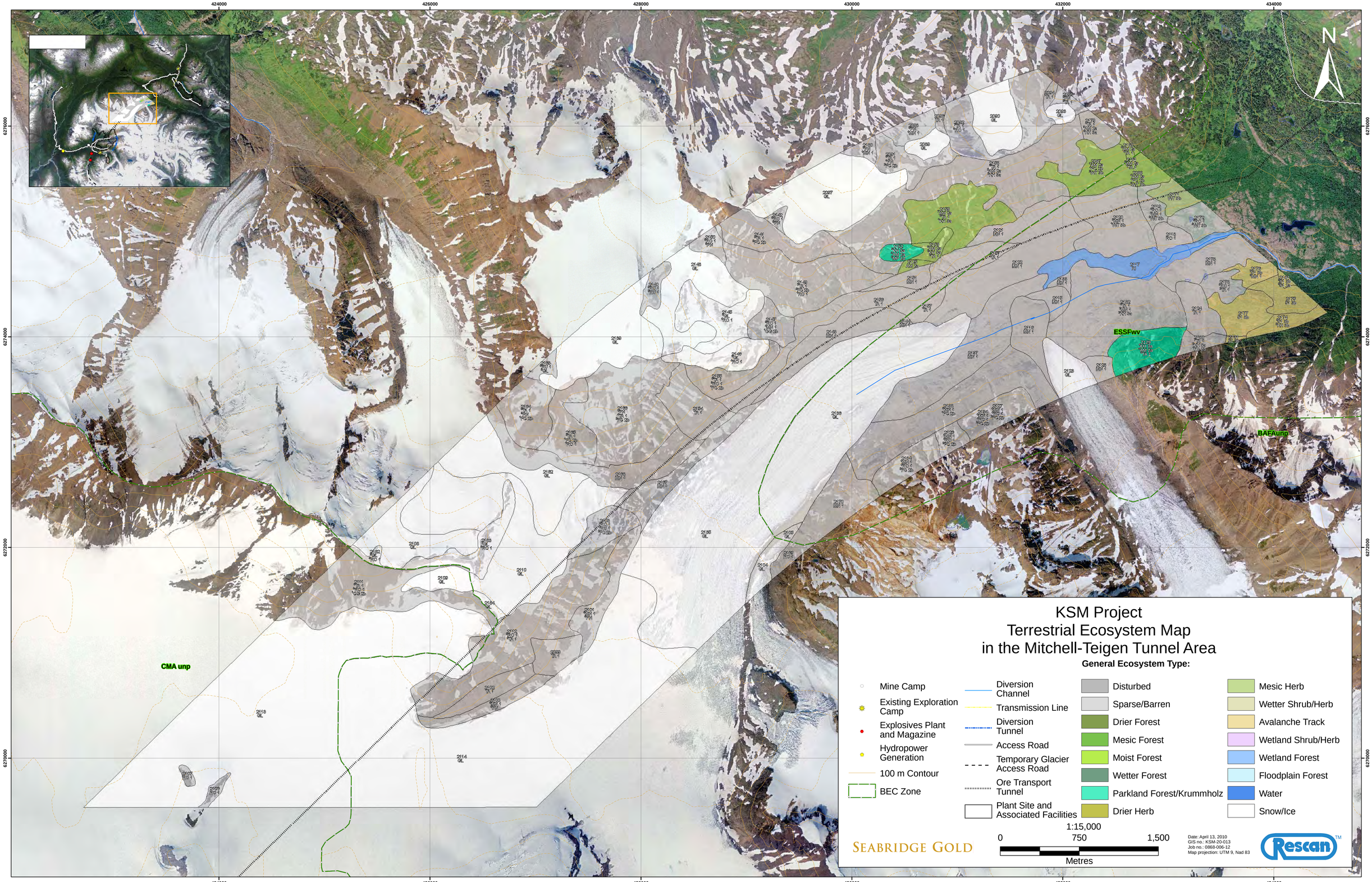

KSM Project
Terrestrial Ecosystem Map
in the Mitchell-Teigen Tunnel Area

General Ecosystem Type:

- Mine Camp
- Existing Exploration Camp
- Explosives Plant and Magazine
- Hydropower Generation
- 100 m Contour
- BEC Zone
- Diversion Channel
- Transmission Line
- Diversion Tunnel
- Access Road
- Temporary Glacier Access Road
- Ore Transport Tunnel
- Plant Site and Associated Facilities
- Disturbed
- Sparse/Barren
- Drier Forest
- Mesic Forest
- Moist Forest
- Wetter Forest
- Parkland Forest/Krummholz
- Drier Herb
- Mesic Herb
- Wetter Shrub/Herb
- Avalanche Track
- Wetland Shrub/Herb
- Wetland Forest
- Floodplain Forest
- Water
- Snow/Ice

1:15,000

0 750 1,500

Metres

SEABRIDGE GOLD

Date: April 13, 2010
GIS no.: KSM-20-013
Job no.: 0868-006-12
Map projection: UTM 9, Nad 83

Rescan™

KSM Project
Terrestrial Ecosystem Map
of the Western Local Study Area

General Ecosystem Type:

- Disturbed
- Sparse/Barren
- Drier Forest
- Mesic Forest
- Moist Forest
- Wetter Forest
- Parkland Forest/Krummholz
- Drier Herb
- Mesic Herb
- Wetter Shrub/Herb
- Avalanche Track
- Wetland Shrub/Herb
- Wetland Forest
- Floodplain Forest
- Water
- Snow/Ice

- Mine Camp
- Existing Exploration Camp
- Explosives Plant and Magazine
- Hydropower Generation
- 100 m Contour
- BEC Zone
- Diversion Channel
- Transmission Line
- Diversion Tunnel
- Access Road
- Temporary Glacier Access Road
- Ore Transport Tunnel
- Plant Site and Associated Facilities

1:20,000

0 1,000 2,000

Metres

SEABRIDGE GOLD

Rescan™

Date: April 13, 2010
GIS no.: KSM-20-014
Job no.: 0868-006-12
Map projection: UTM 9, Nad 83

412000 414000 416000 418000 420000 422000 424000 426000 428000

6262000 6260000 6258000 6256000 6254000

BAFAunp

CWH wm

MH un

CMA unp

KSM Project
Terrestrial Ecosystem Map
of the Sulphurets Access Corridor

General Ecosystem Type:

- Disturbed
- Sparse/Barren
- Drier Forest
- Mesic Forest
- Moist Forest
- Wetter Forest
- Parkland Forest/Krummholz
- Drier Herb
- Mesic Herb
- Wetter Shrub/Herb
- Avalanche Track
- Wetland Shrub/Herb
- Wetland Forest
- Floodplain Forest
- Water
- Snow/Ice

- Mine Camp
- Existing Exploration Camp
- Explosives Plant and Magazine
- Hydropower Generation
- 100 m Contour
- BEC Zone
- Diversion Channel
- Transmission Line
- Diversion Tunnel
- Access Road
- Temporary Glacier Access Road
- Ore Transport Tunnel
- Plant Site and Associated Facilities

1:20,000

0 1,000 2,000

Metres

SEABRIDGE GOLD

Rescan™

Date: April 13, 2010
GIS no.: KSM-20-015
Job no.: 0868-006-12
Map projection: UTM 9, Nad 83

Appendix 9

Distribution of Ecosystem Types in the Regional Study Area

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Appendix 9. Distribution of Ecosystem Types in the Regional Study Area

BEC Unit	Ecosystem Unit	General Ecosystem Type	Area in RSA (ha)
BAFAunp	AM	Mesic Herb	1283.24
	BA	sparsely vegetated	35221.36
	DH	Drier Herb	70.04
	DS	Drier Shrub/Herb	580.04
	GI	non-vegetated	40782.44
	KH	Parkland Forest/Krummholz	1637.04
	LA	non-vegetated	48.4
	Wm	Wetland Shrub/Herb	1.04
	MP	Mesic Herb	2002.32
	RI	non-vegetated	17.2
	VF	Mesic Shrub/Herb	4017.48
	VS	Wetter Shrub/Herb	1734.28
	VW	Wetter Herb	567.24
	WA	non-vegetated	33.32
CMAunp	AM	Mesic Herb	325.16
	BA	sparsely vegetated	22270.48
	DH	Drier Herb	26.64
	DS	Drier Shrub/Herb	760.92
	GI	non-vegetated	32538.92
	KH	Parkland Forest/Krummholz	1690.32
	LA	non-vegetated	316.16
	Wm	Wetland Shrub/Herb	98.4
	MP	Mesic Herb	543.4
	RI	non-vegetated	60.32
	VF	Mesic Shrub/Herb	4324.48
	VS	Wetter Shrub/Herb	1933
	VW	Wetter Herb	107
	WA	non-vegetated	41.04
CWHwm	AV	Avalanche Track	1533.08
	BA	sparsely vegetated	224.4
	CD	Floodplain Forest	66.16
	CD/CW	Floodplain Forest	385.88
	CW	Floodplain Forest	321.84
	DS	Drier Shrub/Herb	37.84
	GT	Avalanche Track	97.36
	GW	Wetland Shrub/Herb	0.52
	HB / SO	Mesic Forest	9521.88
	HM	Drier Forest	639.88
	HS	wetter forest	326.64
	LA	non-vegetated	104.04
	Wm	Wetland Shrub/Herb	103.32
	RI	non-vegetated	1265.6
	Ws	wetter forest	44.56
	SC / LS	wetter forest	182.64

Appendix 9. Distribution of Ecosystem Types in the Regional Study Area

BEC Unit	Ecosystem Unit	General Ecosystem Type	Area in RSA (ha)
	SD	Moist Forest	2077.76
	SS	Floodplain Forest	41.72
	VF	Mesic Shrub/Herb	624.36
	VS	Wetter Shrub/Herb	178.08
	VW	Wetter Herb	6.08
	WA	non-vegetated	13.24
	WE	Wetland Shrub/Herb	38.6
ESSFwv	AM	Mesic Herb	939.32
	AV	Avalanche Track	18696.64
	BA	sparsely vegetated	8156.72
	FA	Mesic Forest	23474.04
	FD	wetter forest	1945.32
	FF	Drier Forest	258.72
	FH	wetter forest	1852.04
	FL	wetter forest	357
	FO	Mesic Forest	3155
	FP	Floodplain Forest	1.32
	FV	wetter forest	371.16
	GI	non-vegetated	907.72
	GT	Avalanche Track	2728.84
	GW	Wetland Shrub/Herb	143.4
	LA	non-vegetated	1078.96
	LC	Drier Forest	439.84
	Wm	Wetland Shrub/Herb	469.92
	MH	Mesic Forest	2362.6
	MP	Mesic Herb	995.8
	PK	Parkland Forest/Krummholz	1266.72
	RI	non-vegetated	678.4
	Ws	wetter forest	257.6
	VF	Mesic Shrub/Herb	5047.64
	VS	Wetter Shrub/Herb	3517.24
	VW	Wetter Herb	294.88
	WA	non-vegetated	83.12
	WE	Wetland Shrub/Herb	1962.88
	AM	Mesic Herb	257.68
	AV	Avalanche Track	2980.68
ICHvc	BA	sparsely vegetated	1147.84
	DD /CD	Floodplain Forest	3153.24
	DH	Drier Herb	4.8
	DS	Drier Shrub/Herb	66.36
	GT	Avalanche Track	697.12
	GW	Wetland Shrub/Herb	117.84
	HD	Mesic Forest	13778.4
	HM	Drier Forest	337.4

Appendix 9. Distribution of Ecosystem Types in the Regional Study Area

BEC Unit	Ecosystem Unit	General Ecosystem Type	Area in RSA (ha)
	LA	non-vegetated	4280.52
	Wm	Wetland Shrub/Herb	538.24
	RI	non-vegetated	1780.6
	Ws	wetter forest	1563.72
	SD	Moist Forest	4668.28
	SH	wetter forest	677.28
	VF	Mesic Shrub/Herb	7002.68
	VS	Wetter Shrub/Herb	2826.12
	VW	Wetter Herb	488.52
	WA	non-vegetated	42.68
	WE	Wetland Shrub/Herb	993.64
MHmm2	AB	Moist Forest	391.4
	AM	Mesic Herb	108.68
	AV	Avalanche Track	11583.8
	BA	sparsely vegetated	4201.08
	DH	Drier Herb	18.56
	DS	Drier Shrub/Herb	416.68
	GI	non-vegetated	924.24
	GT	Avalanche Track	503.2
	GW	Wetland Shrub/Herb	3
	LA	non-vegetated	226.12
	Wm	Wetland Shrub/Herb	50.84
	MB	Mesic Forest	9002.6
	MD	wetter forest	779.4
	MM	Drier Forest	511.44
	MO	Mesic Forest	2556
	MP	Mesic Herb	434.56
	MT	Moist Forest	1855.88
	PK	Parkland Forest/Krummholz	540.24
	RI	non-vegetated	329.92
	VF	Mesic Shrub/Herb	1049.6
	VS	Wetter Shrub/Herb	325.64
	VW	Wetter Herb	22.72
	WA	non-vegetated	36.44
	WE	Wetland Shrub/Herb	1149.96
	YH	wetter forest	1055.96
	YS /YC	wetter forest	216.4
Grand Total			**338008**

Appendix 10

Plant Species Identified During Field Surveys

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Appendix 10. Plant Species Identified During Field Surveys

Scientific Name	English Name	Family	Lifeform
Abies lasiocarpa	subalpine fir	Pinaceae	Tree-Conifer
Achillea millefolium	yarrow	Asteraceae	Forb
Aconitum delphiniifolium	mountain monkshood	Ranunculaceae	Forb
Actaea rubra	baneberry	Ranunculaceae	Forb
Agoseris aurantiaca	orange agoseris	Asteraceae	Forb
Agrostis sp.	bentgrass	Poaceae	Graminoid
Alnus sp.	alder	Betulaceae	Genus-level/Mixed
Alnus viridis	green alder	Betulaceae	Shrub-Deciduous
Alnus viridis ssp. sinuata	Sitka alder	Betulaceae	Shrub-Deciduous
Anaphalis margaritacea	pearly everlasting	Asteraceae	Forb
Anemone multifida	cut-leaved anemone	Ranunculaceae	Forb
Anemone narcissiflora	narcissus anemone	Ranunculaceae	Forb
Anemone sp.	anemone	Ranunculaceae	Forb
Antennaria alpina	alpine pussytoes	Asteraceae	Forb
Antennaria neglecta	field pussytoes	Asteraceae	Forb
Antennaria sp.	pussytoes	Asteraceae	Forb
Aquilegia formosa	Sitka columbine	Ranunculaceae	Forb
Aquilegia sp.	columbine	Ranunculaceae	Forb
Arnica angustifolia	alpine arnica	Asteraceae	Forb
Arnica cordifolia	heart-leaved arnica	Asteraceae	Forb
Arnica latifolia	mountain arnica	Asteraceae	Forb
Arnica mollis	hairy arnica	Asteraceae	Forb
Artemisia sp.		Asteraceae	Genus-level/Mixed
Artemisia norvegica	mountain sagewort	Asteraceae	Forb
Aruncus dioicus	goatsbeard	Rosaceae	Forb
Aster foliaceus var. cusickii		Asteraceae	Forb
Aster sp.		Asteraceae	Forb
Athyrium filix-femina	lady fern	Dryopteridaceae	Fern/Fern Ally
Aulacomnium sp.	groove-moss	Aulacomniaceae	Moss
Aulacomnium palustre	glow moss	Aulacomniaceae	Moss
Aulacomnium turgidum	mountain groove-moss	Aulacomniaceae	Moss
Barbilophozia floerkei	mountain leafy liverwort	Jungermanniaceae	Hepatic
Barbilophozia sp.		Jungermanniaceae	Hepatic
Barbilophozia lycopodioides	common leafy liverwort	Jungermanniaceae	Hepatic
Bistorta vivipara	alpine bistort	Polygonaceae	Forb
Botrychium lunaria	common moonwort	Ophioglossaceae	Fern/Fern Ally
Brachythecium holzingeri		Brachytheciaceae	Moss
Brachydontium sp.		Seligeriaceae	Moss
Brachythecium hylotapetum	woodsy ragged-moss	Brachytheciaceae	Moss
Brachythecium sp.	ragged-moss	Brachytheciaceae	Moss
Brachythecium oedipodium	short-leaved ragged-moss	Brachytheciaceae	Moss
Brassicaceae		Brassicaceae	Forb
Bromus vulgaris	Columbia brome	Poaceae	Graminoid
Calamagrostis canadensis	bluejoint reedgrass	Poaceae	Graminoid
Calamagrostis sp.	reedgrass	Poaceae	Graminoid
Caltha leptosepala	white mountain marsh-marigold	Ranunculaceae	Forb
Campanula lasiocarpa	mountain harebell	Campanulaceae	Forb
Campanula rotundifolia	common harebell	Campanulaceae	Forb

Appendix 10. Plant Species Identified During Field Surveys

Scientific Name	English Name	Family	Lifeform
Campanula uniflora	arctic harebell	Campanulaceae	Forb
Canadanthus modestus	great northern aster	Asteraceae	Forb
Carex albonigra	two-toned sedge	Cyperaceae	Graminoid
Carex diandra	lesser-panicled sedge	Cyperaceae	Graminoid
Carex gynocrates	yellow bog sedge	Cyperaceae	Graminoid
Carex limosa	shore sedge	Cyperaceae	Graminoid
Carex mertensii	Merten's sedge	Cyperaceae	Graminoid
Carex nardina	spikenard sedge	Cyperaceae	Graminoid
Carex nigricans	black alpine sedge	Cyperaceae	Graminoid
Carex phaeocephala	dunhead sedge	Cyperaceae	Graminoid
Carex podocarpa	graceful mountain sedge	Cyperaceae	Graminoid
Carex saxatilis	russet sedge	Cyperaceae	Graminoid
Carex sitchensis	Sitka sedge	Cyperaceae	Graminoid
Carex sp.	sedge	Cyperaceae	Graminoid
Cassiope mertensiana	white mountain-heather	Ericaceae	Dwarf Woody Plant
Cassiope tetragona	four-angled mountain-heather	Ericaceae	Dwarf Woody Plant
Castilleja sp.	paintbrush	Scrophulariaceae	Forb
Castilleja miniata	scarlet paintbrush	Scrophulariaceae	Forb
Castilleja parviflora	small-flowered paintbrush	Scrophulariaceae	Forb
Castilleja unalaschcensis	Unalaska paintbrush	Scrophulariaceae	Forb
Chimaphila umbellata	prince's pine	Pyrolaceae	Dwarf Woody Plant
Cirsium edule	edible thistle	Asteraceae	Forb
Cladonia borealis	boreal pixie-cup	Not Used	Lichen
Cladonia cornuta		Not Used	Lichen
Cladonia ecmocyna		Not Used	Lichen
Cladina mitis	lesser green reindeer	Not Used	Lichen
Cladonia sp.	clad lichens	Not Used	Lichen
Cladonia pyxidata	pebbled pixie-cup	Not Used	Lichen
Cladina rangiferina	grey reindeer	Not Used	Lichen
Claopodium sp.		Leskeaceae	Moss
Claytonia sibirica	Siberian miner's-lettuce	Portulacaceae	Forb
Clintonia uniflora	queen's cup	Liliaceae	Forb
Corallorhiza trifida	yellow coralroot	Orchidaceae	Parasite/Saprophyte
Cornus canadensis	bunchberry	Cornaceae	Forb
Cornus stolonifera	red-osier dogwood	Cornaceae	Shrub-Deciduous
Cryptogramma acrostichoides	parsley fern	Pteridaceae	Fern/Fern Ally
Cystopteris fragilis	fragile fern	Dryopteridaceae	Fern/Fern Ally
Danthonia intermedia	timber oatgrass	Poaceae	Graminoid
Deschampsia cespitosa	tufted hairgrass	Poaceae	Graminoid
Dicranum sp.	heron's-bill moss	Dicranaceae	Moss
Dicranum fuscescens	curly heron's-bill moss	Dicranaceae	Moss
Dicranum pallidisetum	pale-stalked broom-moss	Dicranaceae	Moss
Dicranella palustris	marsh forklet-moss	Dicranaceae	Moss
Dicranum scoparium	broom-moss	Dicranaceae	Moss
Diphasiastrum alpinum	alpine club-moss	Lycoperdaceae	Fern/Fern Ally
Diphasiastrum sitchense	Alaska club-moss	Lycoperdaceae	Fern/Fern Ally
Draba sp.		Brassicaceae	Forb
Drepanocladus aduncus	common hook-moss	Amblystegiaceae	Moss

Appendix 10. Plant Species Identified During Field Surveys

Scientific Name	English Name	Family	Lifeform
Dryas drummondii	yellow mountain-avens	Rosaceae	Dwarf Woody Plant
Dryas integrifolia	entire-leaved mountain-avens	Rosaceae	Dwarf Woody Plant
Dryopteris expansa	spiny wood fern	Dryopteridaceae	Fern/Fern Ally
Empetrum nigrum	crowberry	Empetraceae	Dwarf Woody Plant
Epilobium anagallidifolium	alpine willowherb	Onagraceae	Forb
Epilobium angustifolium	fireweed	Onagraceae	Forb
Epilobium ciliatum	purple-leaved willowherb	Onagraceae	Forb
Epilobium latifolium	broad-leaved willowherb	Onagraceae	Forb
Epilobium sp.	willowherb	Onagraceae	Forb
Equisetum arvense	common horsetail	Equisetaceae	Fern/Fern Ally
Equisetum scirpoides	dwarf scouring-rush	Equisetaceae	Fern/Fern Ally
Equisetum sp.	horsetail	Equisetaceae	Fern/Fern Ally
Equisetum sylvaticum	wood horsetail	Equisetaceae	Fern/Fern Ally
Equisetum variegatum	northern scouring-rush	Equisetaceae	Fern/Fern Ally
Erigeron sp.	fleabane	Asteraceae	Forb
Erigeron humilis	arctic-alpine daisy	Asteraceae	Forb
Eriophorum angustifolium	narrow-leaved cotton-grass	Cyperaceae	Graminoid
Eriophorum chamissonis	Chamisso's cotton-grass	Cyperaceae	Graminoid
Eurhynchium oreganum	Oregon beaked-moss	Brachytheciaceae	Moss
Festuca altaica	Altai fescue	Poaceae	Graminoid
Festuca sp.	fescue	Poaceae	Graminoid
Fritillaria camschatcensis	northern rice-root	Liliaceae	Forb
Galium trifidum	small bedstraw	Rubiaceae	Forb
Galium sp.	bedstraw	Rubiaceae	Forb
Gentiana glauca	glaucous gentian	Gentianaceae	Forb
Geranium erianthum	northern geranium	Geraniaceae	Forb
Geum macrophyllum	large-leaved avens	Rosaceae	Forb
Goodyera oblongifolia	rattlesnake-plantain	Orchidaceae	Forb
Gymnocarpium dryopteris	oak fern	Dryopteridaceae	Fern/Fern Ally
Harrimanella stelleriana	Alaskan mountain-heather	Ericaceae	Dwarf Woody Plant
Heracleum sp.	cow-parsnip	Apiaceae	Forb
Heracleum maximum	cow-parsnip	Apiaceae	Forb
Heterocladium dimorphum	bileaf moss	Pterigynandraceae	Moss
Hieracium sp.	hawkweed	Asteraceae	Forb
Hieracium albiflorum	white hawkweed	Asteraceae	Forb
Hierochloë alpina	alpine sweetgrass	Poaceae	Graminoid
Hieracium gracile	slender hawkweed	Asteraceae	Forb
Hierochloë hirta	common sweetgrass	Poaceae	Graminoid
Hieracium lachenalii	European hawkweed	Asteraceae	Forb
Hieracium triste	woolly hawkweed	Asteraceae	Forb
Hylocomium splendens	step moss	Hylocomiaceae	Moss
Juncus drummondii	Drummond's rush	Juncaceae	Graminoid
Juncus sp.	rush	Juncaceae	Graminoid
Juniperus communis	common juniper	Cupressaceae	Shrub-Evergreen
Kalmia microphylla	western bog-laurel	Ericaceae	Dwarf Woody Plant
Leptarrhena pyrolifolia	leatherleaf saxifrage	Saxifragaceae	Forb
Listera cordata	heart-leaved twayblade	Orchidaceae	Forb
Lobaria pulmonaria	lungwort	Not Used	Lichen

Appendix 10. Plant Species Identified During Field Surveys

Scientific Name	English Name	Family	Lifeform
Luetkea pectinata	partridge-foot	Rosaceae	Dwarf Woody Plant
Lupinus arcticus	arctic lupine	Fabaceae	Forb
Luzula arcuata	curved wood-rush	Juncaceae	Graminoid
Luzula sp.	wood-rush	Juncaceae	Graminoid
Luzula parviflora	small-flowered wood-rush	Juncaceae	Graminoid
Lycopodium annotinum	stiff club-moss	Lycoperdaceae	Fern/Fern Ally
Lycopodium clavatum	running club-moss	Lycoperdaceae	Fern/Fern Ally
Lycopodium sp.	clubmoss	Lycoperdaceae	Fern/Fern Ally
Lysichiton americanus	skunk cabbage	Araceae	Forb
Maianthemum canadense	false Solomon's-seal	Liliaceae	Forb
Masonhalea richardsonii	arctic tumbleweed	Not Used	Lichen
Menziesia ferruginea	false azalea	Ericaceae	Shrub-Deciduous
Menziesia sp.		Ericaceae	Shrub-Deciduous
Mitella sp.	mitrewort	Saxifragaceae	Forb
Mitella nuda	common mitrewort	Saxifragaceae	Forb
Mitella pentandra	five-stamened mitrewort	Saxifragaceae	Forb
Moneses uniflora	single delight	Pyrolaceae	Forb
Monotropa hypopithys	pinesap	Monotropaceae	Parasite/Saprophyte
Myosotis asiatica	mountain forget-me-not	Boraginaceae	Forb
Narcissus sp.		Liliaceae	Forb
Nephroma arcticum	green light	Not Used	Lichen
Oplopanax horridus	devil's club	Araliaceae	Shrub-Deciduous
Orthilia secunda	one-sided wintergreen	Pyrolaceae	Forb
Osmorhiza berteroi	mountain sweet-cicely	Apiaceae	Forb
Osmorhiza sp.	sweet-cicely	Apiaceae	Forb
Oxycoccus oxycoccos	bog cranberry	Ericaceae	Dwarf Woody Plant
Oxyria digyna	mountain sorrel	Polygonaceae	Forb
Parnassia fimbriata	fringed grass-of-Parnassus	Parnassiaceae	Forb
Pedicularis sp.	lousewort	Scrophulariaceae	Forb
Pedicularis langsdorfii	Langsdorf's lousewort	Scrophulariaceae	Forb
Pellia neesiana	shiny liverwort	Pelliaceae	Hepatic
Peltigera aphthosa	freckle pelt	Not Used	Lichen
Peltigera canina	dog pelt	Not Used	Lichen
Peltigera sp.	pelt lichens	Not Used	Lichen
Peltigeraceae		Not Used	Lichen
Peltigera scabrosa	toad pelt	Not Used	Lichen
Petasites frigidus	sweet coltsfoot	Asteraceae	Forb
Phleum alpinum	alpine timothy	Poaceae	Graminoid
Phleum sp.		Poaceae	Graminoid
Phyllodoce empetriformis	pink mountain-heather	Ericaceae	Dwarf Woody Plant
Picea sp.	spruce	Pinaceae	Tree-Conifer
Picea sp. x Picea sp.	spruce hybrid	Pinaceae	Tree-Conifer
Picea engelmannii x glauca	hybrid white spruce	Pinaceae	Tree-Conifer
Picea glauca	white spruce	Pinaceae	Tree-Conifer
Picea sitchensis	Sitka spruce	Pinaceae	Tree-Conifer
Picea x lutzii	Roche spruce	Pinaceae	Tree-Conifer
Plagiomnium insigne	coastal leafy moss	Mniaceae	Moss
Plagiomnium sp.	leafy moss	Mniaceae	Moss

Appendix 10. Plant Species Identified During Field Surveys

Scientific Name	English Name	Family	Lifeform
Plagiomnium medium	common leafy moss	Mniaceae	Moss
Plagiothecium undulatum	flat-moss	Plagiochilaceae	Moss
Platanthera sp.	orchid	Orchidaceae	Forb
Platanthera aquilonis	northern green rein orchid	Orchidaceae	Forb
Platanthera dilatata	fragrant white rein orchid	Orchidaceae	Forb
Pleurozium schreberi	red-stemmed feathermoss	Hylocomiaceae	Moss
Poa sp.	bluegrass	Poaceae	Graminoid
Poa arctica	arctic bluegrass	Poaceae	Graminoid
Polytrichastrum alpinum	stiff-leaved haircap moss	Polytrichaceae	Moss
Polytrichum juniperinum	juniper haircap moss	Polytrichaceae	Moss
Polystichum lonchitis	northern holly fern	Dryopteridaceae	Fern/Fern Ally
Polystichum munitum	sword fern	Dryopteridaceae	Fern/Fern Ally
Polytrichum piliferum	awned haircap moss	Polytrichaceae	Moss
Polytrichum sp.	haircap moss	Polytrichaceae	Moss
Populus balsamifera	balsam poplar	Salicaceae	Tree-Broad-Leaf
Populus balsamifera ssp. trichocarpa	black cottonwood	Salicaceae	Tree-Broad-Leaf
Potentilla anserina	common silverweed	Rosaceae	Forb
Potentilla diversifolia	diverse-leaved cinquefoil	Rosaceae	Forb
Potentilla hippiana	woolly cinquefoil	Rosaceae	Forb
Potentilla sp.		Rosaceae	Genus-level/Mixed
Potentilla uniflora	one-flowered cinquefoil	Rosaceae	Forb
Prosartes sp.	fairybells	Liliaceae	Forb
Prosartes hookeri	Hooker's fairybells	Liliaceae	Forb
Pseudotsuga menziesii	Douglas-fir	Pinaceae	Tree-Conifer
Pteridium aquilinum	bracken fern	Denstaedtiaceae	Fern/Fern Ally
Ptilium crista-castrensis	knight's plume	Hypnaceae	Moss
Pyrola asarifolia	pink wintergreen	Pyrolaceae	Forb
Pyrola sp.	wintergreen	Pyrolaceae	Forb
Racomitrium canescens	grey rock-moss	Grimmiaceae	Moss
Racomitrium sp.	rock-moss	Grimmiaceae	Moss
Ranunculus acris	meadow buttercup	Ranunculaceae	Forb
Ranunculus eschscholtzii	subalpine buttercup	Ranunculaceae	Forb
Ranunculus sp.	buttercup	Ranunculaceae	Forb
Ranunculus nivalis	snow buttercup	Ranunculaceae	Forb
Ranunculus occidentalis	western buttercup	Ranunculaceae	Forb
Rhizocarpon geographicum	green map	Not Used	Lichen
Rhizomnium glabrescens	large leafy moss	Mniaceae	Moss
Rhizomnium sp.	leafy moss	Mniaceae	Moss
Rhodiola integrifolia	roseroot	Crassulaceae	Forb
Rhytidiopsis sp.		Hylocomiaceae	Moss
Rhytidium sp.		Rhytidiaceae	Moss
Rhytidiadelphus loreus	lanky moss	Hylocomiaceae	Moss
Rhytidiopsis robusta	pipecleaner moss	Hylocomiaceae	Moss
Rhytidiadelphus triquetrus	electrified cat's-tail moss	Hylocomiaceae	Moss
Ribes glandulosum	skunk currant	Grossulariaceae	Shrub-Deciduous
Ribes hudsonianum	northern blackcurrant	Grossulariaceae	Shrub-Deciduous
Ribes lacustre	black gooseberry	Grossulariaceae	Shrub-Deciduous
Ribes laxiflorum	trailing black currant	Grossulariaceae	Shrub-Deciduous

Appendix 10. Plant Species Identified During Field Surveys

Scientific Name	English Name	Family	Lifeform
Ribes sp.	currant or gooseberry	Grossulariaceae	Shrub-Deciduous
Rubus parviflorus	thimbleberry	Rosaceae	Shrub-Deciduous
Rubus pedatus	five-leaved bramble	Rosaceae	Forb
Rubus sp.		Rosaceae	Genus-level/Mixed
Rubus spectabilis	salmonberry	Rosaceae	Shrub-Deciduous
Salix alaxensis	Alaska willow	Salicaceae	Shrub-Deciduous
Salix arctica	arctic willow	Salicaceae	Dwarf Woody Plant
Salix barrattiana	Barratt's willow	Salicaceae	Shrub-Deciduous
Salix barclayi	Barclay's willow	Salicaceae	Shrub-Deciduous
Salix brachycarpa	short-fruited willow	Salicaceae	Shrub-Deciduous
Salix drummondiana	Drummond's willow	Salicaceae	Shrub-Deciduous
Salix glauca	grey-leaved willow	Salicaceae	Shrub-Deciduous
Salix polaris	polar willow	Salicaceae	Dwarf Woody Plant
Salix prolixa	Mackenzie willow	Salicaceae	Shrub-Deciduous
Salix reticulata	net-veined willow	Salicaceae	Dwarf Woody Plant
Salix scouleriana	Scouler's willow	Salicaceae	Tree-Broad-Leaf
Salix sitchensis	Sitka willow	Salicaceae	Tree-Broad-Leaf
Salix stolonifera	creeping willow	Salicaceae	Dwarf Woody Plant
Salix sp.	willow	Salicaceae	Genus-level/Mixed
Sambucus racemosa	red elderberry	Caprifoliaceae	Shrub-Deciduous
Sambucus sp.		Caprifoliaceae	Shrub-Deciduous
Sanguisorba canadensis	Sitka burnet	Rosaceae	Forb
Saxifraga ferruginea	Alaska saxifrage	Saxifragaceae	Forb
Saxifraga sp.	saxifrage	Saxifragaceae	Forb
Saxifraga lyallii	red-stemmed saxifrage	Saxifragaceae	Forb
Saxifraga tricuspidata	three-toothed saxifrage	Saxifragaceae	Forb
Scirpus microcarpus	small-flowered bulrush	Cyperaceae	Graminoid
Senecio triangularis	arrow-leaved groundsel	Asteraceae	Forb
Shepherdia canadensis	soopolallie	Elaeagnaceae	Shrub-Deciduous
Silene acaulis	moss campion	Caryophyllaceae	Forb
Solidago multiradiata	northern goldenrod	Asteraceae	Forb
Solorina crocea	chocolate chip	Not Used	Lichen
Sorbus scopulina	western mountain-ash	Rosaceae	Shrub-Deciduous
Sorbus sitchensis	Sitka mountain-ash	Rosaceae	Shrub-Deciduous
Sorbus sp.	mountain ash	Rosaceae	Genus-level/Mixed
Sphagnum angustifolium	poor-fen peat-moss	Sphagnaceae	Moss
Sphagnum capillifolium	common red peat-moss	Sphagnaceae	Moss
Sphagnum girgensohnii	common green peat-moss	Sphagnaceae	Moss
Sphagnum sp.	peat-moss	Sphagnaceae	Moss
Stereocaulon sp.	foam lichens	Not Used	Lichen
Stereocaulon tomentosum	eyed foam	Not Used	Lichen
Streptopus amplexifolius	clasping twistedstalk	Liliaceae	Forb
Streptopus lanceolatus var. curvipes	rosy twistedstalk	Liliaceae	Forb
Streptopus sp.	twistedstalk	Liliaceae	Forb
Streptopus streptopoides	small twistedstalk	Liliaceae	Forb
Symphoricarpos occidentalis	western snowberry	Caprifoliaceae	Shrub-Deciduous
Taraxacum ceratophorum	horned dandelion	Asteraceae	Forb
Thamnolia vermicularis	the whiteworm	Not Used	Lichen

Appendix 10. Plant Species Identified During Field Surveys

Scientific Name	English Name	Family	Lifeform
Tiarella trifoliata	three-leaved foamflower	Saxifragaceae	Forb
Tiarella trifoliata var. trifoliata	three-leaved foamflower	Saxifragaceae	Forb
Tiarella trifoliata var. unifoliata	one-leaved foamflower	Saxifragaceae	Forb
Timmia sp.	timmia	Timmiaceae	Moss
Tolmiea menziesii	piggy-back plant	Saxifragaceae	Forb
Tortula ruralis	sidewalk moss	Pottiaceae	Moss
Trientalis europaea	northern starflower	Primulaceae	Forb
Trientalis europaea ssp. arctica	northern starflower	Primulaceae	Forb
Tsuga heterophylla	western hemlock	Pinaceae	Tree-Conifer
Tsuga mertensiana	mountain hemlock	Pinaceae	Tree-Conifer
Umbilicaria hyperborea	blistered rocktripe	Not Used	Lichen
Urtica dioica	stinging nettle	Urticaceae	Forb
Vaccinium alaskaense	Alaskan blueberry	Ericaceae	Shrub-Deciduous
Vaccinium caespitosum	dwarf blueberry	Ericaceae	Dwarf Woody Plant
Vaccinium sp.	blueberry, huckleberry	Ericaceae	Genus-level/Mixed
Vaccinium membranaceum	black huckleberry	Ericaceae	Shrub-Deciduous
Vaccinium ovalifolium	oval-leaved blueberry	Ericaceae	Shrub-Deciduous
Vaccinium scoparium	grouseberry	Ericaceae	Dwarf Woody Plant
Vahlodea atropurpurea	mountain hairgrass	Poaceae	Graminoid
Valeriana dioica	marsh valerian	Valerianaceae	Forb
Valeriana sitchensis	Sitka valerian	Valerianaceae	Forb
Veratrum viride	Indian hellebore	Liliaceae	Forb
Veronica wormskjoldii	alpine speedwell	Scrophulariaceae	Forb
Viburnum edule	highbush-cranberry	Caprifoliaceae	Shrub-Deciduous
Viola sp.	violet	Violaceae	Forb
Viola adunca	early blue violet	Violaceae	Forb
Viola canadensis	Canada violet	Violaceae	Forb
Viola glabella	stream violet	Violaceae	Forb
Viola orbiculata	round-leaved violet	Violaceae	Forb
Woodsia scopulina	mountain cliff fern	Dryopteridaceae	Fern/Fern Ally
Unknown moss 1			Moss
Unknown moss 2			Moss
Unknown lichen 1			Lichen

Appendix 11

Plant Tissue Metals Analysis - Raw Results

SEABRIDGE GOLD

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Appendix 11a. Metal Concentrations in *Rubus idaeus* (mg/kg wwt)

RESULTS OF ANALYSIS	Control Sites						Infrastructure Sites				
Sample ID	Rubus idaeus (8)-16	Rubus idaeus (8)-17	Rubus idaeus (6)-21	Rubus idaeus (5)-22	326-Rubusida-Lv	327-Rubusida-Lv	Rubus idaeus (4)-1	Rubus idaeus (3)-2	Rubus idaeus (2)-3	Rubus idaeus (1)-6	321-rubuida-Lv
ALS Sample ID	L716470-2	L716470-7	L716470-4	L716470-1	L834403-28	L834403-31	L716470-6	L716470-3	L716470-5	L716470-47	L834403-19
Date Sampled	18-Aug-08	18-Aug-08	18-Aug-08	18-Aug-08	24-Sep-09	24-Sep-09	18-08-09	18-08-09	18-08-09	18-08-09	23-Sep-09
UTM Zone	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V
UTM Easting	408434	408434	407686	407668	407728	405053	440914	440904	440903	432619	441119
UTM Northing	6264472	6264422	6262140	6262109	6257943	6263732	6284544	6284759	6284886	6279896	6278639
Plot#	16	17	21	22	326	327	1	2	3	6	321
% Moisture	80.1	79.2	83.2	83.5	76.80	75.30	71.0	72.4	76.2	70.1	79.70
Metals											
Aluminum (Al)-Total	5.9	9.2	5.5	9.0	7.7	6.4	145.0	6.4	6.0	4.5	16.6
Antimony (Sb)-Total	0.005	0.005	0.005	0.005	0.006	0.006	0.005	0.005	0.005	0.010	0.005
Arsenic (As)-Total	0.029	0.018	0.005	0.015	0.012	0.006	0.054	0.005	0.014	0.010	0.013
Barium (Ba)-Total	6.16	3.63	12.20	7.48	21.48	3.11	12.10	5.62	2.73	1.92	9.56
Beryllium (Be)-Total	0.050	0.050	0.050	0.050	0.035	0.037	0.050	0.050	0.050	0.100	0.030
Bismuth (Bi)-Total	0.015	0.015	0.015	0.015	0.035	0.037	0.015	0.015	0.015	0.030	0.030
Cadmium (Cd)-Total	0.031	0.010	0.077	0.168	0.018	0.011	0.064	0.008	0.019	0.005	0.016
Calcium (Ca)-Total	1750	2160	1820	1460	3341	4273	3000	3110	1280	2500	2984
Chromium (Cr)-Total	0.05	0.05	0.05	0.05	0.06	0.06	1.6	0.1	0.1	0.1	0.2
Cobalt (Co)-Total	0.010	0.025	0.024	0.024	0.028	0.012	0.12	0.01	0.02	0.02	0.06
Copper (Cu)-Total	1.60	1.46	1.50	1.88	2.41	2.25	1.67	1.60	1.05	1.57	2.17
Iron (Fe)-Total	12.2	14.4	28.2	21.2	20.8	17.1	191.0	13.6	10.5	15.9	20.2
Lead (Pb)-Total	0.022	0.010	0.010	0.027	0.012	0.012	0.041	0.010	0.010	0.020	0.010
Lithium (Li)-Total	0.05	0.05	0.05	0.05	0.06	0.06	0.13	0.05	0.05	0.10	0.05
Magnesium (Mg)-Total	783	1060	933	473	1464	1769	1180	1390	562	1640	1610
Manganese (Mn)-Total	22.20	43.70	22.60	8.66	62.87	61.01	51.70	16.00	16.50	8.73	129.31
Mercury (Hg)-Total	0.004	0.007	0.008	0.016	0.004	0.005	0.005	0.005	0.001	0.006	0.003
Molybdenum (Mo)-Total	0.052	0.062	0.086	0.047	1.675	0.753	0.08	0.11	0.06	0.12	0.34
Nickel (Ni)-Total	0.90	0.26	2.04	1.49	1.70	0.19	2.13	1.00	1.71	0.61	2.17
Phosphorus (P)-Total	249	290	305	287	350	311	332	382	548	751	347
Potassium (K)-Total	2290	2590	1950	1840	4176	2989	2670	3560	2830	2720	3329
Selenium (Se)-Total	0.1	0.1	0.7	0.5	0.1	0.1	0.10	0.10	0.10	0.20	0.10
Sodium (Na)-Total	102	91	148	10	12	148	10	10	10	10	10
Strontium (Sr)-Total	4.08	6.29	7.74	3.20	14.50	22.45	23.10	21.80	9.63	18.40	34.71
Thallium (Tl)-Total	0.005	0.005	0.005	0.005	0.003	0.004	0.005	0.005	0.005	0.010	0.003
Tin (Sn)-Total	0.025	0.025	0.025	0.025	0.023	0.025	0.025	0.025	0.025	0.050	0.020
Titanium (Ti)-Total	0.31	0.34	0.26	0.41	0.42	0.31	5.1	0.3	0.3	0.3	0.4
Uranium (U)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.0021	0.0010	0.0010	0.0020	0.0010
Vanadium (V)-Total	0.05	0.05	0.05	0.05	0.06	0.06	0.46	0.05	0.05	0.10	0.05
Zinc (Zn)-Total	7.5	4.5	7.1	7.9	5.9	7.6	18.9	8.9	6.0	4.5	8.1

Appendix 11b. Metal Concentrations in *Salix* spp.(mg/kg wwt)

RESULTS OF ANALYSIS	Control Sites								Infrastructure Sites						
Sample ID	Salix-P216	Salix-P270	324-Salix sp	325-Salix sp	326-Salix sp	328-Salix sp	329-Salix sp	330-Salix sp	Salix-P215	Salix-P227	Salix-P250	Salix-P263	302-Salix sp	312-Salix sp	317-Salix-Lv
ALS Sample ID	L813732-11	L813732-15	L834403-22	L834403-24	L834403-27	L834403-34	L834403-37	L834403-38	L813732-10	L813732-12	L813732-13	L813732-14	L834403-3	L834403-12	L834403-16
Date Sampled	20-Aug-09	30-Aug-09	24-Sep-09	24-Sep-09	24-Sep-09	24-Sep-09	24-Sep-09	24-Sep-09	20-Aug-09	23-Aug-09	26-Aug-09	29-Aug-09	19-Sep-09	21-Sep-09	22-Sep-09
UTM Zone	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V
UTM Easting	406776	437432	405727	408020	407728	403778	404414	408719	407374	434766	417005	415121	444973	422705	421369
UTM Northing	6272048	6283325	6264370	6260896	6257943	6268294	6272315	6266049	6273089	6276294	6259289	6262337	6275505	6265550	6262876
Plot#	216	270	324	325	326	328	329	330	215	227	250	263	302	312	317
% Moisture	80.4	75.6	74.00	62.00	76.40	65.20	69.40	69.90	77.6	76.6	71.9	74.2	71.10	68.20	78.10
Metals															
Aluminum (Al)-Total	1	5.3	3.9	6.5	4.5	4.5	4.0	22.6	8.0	7.6	17.4	9.5	49.4	22.6	15.1
Antimony (Sb)-Total	0.005	0.005	0.007	0.010	0.006	0.009	0.008	0.038	0.005	0.005	0.01	0.005	0.007	0.008	0.005
Arsenic (As)-Total	0.005	0.011	0.007	0.054	0.006	0.009	0.008	0.038	0.005	0.012	0.020	0.047	0.032	0.058	0.048
Barium (Ba)-Total	6.38	3.94	9.59	14.21	24.78	7.69	4.50	67.12	6.69	3.40	7.77	7.58	8.84	7.54	8.87
Beryllium (Be)-Total	0.05	0.05	0.039	0.057	0.035	0.052	0.046	0.226	0.1	0.05	0.1	0.05	0.043	0.048	0.033
Bismuth (Bi)-Total	0.03	0.03	0.039	0.057	0.035	0.052	0.046	0.226	0.015	0.015	0.03	0.015	0.043	0.048	0.033
Cadmium (Cd)-Total	0.336	0.596	0.481	0.105	0.562	0.026	0.026	0.780	2.42	0.0829	0.692	0.781	0.238	2.325	0.072
Calcium (Ca)-Total	2830	5260	4368	6878	5947	6786	4865	2083	2780	3300	4460	4110	3584	3609	2190
Chromium (Cr)-Total	0.05	0.05	0.07	0.10	0.06	0.09	0.19	0.38	0.05	0.05	0.1	0.05	0.4	0.1	0.1
Cobalt (Co)-Total	0.129	0.268	0.309	0.019	0.304	0.331	0.049	0.075	0.055	0.187	0.166	0.281	0.19	0.24	0.30
Copper (Cu)-Total	1.13	1.38	1.35	0.35	2.24	1.60	0.35	1.58	1.54	0.778	1.47	1.52	1.90	3.98	1.29
Iron (Fe)-Total	11.1	16.6	33.8	33.2	14.4	53.2	19.0	15.8	21.4	15.2	35.6	25.2	105.8	41.3	16.1
Lead (Pb)-Total	0.01	0.01	0.013	0.019	0.012	0.017	0.015	0.075	0.01	0.01	0.02	0.024	0.043	0.095	0.035
Lithium (Li)-Total	0.05	0.05	0.07	0.10	0.06	0.09	0.08	0.38	0.05	0.05	0.1	0.05	0.07	0.08	0.05
Magnesium (Mg)-Total	562	1230	1076	973	725	1625	676	1499	767	1230	559	499	971	576	690
Manganese (Mn)-Total	24.6	42.5	86.06	136.04	30.92	148.25	48.04	3792.60	17.1	11.8	26.3	49.2	94.21	28.40	30.00
Mercury (Hg)-Total	0.0038	0.0050	0.003	0.006	0.003	0.005	0.004	0.004	0.0030	0.0005	0.0048	0.0086	0.003	0.002	0.001
Molybdenum (Mo)-Total	0.153	0.103	0.154	0.155	0.394	0.190	0.070	0.038	0.044	0.071	0.164	0.080	0.04	0.22	0.28
Nickel (Ni)-Total	0.21	2.16	0.79	0.10	1.84	0.21	0.08	0.38	1.92	0.63	0.76	1.12	2.21	0.94	0.75
Phosphorus (P)-Total	706	365	398	726	380	682	370	512	782	718	444	438	821	3307	731
Potassium (K)-Total	3700	2240	1906	3078	2454	2133	1778	1818	2470	2230	3610	3870	3381	5374	2453
Selenium (Se)-Total	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.8	0.1	0.1	0.2	0.1	0.14	0.16	0.11
Sodium (Na)-Total	10	20	13	19	12	17	15	175	20	10	20	10	14	16	11
Strontium (Sr)-Total	21.2	34.6	34.84	28.42	28.08	32.47	21.39	8.10	23.3	23.6	16.8	15.3	34.39	70.28	14.98
Thallium (Tl)-Total	0.005	0.005	0.004	0.006	0.004	0.005	0.005	0.023	0.005	0.005	0.01	0.005	0.004	0.005	0.003
Tin (Sn)-Total	0.025	0.025	0.026	0.038	0.024	0.035	0.031	0.151	0.025	0.025	0.05	0.025	0.029	0.032	0.022
Titanium (Ti)-Total	0.05	0.16	0.07	0.41	0.28	0.19	0.23	0.21	0.1	0.22	1.16	0.35	1.2	1.2	0.5
Uranium (U)-Total	0.001	0.001	0.001	0.002	0.001	0.002	0.002	0.008	0.001	0.001	0.002	0.001	0.0029	0.0016	0.0011
Vanadium (V)-Total	0.05	0.05	0.07	0.10	0.06	0.09	0.08	0.38	0.05	0.05	0.1	0.05	0.17	0.13	0.05
Zinc (Zn)-Total	23.2	64.7	49.7	44.1	20.1	43.2	26.5	19.9	61.1	14.3	20.5	29.9	29.8	62.6	64.6

Appendix 11c. Metal Concentrations in *Vaccinium membranacium* (mg/kg wwt)

RESULTS OF ANALYSIS	Control Sites									
Sample ID	Vaccinium membranaceum (1)-13a	Vaccinium membranaceum (2)-13b	Vaccinium membranaceum (3)-13c	Vaccinium membranaceum (3)-13d	324-Vaccmem-Lv	325-Vaccmem-Lv	327-Vaccmem-Lv	328-Vaccmem-Lv	329-Vaccmem-Lv	330-Vaccmem-Lv
ALS Sample ID	L716470-43	L716470-44	L716470-45	L716470-17	L834403-23	L834403-25	L834403-30	L834403-33	L834403-36	L834403-39
Date Sampled	19-Aug-08	19-Aug-08	19-Aug-08	18-Aug-08	24-Sep-09	24-Sep-09	24-Sep-09	24-Sep-09	24-Sep-09	24-Sep-09
UTM Zone	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V
UTM Easting	419931	419931	419931	419931	405727	408020	405053	403778	404414	408719
UTM Northing	6264122	6264122	6264122	6264122	6264370	6260896	6263732	6268294	6272315	6266049
Plot#	13	13	13	13	324	325	327	328	329	330
% Moisture	62.0	64.1	63.2	76.3	67.60	71.40	74.50	72.90	69.30	68.60
Metals										
Aluminum (Al)-Total	83.20	76.50	80.70	2.40	67.4	64.6	30.9	61.0	57.7	82.0
Antimony (Sb)-Total	0.010	0.010	0.010	0.005	0.008	0.007	0.006	0.007	0.008	0.008
Arsenic (As)-Total	0.037	0.030	0.034	0.005	0.008	0.007	0.006	0.007	0.008	0.008
Barium (Ba)-Total	32.20	30.50	29.90	2.77	32.17	37.18	29.33	30.35	18.14	33.28
Beryllium (Be)-Total	0.10	0.10	0.10	0.05	0.049	0.043	0.038	0.041	0.046	0.047
Bismuth (Bi)-Total	0.030	0.030	0.030	0.015	0.049	0.043	0.038	0.041	0.046	0.047
Cadmium (Cd)-Total	0.012	0.005	0.018	0.010	0.005	0.025	0.024	0.004	0.014	0.005
Calcium (Ca)-Total	1410.0	1290.0	1190.0	207.0	3182	3146	3239	2664	2204	3234
Chromium (Cr)-Total	0.10	0.10	0.10	0.05	0.08	0.07	0.06	0.07	0.08	0.08
Cobalt (Co)-Total	0.09	0.05	0.05	0.01	0.016	0.074	0.028	0.014	0.068	0.016
Copper (Cu)-Total	2.97	2.39	3.06	0.22	2.17	2.36	2.58	2.41	3.53	3.58
Iron (Fe)-Total	23.1	18.0	21.2	9.5	11.4	12.9	11.4	12.0	13.4	12.9
Lead (Pb)-Total	0.08	0.07	0.06	0.01	0.016	0.014	0.013	0.014	0.015	0.060
Lithium (Li)-Total	0.10	0.10	0.10	0.05	0.08	0.07	0.06	0.07	0.08	0.08
Magnesium (Mg)-Total	658.0	547.0	523.0	62.6	1199	1101	1048	932	718	1030
Manganese (Mn)-Total	357.00	598.00	906.00	32.80	301.32	749.32	198.90	86.45	194.33	502.40
Mercury (Hg)-Total	0.007	0.005	0.005	0.005	0.004	0.004	0.003	0.004	0.003	0.005
Molybdenum (Mo)-Total	0.18	0.11	0.30	0.01	0.065	0.051	0.270	0.069	0.032	0.140
Nickel (Ni)-Total	0.37	0.42	0.61	0.05	0.29	0.51	0.27	0.27	0.41	0.19
Phosphorus (P)-Total	599	537	636	257	483	337	334	385	393	449
Potassium (K)-Total	2240	1810	2170	1790	2362	1464	2170	3117	1053	2974
Selenium (Se)-Total	0.20	0.20	0.20	0.10	0.2	0.1	0.1	0.1	0.2	0.2
Sodium (Na)-Total	10	10	10	10	369	160	51	214	46	122
Strontium (Sr)-Total	5.10	3.00	4.34	0.36	8.55	3.98	7.24	6.40	11.48	6.91
Thallium (Tl)-Total	0.010	0.010	0.010	0.005	0.005	0.004	0.004	0.004	0.005	0.005
Tin (Sn)-Total	0.050	0.050	0.050	0.025	0.032	0.029	0.026	0.027	0.031	0.031
Titanium (Ti)-Total	0.64	0.39	0.51	0.24	0.08	0.20	0.06	0.07	0.29	0.08
Uranium (U)-Total	0.0020	0.0020	0.0020	0.0010	0.002	0.001	0.001	0.001	0.002	0.002
Vanadium (V)-Total	0.10	0.10	0.10	0.05	0.08	0.07	0.06	0.07	0.08	0.08
Zinc (Zn)-Total	14.30	17.60	15.90	1.49	6.9	9.0	5.4	5.3	12.3	5.6

Appendix 11c. Metal Concentrations in *Vaccinium membranacium* (mg/kg wwt)

RESULTS OF ANALYSIS	Infrastructure Sites							
Sample ID	302-Vaccmem-Lv	306-Vaccmem-Lv	308-Vaccmem-Lv	310-Vaccmem-Lv	313-Vaccmem-Lv	317-Vaccmem-Lv	319-Vaccmem-Lv	322-Vaccmem-Lv
ALS Sample ID	L834403-1	L834403-6	L834403-9	L834403-10	L834403-13	L834403-15	L834403-18	L834403-20
Date Sampled	19-Sep-09	20-Sep-09	20-Sep-09	20-Sep-09	21-Sep-09	22-Sep-09	23-Sep-09	23-Sep-09
UTM Zone	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V
UTM Easting	444973	442774	442506	441245	419031	421369	440594	439610
UTM Northing	6275505	6277435	6276952	6278280	6262603	6262876	6278843	6279461
Plot#	302	306	308	310	313	317	319	322
% Moisture	67.10	77.50	76.60	71.10	76.10	80.90	82.50	79.10
Metals								
Aluminum (Al)-Total	107.9	134.6	113.3	98.5	52.6	31.7	55.1	49.3
Antimony (Sb)-Total	0.008	0.011	0.012	0.007	0.006	0.005	0.004	0.005
Arsenic (As)-Total	0.032	0.011	0.012	0.015	0.024	0.025	0.004	0.005
Barium (Ba)-Total	33.23	27.68	17.32	17.05	25.10	13.26	16.57	23.83
Beryllium (Be)-Total	0.049	0.068	0.070	0.043	0.036	0.029	0.026	0.031
Bismuth (Bi)-Total	0.049	0.068	0.070	0.043	0.036	0.029	0.026	0.031
Cadmium (Cd)-Total	0.013	0.007	0.007	0.004	0.004	0.008	0.003	0.003
Calcium (Ca)-Total	1987	2007	1881	1951	1410	1051	1423	1662
Chromium (Cr)-Total	0.9	0.1	0.1	0.3	0.1	0.0	0.0	0.1
Cobalt (Co)-Total	0.23	0.02	0.02	0.06	0.01	0.01	0.04	0.01
Copper (Cu)-Total	2.45	1.53	1.65	1.98	2.08	1.51	1.29	1.47
Iron (Fe)-Total	70.7	17.0	43.1	37.6	9.0	8.7	7.3	13.4
Lead (Pb)-Total	0.033	0.023	0.023	0.014	0.012	0.010	0.009	0.010
Lithium (Li)-Total	0.08	0.11	0.12	0.07	0.06	0.05	0.04	0.05
Magnesium (Mg)-Total	707	763	662	601	978	411	565	700
Manganese (Mn)-Total	1131.76	402.75	533.52	200.57	66.08	144.21	85.58	265.43
Mercury (Hg)-Total	0.003	0.004	0.003	0.003	0.002	0.001	0.002	0.002
Molybdenum (Mo)-Total	0.09	0.01	0.03	0.02	0.27	0.07	0.02	0.05
Nickel (Ni)-Total	1.11	0.27	0.47	1.84	0.27	0.10	0.58	0.46
Phosphorus (P)-Total	470	356	601	538	284	422	294	305
Potassium (K)-Total	2066	2081	2644	2867	1484	1948	1444	1361
Selenium (Se)-Total	0.16	0.23	0.23	0.14	0.12	0.10	0.09	0.10
Sodium (Na)-Total	16	11	23	14	79	10	9	10
Strontium (Sr)-Total	7.47	3.08	4.05	8.87	6.05	4.47	3.78	8.46
Thallium (Tl)-Total	0.005	0.007	0.007	0.004	0.004	0.003	0.003	0.003
Tin (Sn)-Total	0.033	0.045	0.047	0.029	0.024	0.019	0.018	0.021
Titanium (Ti)-Total	1.0	0.3	0.7	0.9	0.3	0.3	0.1	0.2
Uranium (U)-Total	0.0016	0.0023	0.0023	0.0014	0.0012	0.0010	0.0009	0.0010
Vanadium (V)-Total	0.21	0.11	0.12	0.07	0.06	0.05	0.04	0.05
Zinc (Zn)-Total	9.0	4.0	5.6	8.1	4.9	4.9	3.5	5.4

Appendix 11d. Metal Concentrations in *Vaccinium* spp. (mg/kg wwt)

RESULTS OF ANALYSIS	Control Sites						
	Vaccinium spp.(7)	Vaccinium spp (6)	Vaccinium spp (5)	Vaccinium spp (4)	Vaccinium spp (2)		
Sample ID	18a	18b	19	20	23	Vaccinium-P241	Vaccinium-P254
ALS Sample ID	L716470-8	L716470-15	L716470-16	L716470-12	L716470-10	L813732-5	L813732-6
Date Sampled	18-08-09	18-08-09	18-08-09	18-08-09	18-08-09	25-Aug-09	27-Aug-09
UTM Zone	9 V	9 V	9 V	9 V	9 V	9 V	9 V
UTM Easting	408434	408434	408413	407716	407661	418391	410107
UTM Northing	6267739	6267739	6267780	6262175	6262122	6259750	6264670
Plot#	18	18	19	20	23	241	254
% Moisture	74.6	74.3	75.1	73.7	74.5	73.1	75.0
Metals							
Aluminum (Al)-Total	36.6	4.4	4.9	2.0	2.0	34.6	32.3
Antimony (Sb)-Total	0.005	0.005	0.010	0.010	0.010	0.005	0.005
Arsenic (As)-Total	0.045	0.005	0.010	0.010	0.010	0.005	0.005
Barium (Ba)-Total	15.9	2.0	4.5	2.6	1.9	32.6	25.1
Beryllium (Be)-Total	0.05	0.05	0.10	0.10	0.10	0.05	0.1
Bismuth (Bi)-Total	0.015	0.015	0.030	0.030	0.030	0.015	0.015
Cadmium (Cd)-Total	0.056	0.003	0.005	0.011	0.018	0.0025	0.0095
Calcium (Ca)-Total	1600	184	244	194	129	2420	2880
Chromium (Cr)-Total	0.05	0.05	0.10	0.10	0.10	0.05	0.05
Cobalt (Co)-Total	0.07	0.01	0.02	0.02	0.02	0.029	0.01
Copper (Cu)-Total	1.930	0.180	0.196	0.150	0.166	2.27	2.09
Iron (Fe)-Total	15.5	9.3	13.2	29.5	11.2	14.3	13.2
Lead (Pb)-Total	0.010	0.010	0.020	0.020	0.020	0.01	0.01
Lithium (Li)-Total	0.05	0.05	0.10	0.10	0.10	0.05	0.05
Magnesium (Mg)-Total	644.0	71.5	69.2	44.0	40.1	1110	1100
Manganese (Mn)-Total	166.0	25.3	32.8	7.4	28.3	145	147
Mercury (Hg)-Total	0.006	0.006	0.005	0.015	0.005	0.0109	0.0148
Molybdenum (Mo)-Total	0.026	0.005	0.010	0.010	0.010	0.073	0.047
Nickel (Ni)-Total	0.35	0.05	0.10	0.10	0.10	0.45	0.19
Phosphorus (P)-Total	258	266	348	267	343	561	446
Potassium (K)-Total	1830	1340	1790	2270	2720	2040	2010
Selenium (Se)-Total	0.100	0.100	0.200	0.200	0.200	0.1	0.1
Sodium (Na)-Total	52	143	10	22	65	10	10
Strontium (Sr)-Total	3.40	0.31	0.57	0.67	0.27	30.2	3.47
Thallium (Tl)-Total	0.005	0.005	0.010	0.010	0.010	0.005	0.005
Tin (Sn)-Total	0.03	0.03	0.05	0.05	0.05	0.025	0.025
Titanium (Ti)-Total	0.20	0.19	0.22	0.34	0.31	0.05	0.05
Uranium (U)-Total	0.001	0.001	0.002	0.002	0.002	0.001	0.001
Vanadium (V)-Total	0.05	0.05	0.10	0.10	0.10	0.05	0.05
Zinc (Zn)-Total	7.9	0.6	0.8	2.2	1.1	3.65	4.47

Appendix 11d. Metal Concentrations in *Vaccinium* spp. (mg/kg wwt)

RESULTS OF ANALYSIS	Infrastructure Sites												
Sample ID	Vaccinium spp (1) 5	Vaccinium spp (10)-12a	Vaccinium spp (9) 12b	Vaccinium spp (11)-12c	vaccinium-P213	Vaccinium-P217	Vaccinium-P219	Vaccinium-P222	Vaccinium-P257	Vaccinium-P259	Vaccinium-P261	304-vaccova-Lv	306-vaccova-Lv
ALS Sample ID	L716470-43	L716470-11	L716470-13	L716470-14	L813732-1	L813732-2	L813732-3	L813732-4	L813732-7	L813732-8	L813732-9	L834403-5	L834403-7
Date Sampled	19-Aug-08	18-Aug-08	18-Aug-08	18-Aug-08	20-Aug-09	21-Aug-09	21-Aug-09	22-Aug-09	28-Aug-09	28-Aug-09	29-Aug-09	19-Sep-09	19-Sep-09
UTM Zone	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V
UTM Easting	433626	421143	421143	421143	407029	407535	407603	408063	407464	407919	414058	444465	442774
UTM Northing	6277216	6265366	6265366	6265366	6274127	6267743	6264942	6263660	6271292	6269687	6262052	6275701	6277435
Plot#	5	12	12	12	213	217	219	222	257	259	261	304	306
% Moisture	69.3	65.2	61.8	61.7	70.4	83.1	78.8	78.0	80.4	82.9	81.6	68.80	67.30
Metals													
Aluminum (Al)-Total	40.5	2.00	2.00	3.20	37.7	48.7	50.3	49.4	27.2	42.8	16.8	64.6	54.3
Antimony (Sb)-Total	0.010	0.010	0.010	0.005	0.0100	0.005	0.005	0.005	0.005	0.005	0.005	0.008	0.008
Arsenic (As)-Total	0.010	0.010	0.010	0.005	0.0100	0.005	0.005	0.005	0.005	0.005	0.005	0.008	0.008
Barium (Ba)-Total	23.1	1.63	3.20	3.07	31.7	24.6	31.3	12.9	11.7	29.2	32.8	24.02	20.08
Beryllium (Be)-Total	0.10	0.10	0.10	0.05	0.1	0.1	0.05	0.05	0.05	0.05	0.05	0.047	0.049
Bismuth (Bi)-Total	0.030	0.030	0.030	0.015	0.03	0.015	0.015	0.015	0.015	0.015	0.015	0.047	0.049
Cadmium (Cd)-Total	0.018	0.005	0.005	0.003	0.005	0.0160	0.0094	0.0025	0.0050	0.0025	0.0084	0.005	0.010
Calcium (Ca)-Total	1310	198.0	199.0	176.0	2510	1580	2470	1680	1430	1850	2510	1835	2508
Chromium (Cr)-Total	0.10	0.10	0.10	0.05	0.1	0.05	0.05	0.1	0.05	0.05	0.05	0.6	0.1
Cobalt (Co)-Total	0.06	0.02	0.02	0.01	0.044	0.021	0.024	0.01	0.01	0.028	0.01	0.05	0.02
Copper (Cu)-Total	3.640	0.152	0.282	0.308	2.57	1.35	1.52	1.44	1.58	1.57	1.54	2.41	2.24
Iron (Fe)-Total	22.1	11.4	21.4	16.2	11.9	7.81	9.11	10.6	6.87	10.8	11.2	46.2	23.2
Lead (Pb)-Total	0.020	0.020	0.020	0.010	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.016	0.016
Lithium (Li)-Total	0.10	0.10	0.10	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.08	0.08
Magnesium (Mg)-Total	622.0	52.50	68.30	49.70	1300	588	1070	579	457	743	853	627	971
Manganese (Mn)-Total	410.0	17.50	51.90	43.30	457	111	172	144	153	108	213	564.72	434.91
Mercury (Hg)-Total	0.007	0.003	0.004	0.006	0.0121	0.0079	0.0137	0.0122	0.0098	0.0095	0.0163	0.004	0.004
Molybdenum (Mo)-Total	0.098	0.010	0.010	0.005	0.041	0.021	0.039	0.011	0.068	0.028	0.182	0.03	0.03
Nickel (Ni)-Total	0.77	0.10	0.10	0.05	0.45	0.13	0.24	0.33	0.33	0.35	0.18	1.02	0.61
Phosphorus (P)-Total	675	509.0	577.0	374.0	591	197	240	225	315	285	256	393	644
Potassium (K)-Total	1850	2450	2760	2110	2190	1810	2070	2340	1480	1770	1470	1757	4643
Selenium (Se)-Total	0.200	0.20	0.20	0.10	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.16	0.16
Sodium (Na)-Total	10	10	10	10	20	53	73	78	70	46	20	16	33
Strontium (Sr)-Total	10.50	0.25	0.30	0.37	6.47	4.22	14.0	3.16	6.86	30.6	10.3	3.15	4.91
Thallium (Tl)-Total	0.010	0.010	0.010	0.005	0.02	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Tin (Sn)-Total	0.050	0.050	0.050	0.025	0.05	0.025	0.025	0.025	0.025	0.025	0.025	0.031	0.033
Titanium (Ti)-Total	0.57	0.22	0.28	0.32	0.1	0.05	0.05	0.05	0.05	0.05	0.05	1.1	0.2
Uranium (U)-Total	0.0020	0.0020	0.0020	0.0010	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.0016	0.0016
Vanadium (V)-Total	0.100	0.10	0.10	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.08	0.08
Zinc (Zn)-Total	14.00	0.5	0.9	1.1	6.63	3.93	3.32	3.13	3.99	4.43	3.00	9.0	6.0

Appendix 11e. Metal Concentrations in *Valeriana sitchensis* (mg/kg wwt)

RESULTS OF ANALYSIS	Control Sites												
Sample ID	Valeriana sitchensis (3)-8	Valeriana sitchensis (4)-9	Valeriana sitchensis (11)-10a	Valeriana sitchensis (10)-10b	Valeriana sitchensis (21)-13e	Valeriana sitchensis (22)-13f	Valeriana sitchensis (23)-13g	Valeriana sitchensis (17)-14a	Valeriana sitchensis (15)-14b	Valeriana sitchensis (19)-15a	Valeriana sitchensis (20)-15b	Valeriana sitchensis (18)-15c	Valeriana sitchensis (30)-24a
ALS Sample ID	L716470-41	L716470-42	L716470-25	L716470-38	L716470-18	L716470-22	L716470-48	L716470-35	L716470-36	L716470-30	L716470-33	L716470-37	L716470-27
Date Sampled	17-Aug-08	17-Aug-08	19-Aug-08	19-Aug-08	19-08-09	19-Aug-08	19-Aug-08	19-Aug-08	19-Aug-08	19-Aug-08	19-Aug-08	19-Aug-08	19-Aug-08
UTM Zone	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V
UTM Easting	427201	426629	422360	422360	419931	419931	419931	419015	419015	415875	415875	415875	402840
UTM Northing	6280543	6279938	6260231	6260231	6264122	6264122	6264122	6259809	6259809	6264522	6264522	6264522	6273696
Plot#	8	9	10	10	13	13	13	14	14	15	15	15	24
% Moisture	83.7	83.8	82.9	84.1	83.2	82.6	82.6	83.6	84.6	83.5	83.7	82.3	85.2
Metals													
Aluminum (Al)-Total	3.5	3.3	5.3	4.4	1.0	5.4	4.3	5.2	4.5	8.2	6.1	6.6	4.9
Antimony (Sb)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Arsenic (As)-Total	0.005	0.005	0.014	0.044	0.005	0.005	0.005	0.005	0.005	0.005	0.017	0.005	0.005
Barium (Ba)-Total	4.59	3.92	8.85	4.55	0.49	3.68	4.35	5.49	5.62	5.40	7.32	11.00	3.99
Beryllium (Be)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Bismuth (Bi)-Total	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Cadmium (Cd)-Total	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.006	0.003	0.003	0.003	0.003
Calcium (Ca)-Total	1120.0	1430.0	806	1080	88	1110	1440	928	699	906	819	1170	692
Chromium (Cr)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cobalt (Co)-Total	0.04	0.01	0.032	0.028	0.010	0.042	0.033	0.070	0.022	0.021	0.066	0.044	0.029
Copper (Cu)-Total	0.58	0.50	0.59	0.90	0.06	0.56	0.58	0.87	0.63	0.86	0.56	0.76	0.58
Iron (Fe)-Total	5.4	3.8	6.9	8.1	5.0	8.0	5.1	7.4	5.3	10.5	10.4	7.6	5.4
Lead (Pb)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Lithium (Li)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Magnesium (Mg)-Total	287.0	189.0	404.0	424.0	40.6	346.0	332.0	439.0	346.0	443.0	556.0	775.0	461
Manganese (Mn)-Total	5.07	4.16	8.04	9.73	0.74	11.80	9.52	17.80	10.00	7.93	12.10	8.00	7.24
Mercury (Hg)-Total	0.002	0.001	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.003	0.002
Molybdenum (Mo)-Total	0.06	0.08	0.025	0.074	0.005	0.044	0.048	0.026	0.048	0.065	0.030	0.102	0.010
Nickel (Ni)-Total	0.5	0.3	0.41	0.39	0.05	0.58	0.55	0.75	1.15	0.60	0.92	0.65	0.58
Phosphorus (P)-Total	379	373	565	531	472	476	481	456	483	515	627	588	527
Potassium (K)-Total	3960	2990	4150	2160	3310	3490	4010	3360	2680	2540	3620	2370	3370
Selenium (Se)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Sodium (Na)-Total	10	10	10	10	10	10	10	10	10	10	10	10	10
Strontium (Sr)-Total	9.98	22.00	3.80	5.13	0.45	3.37	3.65	4.60	3.76	4.86	5.75	10.50	4.97
Thallium (Tl)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Tin (Sn)-Total	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Titanium (Ti)-Total	0.15	0.16	0.18	0.17	0.22	0.17	0.15	0.16	0.15	0.39	0.23	0.29	0.18
Uranium (U)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Vanadium (V)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Zinc (Zn)-Total	2.3	2.0	3.4	2.7	0.3	2.2	2.7	2.8	3.3	3.1	2.9	2.8	2.6

Appendix 11e. Metal Concentrations in *Valeriana sitchensis* (mg/kg wwt)

RESULTS OF ANALYSIS	Control Sites								Infrastructure Sites				
Sample ID	Valeriana sitchensis (31)-24b	Valeriana sitchensis (32)-24c	Valeriana sitchensis (24)-25a	Valeriana sitchensis (25)-25b	Valeriana sitchensis (26)-25c	Valeriana sitchensis (28)-26a	Valeriana sitchensis (27)-26b	Valeriana sitchensis (29)-26c	Valeriana sitchensis (1)-4	Valeriana sitchensis (2)-7	Valeriana sitchensis (13)-11a	Valeriana sitchensis (14)-11b	Valeriana sitchensis (12)-11c
ALS Sample ID	L716470-31	L716470-34	L716470-20	L716470-21	L716470-28	L716470-24	L716470-26	L716470-29	L716470-39	L716470-39	L716470-19	L716470-23	L716470-32
Date Sampled	19-Aug-08	19-Aug-08	19-Aug-08	19-Aug-08	19-Aug-08	19-Aug-08	19-Aug-08	19-Aug-08	17-Aug-08	17-Aug-08	19-Aug-08	19-Aug-08	19-Aug-08
UTM Zone	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V
UTM Easting	402840	40284	400194	400194	400194	395494	395494	395494	433634	432210	421306	421306	421306
UTM Northing	6273696	6273696	6259442	6259442	6259442	6254464	6254464	6254464	6277233	6277610	6263220	6263220	6263220
Plot#	24	24	25	25	25	26	26	26	4	7	11	11	11
% Moisture	86.3	82.9	82.8	84.0	84.9	86.5	84.4	87.0	86.1	82.8	84.4	85.3	85.3
Metals													
Aluminum (Al)-Total	4.1	4.4	1.0	3.9	4.4	3.3	3.9	2.9	4.3	4.6	1.0	3.6	3.4
Antimony (Sb)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Arsenic (As)-Total	0.005	0.005	0.005	0.005	0.014	0.005	0.005	0.005	0.017	0.005	0.005	0.014	0.005
Barium (Ba)-Total	2.29	5.84	0.51	5.71	3.71	4.23	3.89	3.39	3.69	5.61	1.37	7.93	7.99
Beryllium (Be)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Bismuth (Bi)-Total	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Cadmium (Cd)-Total	0.003	0.003	0.003	0.0025	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Calcium (Ca)-Total	490	785	93	904	739	1020	997	639	453.0	1320.0	89	1740	927
Chromium (Cr)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cobalt (Co)-Total	0.022	0.033	0.010	0.051	0.010	0.043	0.037	0.033	0.03	0.02	0.010	0.010	0.010
Copper (Cu)-Total	0.63	0.68	0.06	0.80	0.67	0.67	0.70	0.66	0.59	0.61	0.07	0.76	0.66
Iron (Fe)-Total	4.8	5.7	5.4	5.5	6.0	4.9	5.1	4.8	5.3	5.0	6.4	7.3	5.5
Lead (Pb)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Lithium (Li)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Magnesium (Mg)-Total	421	621	52	556.0	544	433	397	386	367.0	426.0	28.3	278.0	269.0
Manganese (Mn)-Total	6.37	6.86	0.95	5.94	6.21	4.01	8.91	4.49	5.03	5.28	0.88	4.66	6.32
Mercury (Hg)-Total	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.002	0.002	0.002
Molybdenum (Mo)-Total	0.019	0.035	0.005	0.032	0.035	0.018	0.005	0.018	0.03	0.02	0.017	0.172	0.031
Nickel (Ni)-Total	0.42	0.28	0.05	0.77	0.46	0.56	0.82	0.44	1.2	2.4	0.05	0.48	0.51
Phosphorus (P)-Total	489	525	510	512	530	430	430	403	536	455	411	472	353
Potassium (K)-Total	3030	2330	3570	2830	3080	2430	3460	2860	3180	2860	3040	3280	1640
Selenium (Se)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Sodium (Na)-Total	10	10	10	10	10	10	10	10	10	10	10	10	10
Strontium (Sr)-Total	2.97	5.56	0.53	6.83	4.63	6.54	5.49	4.72	4.00	10.40	0.45	7.92	4.23
Thallium (Tl)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Tin (Sn)-Total	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Titanium (Ti)-Total	0.15	0.23	0.24	0.14	0.18	0.15	0.19	0.12	0.11	0.17	0.16	0.23	0.15
Uranium (U)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Vanadium (V)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Zinc (Zn)-Total	2.2	3.0	0.3	3.3	2.7	2.7	2.9	2.5	2.1	2.5	0.3	3.9	2.3

Appendix 11f. Metal Concentrations in *Vaccinium* spp. (berries) (mg/kg wwt)

RESULTS OF ANALYSIS	Control Sites					Infrastructure Sites				
Sample ID	324-Vacc-Br	325-Vacc-Br	327-Vacc-Br	328-Vacc-Br	329-Vacc-Br	302-Vaccova-Br	308-Vaccova-Br	310-Vaccova-Br	313-Vaccova-Br	319-Vaccova-Br
ALS Sample ID	L834403-21	L834403-26	L834403-29	L834403-32	L834403-36	L834403-2	L834403-8	L834403-11	L834403-14	L834403-17
Date Sampled	24-Sep-09	24-Sep-09	24-Sep-09	24-Sep-09	24-Sep-09	19-Sep-09	20-Sep-09	20-Sep-09	21-Sep-09	23-Sep-09
UTM Zone	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V	9 V
UTM Easting	405727	408020	405053	403778	404414	444973	442506	441245	419031	440594
UTM Northing	6264370	6260896	6263732	6268294	6272315	6275505	6276952	6278280	6262603	6278843
Plot#	324	325	327	328	329	302	308	310	313	319
% Moisture	92.30	92.90	92.10	91.70	91.70	91.50	89.60	90.50	91.40	90.40
Metals										
Aluminum (Al)-Total	2.5	0.7	2.5	3.9	3.9	24.7	5.5	6.4	4.0	2.1
Antimony (Sb)-Total	0.004	0.004	0.004	0.004	0.002	0.004	0.005	0.005	0.004	0.002
Arsenic (As)-Total	0.004	0.004	0.004	0.004	0.002	0.010	0.005	0.005	0.004	0.002
Barium (Ba)-Total	1.54	0.96	2.28	1.19	2.00	3.32	1.88	1.74	2.62	1.17
Beryllium (Be)-Total	0.023	0.021	0.024	0.025	0.012	0.026	0.031	0.029	0.026	0.014
Bismuth (Bi)-Total	0.023	0.021	0.024	0.025	0.012	0.026	0.031	0.029	0.026	0.014
Cadmium (Cd)-Total	0.002	0.002	0.002	0.002	0.001	0.006	0.003	0.003	0.003	0.001
Calcium (Ca)-Total	136	177	260	148	182	260	188	75	135	139
Chromium (Cr)-Total	0.04	0.04	0.04	0.04	0.02	0.2	0.1	0.0	0.0	0.0
Cobalt (Co)-Total	0.008	0.007	0.008	0.008	0.004	0.03	0.01	0.01	0.01	0.00
Copper (Cu)-Total	0.68	0.23	1.27	0.74	0.99	1.29	0.93	0.76	1.10	0.67
Iron (Fe)-Total	2.3	2.0	2.3	2.0	2.2	27.7	5.3	3.1	2.0	1.8
Lead (Pb)-Total	0.008	0.007	0.008	0.008	0.004	0.009	0.010	0.010	0.009	0.005
Lithium (Li)-Total	0.04	0.04	0.04	0.04	0.02	0.04	0.05	0.05	0.04	0.02
Magnesium (Mg)-Total	74	51	110	78	86	137	101	83	132	103
Manganese (Mn)-Total	10.55	11.64	16.35	4.52	6.08	71.06	38.27	16.15	3.84	8.16
Mercury (Hg)-Total	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Molybdenum (Mo)-Total	0.025	0.040	0.375	0.035	0.070	0.09	0.05	0.04	0.19	0.03
Nickel (Ni)-Total	0.04	0.04	0.04	0.04	0.05	0.39	0.14	0.17	0.09	0.13
Phosphorus (P)-Total	161	130	168	158	188	284	244	102	104	189
Potassium (K)-Total	708	559	916	679	770	1063	1144	917	903	790
Selenium (Se)-Total	0.1	0.1	0.1	0.1	0.0	0.09	0.10	0.10	0.09	0.05
Sodium (Na)-Total	8	7	8	8	8	4	16	10	9	10
Strontium (Sr)-Total	0.62	0.42	0.60	0.75	0.59	1.09	0.41	0.56	0.54	0.37
Thallium (Tl)-Total	0.002	0.002	0.002	0.002	0.001	0.003	0.003	0.003	0.003	0.001
Tin (Sn)-Total	0.083	0.014	0.016	0.017	0.008	0.017	0.021	0.019	0.017	0.010
Titanium (Ti)-Total	0.04	0.04	0.04	0.04	0.04	0.3	0.1	0.1	0.0	0.0
Uranium (U)-Total	0.001	0.001	0.001	0.001	0.000	0.0009	0.0010	0.0010	0.0009	0.0005
Vanadium (V)-Total	0.04	0.04	0.04	0.04	0.02	0.04	0.05	0.05	0.04	0.02
Zinc (Zn)-Total	1.1	1.0	1.8	1.3	1.5	2.2	1.5	1.3	1.0	1.2

Appendix 12

Plant Tissue Metals Analysis – Detection Limits

SEABRIDGE GOLD

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Appendix 12a. Metals Sampling of *Rubus Ideaus* Tissue - DETECTION LIMITS (wet weight)

	Control Sites						Infrastructure Sites				
Sample ID	Rubus idaeus (8)-16	Rubus idaeus (8)-17	Rubus idaeus (6)-21	Rubus idaeus (5)-22	326-Rubusida-Lv	327-Rubusida Lv	Rubus idaeus (4)-1	Rubus idaeus (3)-2	Rubus idaeus (2)-3	Rubus idaeus (1)- 6	321-Rubuida-Lv
Date Sampled	18-AUG-08	18-AUG-08	18-AUG-08	18-AUG-08	24-SEP-09	24-SEP-09	18-AUG-08	18-AUG-08	18-AUG-08	18-08-09	23-SEP-09
ALS Sample ID	L716470-2	L716470-7	L716470-4	L716470-1	L834403-28	L834403-31	L716470-6	L716470-3	L716470-5	L716470-47	L834403-19
% Moisture	0.1	0.1	0.1	0.1	0.10	0.10	0.1	0.1	0.1	0.1	0.10
Metals											
Aluminum (Al)-Total	2	2	2	2	2.32	2.47	2	2	2	4	2.03
Antimony (Sb)-Total	0.01	0.01	0.01	0.01	0.0116	0.01235	0.01	0.01	0.01	0.02	0.01015
Arsenic (As)-Total	0.01	0.01	0.01	0.01	0.0116	0.01235	0.01	0.01	0.01	0.02	0.01015
Barium (Ba)-Total	0.01	0.01	0.01	0.01	0.0116	0.01235	0.01	0.01	0.01	0.02	0.01015
Beryllium (Be)-Total	0.1	0.1	0.1	0.1	0.0696	0.0741	0.1	0.1	0.1	0.2	0.0609
Bismuth (Bi)-Total	0.03	0.03	0.03	0.03	0.0696	0.0741	0.03	0.03	0.03	0.06	0.0609
Cadmium (Cd)-Total	0.005	0.005	0.005	0.005	0.00696	0.00741	0.005	0.005	0.005	0.01	0.00609
Calcium (Ca)-Total	2	2	2	2	2.32	2.47	2	2	2	4	2.03
Chromium (Cr)-Total	0.1	0.1	0.1	0.1	0.116	0.1235	0.1	0.1	0.1	0.2	0.1015
Cobalt (Co)-Total	0.02	0.02	0.02	0.02	0.0232	0.0247	0.02	0.02	0.02	0.04	0.0203
Copper (Cu)-Total	0.01	0.01	0.01	0.01	0.0116	0.01235	0.01	0.01	0.01	0.02	0.01015
Iron (Fe)-Total	0.2	0.2	0.2	0.2	0.232	0.247	0.2	0.2	0.2	0.2	0.203
Lead (Pb)-Total	0.02	0.02	0.02	0.02	0.0232	0.0247	0.02	0.02	0.02	0.04	0.0203
Lithium (Li)-Total	0.1	0.1	0.1	0.1	0.116	0.1235	0.1	0.1	0.1	0.2	0.1015
Magnesium (Mg)-Total	1	1	1	1	0.696	0.741	1	1	1	2	0.609
Manganese (Mn)-Total	0.01	0.01	0.01	0.01	0.0116	0.01235	0.01	0.01	0.01	0.01	0.01015
Mercury (Hg)-Total	0.001	0.001	0.001	0.001	0.00116	0.001235	0.001	0.001	0.001	0.001	0.001015
Molybdenum (Mo)-Total	0.01	0.01	0.01	0.01	0.0116	0.01235	0.01	0.01	0.01	0.02	0.01015
Nickel (Ni)-Total	0.1	0.1	0.1	0.1	0.116	0.1235	0.1	0.1	0.1	0.2	0.1015
Phosphorus (P)-Total	5	5	5	5	4.64	4.94	5	5	5	5	4.06
Potassium (K)-Total	20	20	20	20	23.2	24.7	20	20	20	20	20.3
Selenium (Se)-Total	0.2	0.2	0.2	0.2	0.232	0.247	0.2	0.2	0.2	0.4	0.203
Sodium (Na)-Total	20	20	20	20	23.2	24.7	20	20	20	20	20.3
Strontium (Sr)-Total	0.01	0.01	0.01	0.01	0.0116	0.01235	0.01	0.01	0.01	0.02	0.01015
Thallium (Tl)-Total	0.01	0.01	0.01	0.01	0.00696	0.00741	0.01	0.01	0.01	0.02	0.00609
Tin (Sn)-Total	0.05	0.05	0.05	0.05	0.0464	0.0494	0.05	0.05	0.05	0.1	0.0406
Titanium (Ti)-Total	0.1	0.1	0.1	0.1	0.116	0.1235	0.1	0.1	0.1	0.1	0.1015
Uranium (U)-Total	0.002	0.002	0.002	0.002	0.00232	0.00247	0.002	0.002	0.002	0.004	0.00203
Vanadium (V)-Total	0.1	0.1	0.1	0.1	0.116	0.1235	0.1	0.1	0.1	0.2	0.1015
Zinc (Zn)-Total	0.1	0.1	0.1	0.1	0.116	0.1235	0.1	0.1	0.1	0.2	0.1015

Appendix 12b. Metals Sampling of *Salix* spp. Tissue - DETECTION LIMITS (wet weight)

	Control Sites								Infrastructure Sites						
Sample ID	Salix-P216	Salix-P270	324-Salix SP	325-Salix SP	326-Salix SP	328-Salix SP	329-Salix SP	330-Salix SP	Salix-P215	Salix-P227	Salix-P250	Salix-P263	302-Salix-LV	312-Salix SP	317-Salix-LV
Date Sampled	20-AUG-09	30-AUG-09	24-SEP-09	24-SEP-09	24-SEP-09	24-SEP-09	24-SEP-09	24-SEP-09	20-AUG-09	23-AUG-09	26-AUG-09	29-AUG-09	19-SEP-09	21-SEP-09	22-SEP-09
ALS Sample ID	L813732-11	L813732-15	L834403-22	L834403-24	L834403-27	L834403-34	L834403-37	L834403-38	L813732-10	L813732-12	L813732-13	L813732-14	L834403-3	L834403-12	L834403-16
% Moisture	0.1	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.1	0.1	0.1	0.1	0.10	0.10	0.10
Metals															
Aluminum (Al)-Total	2	2	2.6	3.8	2.36	3.48	3.06	15.05	2	2	4	2	2.89	3.18	2.19
Antimony (Sb)-Total	0.01	0.01	0.013	0.019	0.0118	0.0174	0.0153	0.07525	0.01	0.01	0.02	0.01	0.01445	0.0159	0.01095
Arsenic (As)-Total	0.01	0.01	0.013	0.019	0.0118	0.0174	0.0153	0.07525	0.01	0.01	0.02	0.01	0.01445	0.0159	0.01095
Barium (Ba)-Total	0.01	0.01	0.013	0.019	0.0118	0.0174	0.0153	0.07525	0.01	0.01	0.02	0.01	0.01445	0.0159	0.01095
Beryllium (Be)-Total	0.1	0.1	0.078	0.114	0.0708	0.1044	0.0918	0.4515	0.1	0.1	0.2	0.1	0.0867	0.0954	0.0657
Bismuth (Bi)-Total	0.03	0.03	0.078	0.114	0.0708	0.1044	0.0918	0.4515	0.03	0.03	0.06	0.03	0.0867	0.0954	0.0657
Cadmium (Cd)-Total	0.005	0.005	0.0078	0.0114	0.00708	0.01044	0.00918	0.04515	0.005	0.005	0.01	0.005	0.00867	0.00954	0.00657
Calcium (Ca)-Total	2	2	2.6	3.8	2.36	3.48	3.06	15.05	2	2	4	2	2.89	3.18	2.19
Chromium (Cr)-Total	0.1	0.1	0.13	0.19	0.118	0.174	0.153	0.7525	0.1	0.1	0.2	0.1	0.1445	0.159	0.1095
Cobalt (Co)-Total	0.02	0.02	0.026	0.038	0.0236	0.0348	0.0306	0.1505	0.02	0.02	0.04	0.02	0.0289	0.0318	0.0219
Copper (Cu)-Total	0.01	0.01	0.013	0.019	0.0118	0.0174	0.0153	0.07525	0.01	0.01	0.02	0.01	0.01445	0.0159	0.01095
Iron (Fe)-Total	0.2	0.2	0.26	0.38	0.236	0.348	0.306	0.301	0.4	0.2	0.4	0.2	0.289	0.318	0.219
Lead (Pb)-Total	0.02	0.02	0.026	0.038	0.0236	0.0348	0.0306	0.1505	0.02	0.02	0.04	0.02	0.0289	0.0318	0.0219
Lithium (Li)-Total	0.1	0.1	0.13	0.19	0.118	0.174	0.153	0.7525	0.1	0.1	0.2	0.1	0.1445	0.159	0.1095
Magnesium (Mg)-Total	1	1	0.78	1.14	0.708	1.044	0.918	4.515	1	1	2	1	0.867	0.954	0.657
Manganese (Mn)-Total	0.01	0.01	0.013	0.019	0.0118	0.0174	0.0153	0.07525	0.01	0.01	0.02	0.01	0.01445	0.0159	0.01095
Mercury (Hg)-Total	0.001	0.001	0.0013	0.0019	0.00118	0.00174	0.00153	0.001505	0.001	0.001	0.001	0.001	0.001445	0.00159	0.001095
Molybdenum (Mo)-Total	0.01	0.01	0.013	0.019	0.0118	0.0174	0.0153	0.07525	0.01	0.01	0.02	0.01	0.01445	0.0159	0.01095
Nickel (Ni)-Total	0.1	0.1	0.13	0.19	0.118	0.174	0.153	0.7525	0.1	0.1	0.2	0.1	0.1445	0.159	0.1095
Phosphorus (P)-Total	5	5	5.2	7.6	4.72	6.96	6.12	6.02	10	5	10	5	5.78	6.36	4.38
Potassium (K)-Total	20	20	26	38	23.6	34.8	30.6	30.1	40	20	40	20	28.9	31.8	21.9
Selenium (Se)-Total	0.2	0.2	0.26	0.38	0.236	0.348	0.306	1.505	0.2	0.2	0.4	0.2	0.289	0.318	0.219
Sodium (Na)-Total	20	20	26	38	23.6	34.8	30.6	30.1	40	20	40	20	28.9	31.8	21.9
Strontium (Sr)-Total	0.01	0.01	0.013	0.019	0.0118	0.0174	0.0153	0.07525	0.01	0.01	0.02	0.01	0.01445	0.0159	0.01095
Thallium (Tl)-Total	0.01	0.01	0.0078	0.0114	0.00708	0.01044	0.00918	0.04515	0.01	0.01	0.02	0.01	0.00867	0.00954	0.00657
Tin (Sn)-Total	0.05	0.05	0.052	0.076	0.0472	0.0696	0.0612	0.301	0.05	0.05	0.1	0.05	0.0578	0.0636	0.0438
Titanium (Ti)-Total	0.1	0.1	0.13	0.19	0.118	0.174	0.153	0.1505	0.2	0.1	0.2	0.1	0.1445	0.159	0.1095
Uranium (U)-Total	0.002	0.002	0.0026	0.0038	0.00236	0.00348	0.00306	0.01505	0.002	0.002	0.004	0.002	0.00289	0.00318	0.00219
Vanadium (V)-Total	0.1	0.1	0.13	0.19	0.118	0.174	0.153	0.7525	0.1	0.1	0.2	0.1	0.1445	0.159	0.1095
Zinc (Zn)-Total	0.1	0.1	0.13	0.19	0.118	0.174	0.153	0.7525	0.1	0.1	0.2	0.1	0.1445	0.159	0.1095

Appendix 12c. Metals Sampling of *Vaccinium* membranaceum Tissue - DETECTION LIMITS (wet weight)

	Control Sites									
Sample ID	Vaccinium membranaceum (1)-13a	Vaccinium membranaceum (2)-13b	Vaccinium membranaceum (3)-13c	Vaccinium membranaceum (3)-13d	324-Vaccmem-Lv	325-Vaccmem-Lv	327-Vaccmem-Lv	328-Vaccmem-Lv	329-Vaccmem-Lv	330-Vaccmem-Lv
Date Sampled	19-AUG-08	19-AUG-08	19-AUG-08	18-AUG-08	24-SEP-09	24-SEP-09	24-SEP-09	24-SEP-09	24-SEP-09	24-SEP-09
ALS Sample ID	L716470-43	L716470-44	L716470-45	L716470-17	L834403-23	L834403-25	L834403-30	L834403-33	L834403-36	L834403-39
% Moisture	0.1	0.1	0.1	0.1	0.10	0.10	0.10	0.10	0.10	0.10
Metals										
Aluminum (Al)-Total	4	4	4	2	3.24	2.86	2.55	2.71	3.07	3.14
Antimony (Sb)-Total	0.02	0.02	0.02	0.01	0.0162	0.0143	0.01275	0.01355	0.01535	0.0157
Arsenic (As)-Total	0.02	0.02	0.02	0.01	0.0162	0.0143	0.01275	0.01355	0.01535	0.0157
Barium (Ba)-Total	0.02	0.02	0.02	0.01	0.0162	0.0143	0.01275	0.01355	0.01535	0.0157
Beryllium (Be)-Total	0.2	0.2	0.2	0.1	0.0972	0.0858	0.0765	0.0813	0.0921	0.0942
Bismuth (Bi)-Total	0.06	0.06	0.06	0.03	0.0972	0.0858	0.0765	0.0813	0.0921	0.0942
Cadmium (Cd)-Total	0.01	0.01	0.01	0.005	0.00972	0.00858	0.00765	0.00813	0.00921	0.00942
Calcium (Ca)-Total	4	4	4	2	3.24	2.86	2.55	2.71	3.07	3.14
Chromium (Cr)-Total	0.2	0.2	0.2	0.1	0.162	0.143	0.1275	0.1355	0.1535	0.157
Cobalt (Co)-Total	0.04	0.04	0.04	0.02	0.0324	0.0286	0.0255	0.0271	0.0307	0.0314
Copper (Cu)-Total	0.02	0.02	0.02	0.01	0.0162	0.0143	0.01275	0.01355	0.01535	0.0157
Iron (Fe)-Total	0.2	0.2	0.2	0.2	0.324	0.286	0.255	0.271	0.307	0.314
Lead (Pb)-Total	0.04	0.04	0.04	0.02	0.0324	0.0286	0.0255	0.0271	0.0307	0.0314
Lithium (Li)-Total	0.2	0.2	0.2	0.1	0.162	0.143	0.1275	0.1355	0.1535	0.157
Magnesium (Mg)-Total	2	2	2	1	0.972	0.858	0.765	0.813	0.921	0.942
Manganese (Mn)-Total	0.02	0.02	0.02	0.01	0.0162	0.0143	0.01275	0.01355	0.01535	0.0157
Mercury (Hg)-Total	0.001	0.001	0.001	0.001	0.00162	0.00143	0.001275	0.001355	0.001535	0.00157
Molybdenum (Mo)-Total	0.02	0.02	0.02	0.01	0.0162	0.0143	0.01275	0.01355	0.01535	0.0157
Nickel (Ni)-Total	0.2	0.2	0.2	0.1	0.162	0.143	0.1275	0.1355	0.1535	0.157
Phosphorus (P)-Total	5	5	5	5	6.48	5.72	5.1	5.42	6.14	6.28
Potassium (K)-Total	20	20	20	20	32.4	28.6	25.5	27.1	30.7	31.4
Selenium (Se)-Total	0.4	0.4	0.4	0.2	0.324	0.286	0.255	0.271	0.307	0.314
Sodium (Na)-Total	20	20	20	20	32.4	28.6	25.5	27.1	30.7	31.4
Strontium (Sr)-Total	0.02	0.02	0.02	0.01	0.0162	0.0143	0.01275	0.01355	0.01535	0.0157
Thallium (Tl)-Total	0.02	0.02	0.02	0.01	0.00972	0.00858	0.00765	0.00813	0.00921	0.00942
Tin (Sn)-Total	0.1	0.1	0.1	0.05	0.0648	0.0572	0.051	0.0542	0.0614	0.0628
Titanium (Ti)-Total	0.1	0.1	0.1	0.1	0.162	0.143	0.1275	0.1355	0.1535	0.157
Uranium (U)-Total	0.004	0.004	0.004	0.002	0.00324	0.00286	0.00255	0.00271	0.00307	0.00314
Vanadium (V)-Total	0.2	0.2	0.2	0.1	0.162	0.143	0.1275	0.1355	0.1535	0.157
Zinc (Zn)-Total	0.2	0.2	0.2	0.1	0.162	0.143	0.1275	0.1355	0.1535	0.157

Appendix 12c. Metals Sampling of Vaccinium membranaceum Tissue - DETECTION LIMITS (wet weight)

	Infrastructure Sites							
Sample ID	302-Vaccmem-Lv	306-Vaccmem-Lv	308-Vaccmem-Lv	310-Vaccmem-Lv	313-Vaccmem-Lv	317-Vaccmem-Lv	319-Vaccmem-Lv	322-Vaccmem-Lv
Date Sampled	19-SEP-09	20-SEP-09	20-SEP-09	20-SEP-09	21-SEP-09	22-SEP-09	23-SEP-09	23-SEP-09
ALS Sample ID	L834403-1	L834403-6	L834403-9	L834403-10	L834403-13	L834403-15	L834403-18	L834403-20
% Moisture	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Metals								
Aluminum (Al)-Total	3.29	4.5	4.68	2.89	2.39	1.91	1.75	2.09
Antimony (Sb)-Total	0.01645	0.0225	0.0234	0.01445	0.01195	0.00955	0.00875	0.01045
Arsenic (As)-Total	0.01645	0.0225	0.0234	0.01445	0.01195	0.00955	0.00875	0.01045
Barium (Ba)-Total	0.01645	0.0225	0.0234	0.01445	0.01195	0.00955	0.00875	0.01045
Beryllium (Be)-Total	0.0987	0.135	0.1404	0.0867	0.0717	0.0573	0.0525	0.0627
Bismuth (Bi)-Total	0.0987	0.135	0.1404	0.0867	0.0717	0.0573	0.0525	0.0627
Cadmium (Cd)-Total	0.00987	0.0135	0.01404	0.00867	0.00717	0.00573	0.00525	0.00627
Calcium (Ca)-Total	3.29	4.5	4.68	2.89	2.39	1.91	1.75	2.09
Chromium (Cr)-Total	0.1645	0.225	0.234	0.1445	0.1195	0.0955	0.0875	0.1045
Cobalt (Co)-Total	0.0329	0.045	0.0468	0.0289	0.0239	0.0191	0.0175	0.0209
Copper (Cu)-Total	0.01645	0.0225	0.0234	0.01445	0.01195	0.00955	0.00875	0.01045
Iron (Fe)-Total	0.329	0.225	0.468	0.289	0.239	0.191	0.175	0.209
Lead (Pb)-Total	0.0329	0.045	0.0468	0.0289	0.0239	0.0191	0.0175	0.0209
Lithium (Li)-Total	0.1645	0.225	0.234	0.1445	0.1195	0.0955	0.0875	0.1045
Magnesium (Mg)-Total	0.987	1.35	1.404	0.867	0.717	0.573	0.525	0.627
Manganese (Mn)-Total	0.01645	0.0225	0.0234	0.01445	0.01195	0.00955	0.00875	0.01045
Mercury (Hg)-Total	0.001645	0.001125	0.00117	0.001445	0.001195	0.000955	0.000875	0.001045
Molybdenum (Mo)-Total	0.01645	0.0225	0.0234	0.01445	0.01195	0.00955	0.00875	0.01045
Nickel (Ni)-Total	0.1645	0.225	0.234	0.1445	0.1195	0.0955	0.0875	0.1045
Phosphorus (P)-Total	6.58	4.5	9.36	5.78	4.78	3.82	3.5	4.18
Potassium (K)-Total	32.9	22.5	46.8	28.9	23.9	19.1	17.5	20.9
Selenium (Se)-Total	0.329	0.45	0.468	0.289	0.239	0.191	0.175	0.209
Sodium (Na)-Total	32.9	22.5	46.8	28.9	23.9	19.1	17.5	20.9
Strontium (Sr)-Total	0.01645	0.0225	0.0234	0.01445	0.01195	0.00955	0.00875	0.01045
Thallium (Tl)-Total	0.00987	0.0135	0.01404	0.00867	0.00717	0.00573	0.00525	0.00627
Tin (Sn)-Total	0.0658	0.09	0.0936	0.0578	0.0478	0.0382	0.035	0.0418
Titanium (Ti)-Total	0.1645	0.1125	0.234	0.1445	0.1195	0.0955	0.0875	0.1045
Uranium (U)-Total	0.00329	0.0045	0.00468	0.00289	0.00239	0.00191	0.00175	0.00209
Vanadium (V)-Total	0.1645	0.225	0.234	0.1445	0.1195	0.0955	0.0875	0.1045
Zinc (Zn)-Total	0.1645	0.225	0.234	0.1445	0.1195	0.0955	0.0875	0.1045

Appendix 12d. Metals Sampling of *Vaccinium* spp. Tissue - DETECTION LIMITS (wet weight)

	Control Sites							Infrastructure Sites					
Sample ID	Vaccinium spp.(7)-18a	Vaccinium spp (6)-18b	Vaccinium spp (5)-19	Vaccinium spp (4)-20	Vaccinium spp (2)-23	Vaccinium-P241	Vaccinium-P254	Vaccinium spp (1)-5	Vaccinium spp (10)-12a	Vaccinium spp (9)-12b	Vaccinium spp (11)-12c	Vaccinium-P213	Vaccinium-P217
Date Sampled	18-AUG-08	18-AUG-08	18-AUG-08	18-AUG-08	18-AUG-08	25-AUG-09	27-AUG-09	19-AUG-08	18-AUG-08	18-AUG-08	18-AUG-08	20-AUG-09	21-AUG-09
ALS Sample ID	L716470-8	L716470-15	L716470-16	L716470-12	L716470-10	L813732-5	L813732-6	L716470-46	L716470-11	L716470-13	L716470-14	L813732-1	L813732-2
% Moisture	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Metals													
Aluminum (Al)-Total	2	2	4	4	4	2	2	4	4	4	2	4	2
Antimony (Sb)-Total	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.01
Arsenic (As)-Total	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.01
Barium (Ba)-Total	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.01
Beryllium (Be)-Total	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.1
Bismuth (Bi)-Total	0.03	0.03	0.06	0.06	0.06	0.03	0.03	0.06	0.06	0.06	0.03	0.06	0.03
Cadmium (Cd)-Total	0.005	0.005	0.01	0.01	0.01	0.005	0.005	0.01	0.01	0.01	0.005	0.01	0.005
Calcium (Ca)-Total	2	2	4	4	4	2	2	4	4	4	2	4	2
Chromium (Cr)-Total	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.1
Cobalt (Co)-Total	0.02	0.02	0.04	0.04	0.04	0.02	0.02	0.04	0.04	0.04	0.02	0.04	0.02
Copper (Cu)-Total	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.01
Iron (Fe)-Total	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.2
Lead (Pb)-Total	0.02	0.02	0.04	0.04	0.04	0.02	0.02	0.04	0.04	0.04	0.02	0.04	0.02
Lithium (Li)-Total	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.1
Magnesium (Mg)-Total	1	1	2	2	2	1	1	2	2	2	1	2	1
Manganese (Mn)-Total	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.01
Mercury (Hg)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Molybdenum (Mo)-Total	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.01
Nickel (Ni)-Total	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.1
Phosphorus (P)-Total	5	5	5	5	5	5	5	5	5	5	5	10	5
Potassium (K)-Total	20	20	20	20	20	20	20	20	20	20	20	40	20
Selenium (Se)-Total	0.2	0.2	0.4	0.4	0.4	0.2	0.2	0.4	0.4	0.4	0.2	0.4	0.2
Sodium (Na)-Total	20	20	20	20	20	20	20	20	20	20	20	40	20
Strontium (Sr)-Total	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.01
Thallium (Tl)-Total	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.01
Tin (Sn)-Total	0.05	0.05	0.1	0.1	0.1	0.05	0.05	0.1	0.1	0.1	0.05	0.1	0.05
Titanium (Ti)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1
Uranium (U)-Total	0.002	0.002	0.004	0.004	0.004	0.002	0.002	0.004	0.004	0.004	0.002	0.004	0.002
Vanadium (V)-Total	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.1
Zinc (Zn)-Total	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.1

Appendix 12d. Metals Sampling of *Vaccinium* spp. Tissue - DETECTION LIMITS (wet weight)

	Infrastructure Sites						
Sample ID	Vaccinium-P219	Vaccinium-P222	Vaccinium-P257	Vaccinium-P259	Vaccinium-P261	304-Vaccova-Lv	306-Vaccova-Lv
Date Sampled	21-AUG-09	22-AUG-09	28-AUG-09	28-AUG-09	29-AUG-09	19-SEP-09	20-SEP-09
ALS Sample ID	L813732-3	L813732-4	L813732-7	L813732-8	L813732-9	L834403-5	L834403-7
% Moisture	0.1	0.1	0.1	0.1	0.1	0.10	0.10
Metals							
Aluminum (Al)-Total	2	2	2	2	2	3.12	3.27
Antimony (Sb)-Total	0.01	0.01	0.01	0.01	0.01	0.0156	0.01635
Arsenic (As)-Total	0.01	0.01	0.01	0.01	0.01	0.0156	0.01635
Barium (Ba)-Total	0.01	0.01	0.01	0.01	0.01	0.0156	0.01635
Beryllium (Be)-Total	0.1	0.1	0.1	0.1	0.1	0.0936	0.0981
Bismuth (Bi)-Total	0.03	0.03	0.03	0.03	0.03	0.0936	0.0981
Cadmium (Cd)-Total	0.005	0.005	0.005	0.005	0.005	0.00936	0.00981
Calcium (Ca)-Total	2	2	2	2	2	3.12	3.27
Chromium (Cr)-Total	0.1	0.1	0.1	0.1	0.1	0.156	0.1635
Cobalt (Co)-Total	0.02	0.02	0.02	0.02	0.02	0.0312	0.0327
Copper (Cu)-Total	0.01	0.01	0.01	0.01	0.01	0.0156	0.01635
Iron (Fe)-Total	0.2	0.2	0.2	0.2	0.2	0.312	0.654
Lead (Pb)-Total	0.02	0.02	0.02	0.02	0.02	0.0312	0.0327
Lithium (Li)-Total	0.1	0.1	0.1	0.1	0.1	0.156	0.1635
Magnesium (Mg)-Total	1	1	1	1	1	0.936	0.981
Manganese (Mn)-Total	0.01	0.01	0.01	0.01	0.01	0.0156	0.01635
Mercury (Hg)-Total	0.001	0.001	0.001	0.001	0.001	0.00156	0.001635
Molybdenum (Mo)-Total	0.01	0.01	0.01	0.01	0.01	0.0156	0.01635
Nickel (Ni)-Total	0.1	0.1	0.1	0.1	0.1	0.156	0.1635
Phosphorus (P)-Total	5	5	5	5	5	6.24	13.08
Potassium (K)-Total	20	20	20	20	20	31.2	65.4
Selenium (Se)-Total	0.2	0.2	0.2	0.2	0.2	0.312	0.327
Sodium (Na)-Total	20	20	20	20	20	31.2	65.4
Strontium (Sr)-Total	0.01	0.01	0.01	0.01	0.01	0.0156	0.01635
Thallium (Tl)-Total	0.01	0.01	0.01	0.01	0.01	0.00936	0.00981
Tin (Sn)-Total	0.05	0.05	0.05	0.05	0.05	0.0624	0.0654
Titanium (Ti)-Total	0.1	0.1	0.1	0.1	0.1	0.156	0.327
Uranium (U)-Total	0.002	0.002	0.002	0.002	0.002	0.00312	0.00327
Vanadium (V)-Total	0.1	0.1	0.1	0.1	0.1	0.156	0.1635
Zinc (Zn)-Total	0.1	0.1	0.1	0.1	0.1	0.156	0.1635

Appendix 12e. Metals Sampling of *Valeriana sitchensis* Tissue - DETECTION LIMITS (wet weight)

	Control Sites												
Sample ID	Valeriana sitchensis (3)-8	Valeriana sitchensis (4)-9	Valeriana sitchensis (11)-10a	Valeriana sitchensis (10)-10b	Valeriana sitchensis (21)-13e	Valeriana sitchensis (22)-13f	Valeriana sitchensis (23)-13g	Valeriana sitchensis (17)-14a	Valeriana sitchensis (15)-14b	Valeriana sitchensis (19)-15a	Valeriana sitchensis (20)-15b	Valeriana sitchensis (18)-15c	Valeriana sitchensis (30)-24a
Date Sampled	17-AUG-08	17-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	19-Aug-08	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08
ALS Sample ID	L716470-41	L716470-42	L716470-25	L716470-38	L716470-18	L716470-22	L716470-48	L716470-35	L716470-36	L716470-30	L716470-33	L716470-37	L716470-27
% Moisture	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Metals													
Aluminum (Al)-Total	2	2	2	2	2	2	2	2	2	2	2	2	2
Antimony (Sb)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Arsenic (As)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Barium (Ba)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Beryllium (Be)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Bismuth (Bi)-Total	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Cadmium (Cd)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Calcium (Ca)-Total	2	2	2	2	2	2	2	2	2	2	2	2	2
Chromium (Cr)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cobalt (Co)-Total	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Copper (Cu)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Iron (Fe)-Total	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lead (Pb)-Total	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Lithium (Li)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Magnesium (Mg)-Total	1	1	1	1	1	1	1	1	1	1	1	1	1
Manganese (Mn)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Mercury (Hg)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Molybdenum (Mo)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Nickel (Ni)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Phosphorus (P)-Total	5	5	5	5	5	5	5	5	5	5	5	5	5
Potassium (K)-Total	20	20	20	20	20	20	20	20	20	20	20	20	20
Selenium (Se)-Total	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Sodium (Na)-Total	20	20	20	20	20	20	20	20	20	20	20	20	20
Strontium (Sr)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Thallium (Tl)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Tin (Sn)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Titanium (Ti)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Uranium (U)-Total	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Vanadium (V)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Zinc (Zn)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Appendix 12e. Metals Sampling of *Valeriana sitchensis* Tissue - DETECTION LIMITS (wet weight)

	Control Sites								Infrastructure Sites				
Sample ID	Valeriana sitchensis (31)-24b	Valeriana sitchensis (32)-24c	Valeriana sitchensis (24)-25a	Valeriana sitchensis (25)-25b	Valeriana sitchensis (26)-25c	Valeriana sitchensis (28)-26a	Valeriana sitchensis (27)-26b	Valeriana sitchensis (29)-26c	Valeriana sitchensis (14)-11b	Valeriana sitchensis (12)-11c	Valeriana sitchensis (13)-11a	Valeriana sitchensis (1)-4	Valeriana sitchensis (2)-7
Date Sampled	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	17-AUG-08	17-AUG-08
ALS Sample ID	L716470-31	L716470-34	L716470-20	L716470-21	L716470-28	L716470-24	L716470-26	L716470-29	L716470-23	L716470-32	L716470-19	L716470-39	L716470-40
% Moisture	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Metals													
Aluminum (Al)-Total	2	2	2	2	2	2	2	2	2	2	2	2	2
Antimony (Sb)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Arsenic (As)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Barium (Ba)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Beryllium (Be)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Bismuth (Bi)-Total	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Cadmium (Cd)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Calcium (Ca)-Total	2	2	2	2	2	2	2	2	2	2	2	2	2
Chromium (Cr)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cobalt (Co)-Total	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Copper (Cu)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Iron (Fe)-Total	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lead (Pb)-Total	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Lithium (Li)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Magnesium (Mg)-Total	1	1	1	1	1	1	1	1	1	1	1	1	1
Manganese (Mn)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Mercury (Hg)-Total	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Molybdenum (Mo)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Nickel (Ni)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Phosphorus (P)-Total	5	5	5	5	5	5	5	5	5	5	5	5	5
Potassium (K)-Total	20	20	20	20	20	20	20	20	20	20	20	20	20
Selenium (Se)-Total	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Sodium (Na)-Total	20	20	20	20	20	20	20	20	20	20	20	20	20
Strontium (Sr)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Thallium (Tl)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Tin (Sn)-Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Titanium (Ti)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Uranium (U)-Total	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Vanadium (V)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Zinc (Zn)-Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Appendix 12f. Metals Sampling of *Vaccinium* spp. (berries) - DETECTION LIMITS (wet weight)

	Control Sites					Infrastructure Sites				
Sample ID	324-Vacc-Br	325-Vacc-Br	327-Vacc-Br	328-Vacc-Br	329-Vacc-Br	302-Vaccova-Br	308-Vaccova-Br	310-Vaccova-Br	313-Vaccova-Br	319-Vaccova-Br
Date Sampled	24-SEP-09	24-SEP-09	24-SEP-09	24-SEP-09	24-SEP-09	19-SEP-09	20-SEP-09	20-SEP-09	21-SEP-09	23-SEP-09
ALS Sample ID	L834403-21	L834403-26	L834403-29	L834403-32	L834403-35	L834403-2	L834403-8	L834403-11	L834403-14	L834403-17
% Moisture	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Metals										
Aluminum (Al)-Total	1.54	1.42	1.58	1.66	0.83	1.7	2.08	1.9	1.72	0.96
Antimony (Sb)-Total	0.0077	0.0071	0.0079	0.0083	0.00415	0.0085	0.0104	0.0095	0.0086	0.0048
Arsenic (As)-Total	0.0077	0.0071	0.0079	0.0083	0.00415	0.0085	0.0104	0.0095	0.0086	0.0048
Barium (Ba)-Total	0.0077	0.0071	0.0079	0.0083	0.00415	0.0085	0.0104	0.0095	0.0086	0.0048
Beryllium (Be)-Total	0.0462	0.0426	0.0474	0.0498	0.0249	0.051	0.0624	0.057	0.0516	0.0288
Bismuth (Bi)-Total	0.0462	0.0426	0.0474	0.0498	0.0249	0.051	0.0624	0.057	0.0516	0.0288
Cadmium (Cd)-Total	0.00462	0.00426	0.00474	0.00498	0.00249	0.0051	0.00624	0.0057	0.00516	0.00288
Calcium (Ca)-Total	1.54	1.42	1.58	1.66	0.83	1.7	2.08	1.9	1.72	0.96
Chromium (Cr)-Total	0.077	0.071	0.079	0.083	0.0415	0.085	0.104	0.095	0.086	0.048
Cobalt (Co)-Total	0.0154	0.0142	0.0158	0.0166	0.0083	0.017	0.0208	0.019	0.0172	0.0096
Copper (Cu)-Total	0.0077	0.0071	0.0079	0.0083	0.00415	0.0085	0.0104	0.0095	0.0086	0.0048
Iron (Fe)-Total	0.154	0.142	0.158	0.166	0.166	0.085	0.312	0.19	0.172	0.192
Lead (Pb)-Total	0.0154	0.0142	0.0158	0.0166	0.0083	0.017	0.0208	0.019	0.0172	0.0096
Lithium (Li)-Total	0.077	0.071	0.079	0.083	0.0415	0.085	0.104	0.095	0.086	0.048
Magnesium (Mg)-Total	0.462	0.426	0.474	0.498	0.249	0.51	0.624	0.57	0.516	0.288
Manganese (Mn)-Total	0.0077	0.0071	0.0079	0.0083	0.00415	0.0085	0.0104	0.0095	0.0086	0.0048
Mercury (Hg)-Total	0.000385	0.000355	0.000395	0.000415	0.000415	0.000425	0.00052	0.000475	0.00043	0.00048
Molybdenum (Mo)-Total	0.0077	0.0071	0.0079	0.0083	0.00415	0.0085	0.0104	0.0095	0.0086	0.0048
Nickel (Ni)-Total	0.077	0.071	0.079	0.083	0.0415	0.085	0.104	0.095	0.086	0.048
Phosphorus (P)-Total	3.08	2.84	3.16	3.32	3.32	1.7	6.24	3.8	3.44	3.84
Potassium (K)-Total	15.4	14.2	15.8	16.6	16.6	8.5	31.2	19	17.2	19.2
Selenium (Se)-Total	0.154	0.142	0.158	0.166	0.083	0.17	0.208	0.19	0.172	0.096
Sodium (Na)-Total	15.4	14.2	15.8	16.6	16.6	8.5	31.2	19	17.2	19.2
Strontium (Sr)-Total	0.0077	0.0071	0.0079	0.0083	0.00415	0.0085	0.0104	0.0095	0.0086	0.0048
Thallium (Tl)-Total	0.00462	0.00426	0.00474	0.00498	0.00249	0.0051	0.00624	0.0057	0.00516	0.00288
Tin (Sn)-Total	0.0308	0.0284	0.0316	0.0332	0.0166	0.034	0.0416	0.038	0.0344	0.0192
Titanium (Ti)-Total	0.077	0.071	0.079	0.083	0.083	0.0425	0.156	0.095	0.086	0.096
Uranium (U)-Total	0.00154	0.00142	0.00158	0.00166	0.00083	0.0017	0.00208	0.0019	0.00172	0.00096
Vanadium (V)-Total	0.077	0.071	0.079	0.083	0.0415	0.085	0.104	0.095	0.086	0.048
Zinc (Zn)-Total	0.077	0.071	0.079	0.083	0.0415	0.085	0.104	0.095	0.086	0.048