Appendix 11-A

Murray River Coal Project: 2010 to 2012 Ecosystem and Vegetation Baseline Report

HD Mining International Ltd.

MURRAY RIVER COAL PROJECT
2010 to 2012 Ecosystem and Vegetation Baseline Report

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MURRAY RIVER COAL PROJECT

2010 TO 2012 ECOSYSTEM AND VEGETATION BASELINE REPORT

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Prepared for:

HD Mining International Ltd.

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Executive Summary

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Executive Summary

HD Mining International Ltd. (HD Mining) proposes to develop the Murray River Coal Project (the Project) as a 6 million tonne per annum (6 Mtpa) underground metallurgical coal mine. The property is located approximately 12.5 km south of Tumbler Ridge, British Columbia. The Project is located within the Peace River Coalfield (PRC), an area with a long history of metallurgical grade coal mining, mainly from open pit mining. HD Mining is proposing to access deeper zones of the coal field (600 to 1,000 m below surface) through underground mining techniques.

To support HD Mining's planning and development of the Project, and to fulfill the requirements of the environmental assessment process, environmental and socio-economic baseline studies were initiated by Rescan Environmental Services Ltd. (Rescan). Project-specific studies began in 2010 and have continued through 2012. As appropriate and available, historical data from government sources and neighbouring projects, as well as traditional use/knowledge information, have been compiled and incorporated into analysis.

This report presents a cumulative summary of all Ecosystems and Vegetation information compiled for the Project to date.

The goal of the Project baseline ecosystems and vegetation program was to document current conditions and to provide a means of determining and assessing future changes to ecosystems and vegetation related to the proposed development. The main objectives of the Ecosystems and Vegetation baseline program were to:

- review existing literature and data sources to describe the ecology of a regional study area (RSA);
- compile existing vegetation and terrestrial ecosystem information for the local study area (LSA);
- conduct field surveys to guide ecosystem mapping in the LSA;
- conduct field surveys for rare and invasive plants species in the LSA;
- provide ecosystem maps for the RSA and LSA; and
- collect plant tissue samples for baseline metals analysis within the LSA and at reference sites within the RSA.

Baseline information will be used to evaluate the potential effects of the Project on vegetation and terrestrial ecosystems, including at-risk or endangered plant species and ecosystems, or those species/ecosystems identified by regulators, First Nations or the public as socially, economically or ecologically important.

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2010 TO 2012 ECOSYSTEM AND VEGETATION BASELINE REPORT

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Glossary and Abbreviations

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Glossary and Abbreviations

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

Alpine High-elevation land above the treeline. 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.

ANPC Alberta Native Plant Council

BC British Columbia

BC CDC British Columbia Conservation Data Centre: collects and disseminates information on plants, animals and ecological communities(ecosystems) 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.

BC EAA *British Columbia Environmental Assessment Act*

BC MELP British Columbia Ministry of Environment, Lands, and Parks

BC MEM British Columbia Ministry of Energy and Mines

BC MOAFF British Columbia Ministry of Agriculture, Food and Fisheries

BC MOE British Columbia Ministry of Environment

BC MOFR British Columbia Ministry of Forests and Range

BC MSRM British Columbia Ministry of Sustainable Resource Management

BEC Biogeoclimatic Ecosystem Classification: a standard, hierarchical classification system for mapping terrestrial ecosystems in British Columbia.

Biogeoclimatic Subzone A site-specific level of the biogeoclimatic classification system that further defines the climate of an area. On the coast, subzones are divided based on climate and continentality (the relative influence of the marine environment on the terrestrial environment). In the interior, subzones are divided based on climate and precipitation.biogeoclimatic zone (Marcoux). The subzone describes the zonal/or climax vegetation and corresponding climate and soil.

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 et al. 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., ESSFmm1-Moist Mild Raush Engelmann Spruce-Subalpine Fir).
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.
Blue-list	A list of ecological communities and indigenous species and subspecies of special concern in British Columbia.
CFIA	Canadian Food Inspection Agency
COSEWIC	Committee on the Status of Endangered Wildlife in Canada: A national 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.
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. For the purposes of Terrestrial Ecosystem Mapping, an ecosystem is characterized by a plant community (a volume of relatively uniform vegetation) and the soil polypedon (a volume of relatively uniform soil) upon which the plant community occurs (Pojar et al. 1987).
Forb	Non-grassy herbaceous plant.
GIF	Ground Inspection Form
Herb	A plant—annual, biennial or perennial—with stems that die back to the ground at the end of the growing season. Herbaceous species include forbs, graminoids (e.g., 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.
Krumholtz	A term widely used to describe the stunted and irregularly formed vegetation that results from exposure to strong winds and cold conditions in subalpine or arctic landscapes.

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 is 7,541 ha, and was defined by a combination of topographical features and buffers around proposed infrastructure, so that all project infrastructure is located at least 1.5 km from any edge of the LSA boundary.

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).

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) (Luttmerding et al. 1990).

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 Oligotrophic (A) to Hypereutrophic (F) (Luttmerding et al. 1990).

NEIPC North East Invasive Plant Council.

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.

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 subspecies have—or are candidates for—official extirpated, endangered or threatened status in BC. Not all red-listed taxa will necessarily become formally designated. Placing taxa on these lists flags them as being at risk and requiring investigation.

Rescan Rescan Environmental Services Ltd.

RIC Resources Inventory Committee.

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 1993). Common scales of Terrestrial Ecosystem Mapping are 1:10,000 and 1:50,000.
SEI	Sensitive Ecosystem Inventory.
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 terrestrial ecosystem mapping 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 and stream networks.
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).

1. Introduction

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1. Introduction

HD Mining International Ltd. (HD Mining) proposes to develop the Murray River Coal Project (the Project) as a 6 million tonne per annum (6 Mtpa) underground metallurgical coal mine. The property is located approximately 12.5 km south of Tumbler Ridge, British Columbia (Figure 1-1), and consists of 57 coal licences covering an area of 16,024 hectares. The Project is located within the Peace River Coalfield (PRC), an area with a long history of metallurgical grade coal mining, mainly from open pit mining. HD Mining is proposing to access deeper zones of the coal field (600 to 1,000 m below surface) through underground mining techniques.

In October 2011, HD Mining submitted an application to the BC Ministry of Energy and Mines and Ministry of Environment seeking permission to complete a bulk sampling program as part of exploration of the property. In March 2012, HD Mining received approval to conduct a 100,000 tonne bulk sample for the purpose of conducting testing to assist in developing markets for the coal. Beyond the bulk sample program, in order to develop a full mine at the proposed 6 Mtpa, the Project is subject to both the BC and Canadian environmental assessment processes. Development of any infrastructure for the full mine is not permitted before the requirements of these processes are met.

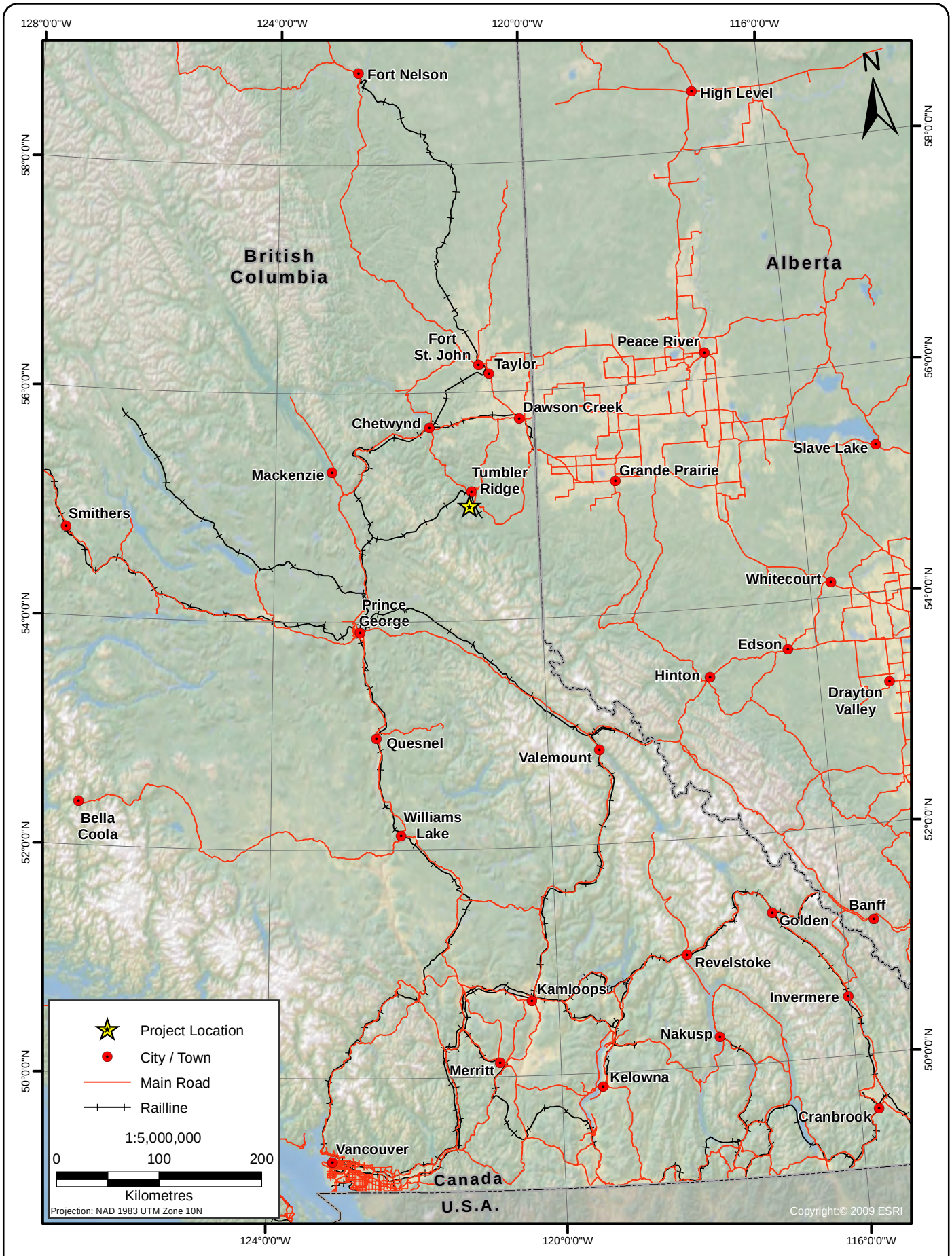
To support HD Mining's planning and development of the Project, and to contribute to the environmental assessment process, environmental and socio-economic baseline studies were initiated by Rescan Environmental Services Ltd. (Rescan). Project-specific studies began in 2010 and have continued through 2012. As appropriate and available, historical data from government sources and neighbouring projects, as well as traditional use/knowledge information, have been compiled and incorporated into analysis.

In order to help guide the scope of baseline studies, regional and local study areas (RSA and LSA, respectively) have been developed (Figures 1-2 and 1-3). The RSA is intended to encompass an area beyond which effects of the Project would not be expected. It is also intended to be ecologically relevant based on the home range of key wildlife species known to inhabit the region. The LSA encompasses an area surrounding the proposed Project infrastructure within which direct effects from the Project may be anticipated. Its boundary has also been developed following natural terrain and drainage boundaries in order to be ecologically relevant. For consistency, the same RSA and LSA are used for all environmental studies.

This report presents a cumulative summary of all Ecosystems and Vegetation information compiled for the Project to date.

The goal of the Project baseline ecosystems and vegetation program was to document current conditions and to provide a means of determining and assessing future changes to ecosystems and vegetation related to the proposed development. The main objectives of the Ecosystems and Vegetation baseline program were to:

- review existing literature and data sources to describe the ecology of the RSA;
- compile existing vegetation and terrestrial ecosystem information for the LSA;



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Project Location

Figure 1-1

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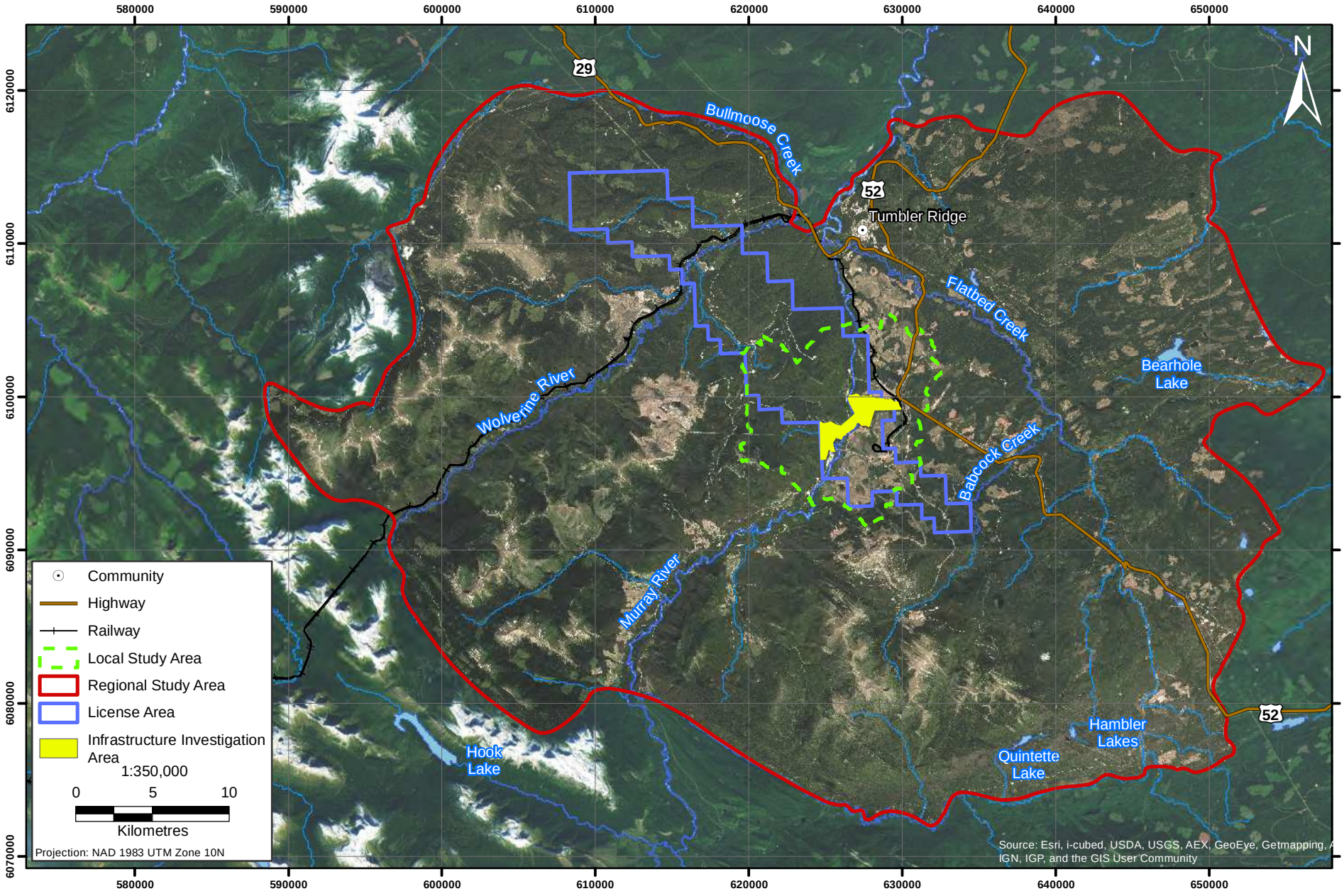

Figure 1-2

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Project Study Boundaries

Figure 1-2

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- conduct field surveys to guide ecosystem mapping in the LSA and RSA;
- conduct field surveys for rare and invasive plants species at infrastructure areas in the LSA;
- provide ecosystem maps for RSA and LSA; and
- collect plant tissue samples for baseline metals analysis within the LSA and at reference sites within the RSA.

Baseline information will be used to evaluate the potential effects of the Project on vegetation and terrestrial ecosystems, including at-risk or endangered plant species and ecosystems, or those species/ecosystems identified by regulators, relevant First Nations or the public as socially, economically or ecologically important. Information obtained through community-based data gathering will be incorporated into this report as it becomes available.

The following chapters outline the available background information that supports the study (Chapter 2); a description of the methods and rationale used to identify sites and collect Project-specific data (Chapter 3); the results of data collection (Chapter 4); and a summary that synthesizes the key findings of the baseline program (Chapter 5).

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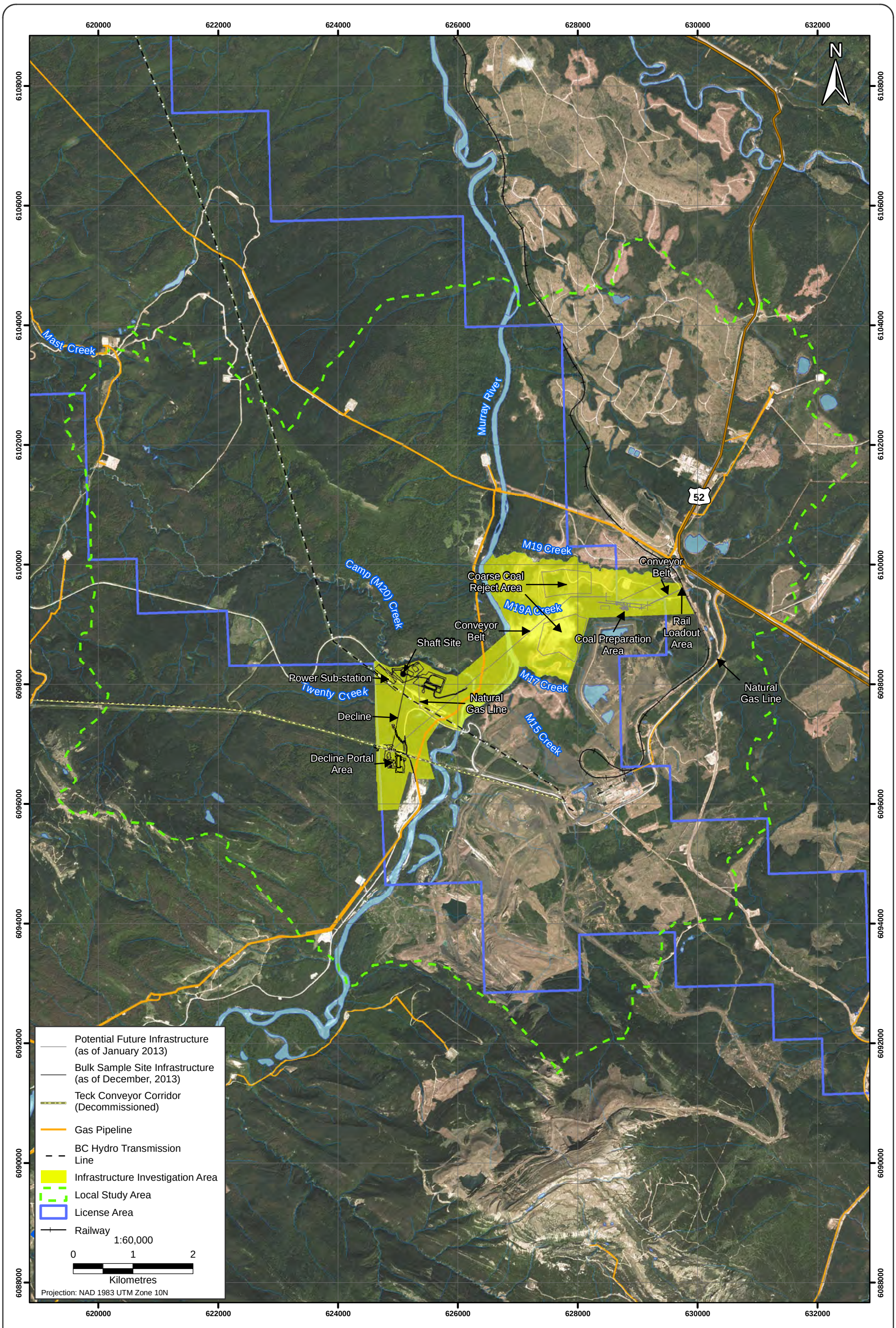

Figure 1-3

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Preliminary Site Layout

Figure 1-3

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2. Background Information

2. Background Information

2.1 REGIONAL SETTING

The Project is within the Rocky Mountain Foothills physiographic region in northeastern BC (Holland 1976). It is classified as part of the Central Canadian Rocky Mountain Ecoregion, the Sub-boreal Interior Ecoprovince and the Hart Foothills Ecosection (Demarchi 1995). The Hart Foothills are situated on the east side of the Rocky Mountains and consist of rounded mountains and wide valleys generally lower than the Rocky Mountains to the north and south. The Hart Foothills are in a relatively dry Ecosection, a result of Arctic air stalling in this area. Immediately northeast of the Project is the Boreal Plains and Peace River Lowlands physiographic region, characterized by a more gentle topography of rolling hills and plateaus (800 to 1,100 masl).

The RSA is drained by northeast-flowing drainages that originate in the Rocky Mountains, including Flatbed Creek, Bullmoose Creek, Wolverine River, and Murray River. These four watercourses merge into the Murray River near Tumbler Ridge. The Murray River then continues north, emptying into the Pine River near East Pine Provincial Park. The Pine River then flows north and east, joining the Peace River near the Town of Taylor, BC.

South of Tumbler Ridge, the Murray River is an approximately 60 m wide meandering river, incised into a floodplain between the higher remnants of benches from older floodplains. Through time the valley has undergone a process of flattening as the river has continued to rework the sand and gravel bed materials. North of its confluence with the Wolverine River, a study of tree ring data from the present floodplain indicated that there were no trees older than 150 years before present, suggesting that the river may have encompassed the entire floodplain over approximately the past 200 years (Thompson, Berwick, Pratt & Partners 1978).

The RSA spans elevations from approximately 730 masl along the Murray River to 1,900 masl at the peak of Mount Babcock and encompasses portions of the Boreal White and Black Spruce, Sub-Boreal Spruce, Engelmann Spruce-Subalpine Fir, and Boral Altai Fescue Alpine biogeoclimatic zones (Meidinger and Pojar 1991); however, the Project footprint is entirely within the Boreal White and Black Spruce zone.

The Boreal White and Black Spruce zone covers most of northeastern BC. Upland forests are characterized by trembling aspen, white spruce, lodgepole pine, subalpine fir, birch, and balsam poplar. Large expanses of low-lying terrain are muskeg (peat wetlands) characterized by scrub forest of black spruce and tamarack (DeLong, Annas, and Stewart 1991). The climatic conditions are continental, with low precipitation and long, cold winters. Average temperatures at Chetwynd, about 100 km north of Tumbler Ridge, range from -10.7°C in the winter to 15.3°C in the summer, and annual precipitation is 447.5 mm, approximately 38% of it falling as snow (Environment Canada 2011). Mammalian fauna observed in the Tumbler Ridge region include woodland caribou, Rocky Mountain elk, moose, mountain goat, mountain sheep, wolverine, fisher, marten, hoary marmot, black bear, grizzly bear, wolf, coyote, snowshoe hare, beaver, lynx, red fox, white-tail deer, mule deer, and cougar. A number of bird species are also present, including ptarmigans, raptors, songbirds and ducks (Rescan 2011b).

The RSA is part of the vast Arctic Ocean drainage system, and unlike the Pacific drainages immediately south and west of the Rocky Mountains, there are no anadromous fish such as salmon in the Project area. Fish species present in the Murray River include mountain whitefish, Arctic grayling, bull trout, northern pike, burbot, longnose sucker, slimy sculpin, longnose dace, finescale dace, and lake chub (Diversified Environmental Services 2011).

2.1.1 Dawson Creek Land and Resource Management Plan

The proposed Project is located within the boundaries of the Dawson Creek LRMP (Figure 2.1-1). The Dawson Creek LRMP provides a guide for managing and directing resource development and conservation for each of the region's distinct landscape areas. The Dawson Creek LRMP was completed in 1999 as a strategic long-term planning framework for Crown land resource access, development and management (BC Ministry of Forests and Range 1999). The Dawson Creek LRMP provides General Management Directions (GMDs) to guide the management of key resources, interests and activities throughout the planning area. Principles guiding GMDs include:

- sustainable use of renewable natural resources;
- management of any one resource will take into consideration other resource values, rights, tenures and development opportunities which recognize the biological and physical limitations of the land and resources;
- maintenance or enhancement of the quality of life, social and economic stability, employment opportunities including job creation, and the vitality of local communities;
- acknowledgement that communities located within the planning area should have the opportunities to benefit from the natural resources within the planning area; and
- land, water, air and all living organisms are integral parts of the ecosystem and should be sustained and accommodated by management plans (BC Ministry of Forests and Range 1999).

The goals, objectives and GMD's served to guide the design and implementation of the ecosystem and vegetation baseline studies. Management direction relevant to terrestrial ecosystems and vegetation include, but are not limited to, the following:

- biodiversity (including diversity of plants, animals and other living organisms well as genetic and ecosystem diversity);
- cultural heritage (ecosystems of importance for cultural reasons including traditional use plants);
- wildlife habitat;
- connectivity at the landscape (watershed) level; and
- scenic areas (i.e. ecosystems) for tourism and visual quality.

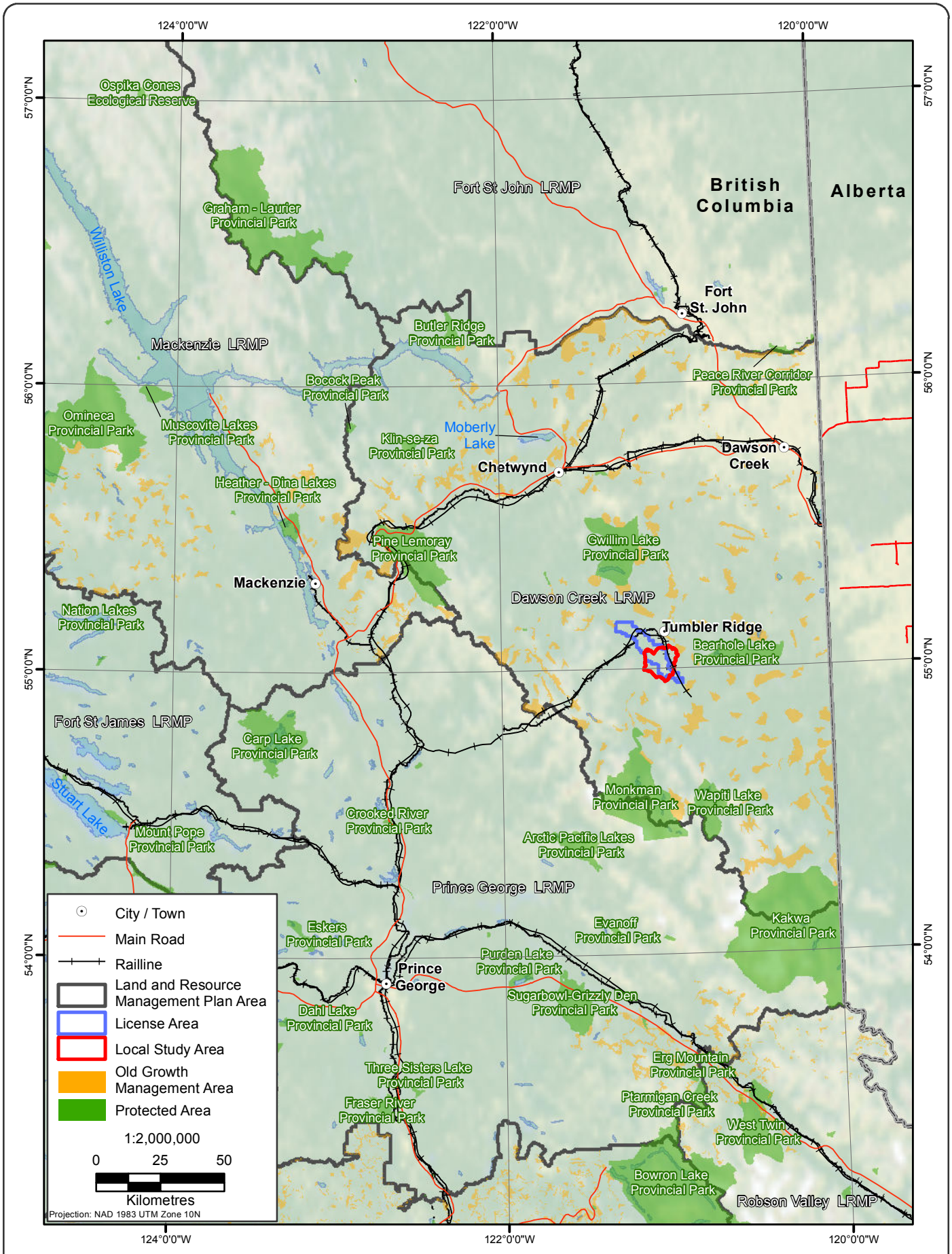
2.2 LITERATURE REVIEW

2.2.1 Occurrences of Plants Listed by the BC Conservation Data Centre

There are several occurrences of listed plants documented in past studies carried out in proximity to the proposed Project. Of these species, one is red listed and seven are blue listed. The plant species, associated habitat and source of the information are summarized in Table 2.2-1.

2.2.2 Invasive Plant Occurrences

According to the BC Invasive Alien Plant Program Map Display, there are numerous documented occurrences of invasive plant species near the proposed Project (Table 2.2-2).



MURRAY RIVER COAL PROJECT

Land and Resource Management Areas

Figure 2.1-1

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Table 2.2-1. Listed Plant Species Identified near the Project

Plant Species	Associated Habitat	Status	Source
Three lobed daisy (*Erigeron trifidus*)	terrestrial; alpine	Red	imap
Alpine draba (*Draba alpina*)	terrestrial; alpine	Blue	imap
Blue milky draba (*Draba lactea*)	stony slopes in alpine areas	Blue	imap
Tender sedge (*Carex tenera*)	hollow among outcrops in terrestrial alpine areas	Blue	imap
Western Jacob's ladder (*Polemonium occidentale* var. *occidentale*)	talus slope	Blue	Peace River Coal Inc.
Arctic campion (*Silene involucrata* ssp. *involcrata*)	gravel and sparse vegetation	Blue	Peace River Coal Inc.
Porsilid's whitlow-grass (*Draba porsildii*)	talus slopes	Blue	Peace River Coal Inc.
Small flowered willow herb (*Epilobium occidentale* ssp. *occidentale*)	Mountain-heather willow	Blue	Peace River Coal Inc.

Table 2.2-2. Documented Occurrences of Invasive Plants near the Project

Common Name	Scientific Name	Regulated by the Weed Control Act?
Spotted Knapweed	*Centaurea biebersteinii*	Yes
Canada Thistle	*Cirsium arvense*	Yes
Scentless Chamomile	*Matricaria perforata*	Yes
Sowthistle species	*Sonchus* spp.	Certain species
Oxeye Daisy	*Leucanthemum vulgare*	Yes
Yellow Hawkweed	*Hieracium prateinse*	No
Tall Hawkweed	*Hieracium pilloselloides*	No
Bull Thistle	*Cirsium vulgare*	No

3. Methodology

3. Methodology

3.1 ECOSYSTEM CLASSIFICATION

Ecological classification is the stratification of ecosystems based on observed similarities. The most commonly used ecosystem classification system in BC is the Biogeoclimatic Ecosystem Classification (BEC). A full description of BEC methodology and associated terms can be found on the BC Ministry of Forests and Range internet site (BC Ministry of Forests and Range 2007).

BEC is a hierarchical classification method that uses a standardized terminology and methodology to assess the interrelationships between physiography, soils and vegetation. It is these interrelationships that result in the expression of repeated and predictable patterns of ecosystems across the landscape in response to changes in edaphic site conditions, local climate, and regional climate. The BEC system was used to identify ecosystems within the RSA and LSA.

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 subzones based on dominant vegetation or vegetation associations that express regional climate. Subzones may be divided into variants, which represent variations in climate associated with moisture and temperature. The combination of zone, subzone and variant is referred to as a BEC unit.

The next hierarchy is site series, which are finer-scale ecosystems based on the site's potential to produce a self-reproducing plant community at ecological climax (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 code is also assigned to these units to help distinguish among them during ecological mapping.

3.1.1 Natural Disturbance and Regeneration

In British Columbia, areas are also categorized by BEC unit into Natural Disturbance Types (NDTs). NTDs separate areas based on differences in disturbance processes, stand development, and temporal and spatial landscape patterns (Integrated Land Management Bureau ; BC MOF 1995). Understanding the interaction and influence of natural disturbances on the landscape is critical for effective ecosystem-based forest management, ecological restoration, and conservation activities (Swanson et al. 1993; Landres, Morgan, and Swanson 1999; Veblen 2003). NDT units were summarized per BEC unit for the RSA and LSA in order to provide further ecological context of ecosystem distribution and evolution. Five Natural Disturbance Types are recognized in BC (Table 3.1-1).

Table 3.1-1. Natural Disturbance Types and Descriptions

Disturbance Category	Definition	Description
NDT1	Ecosystems with rare stand initiating events	In the absence of anthropogenic disturbance, forested landscapes in NDT 1 contain a high proportion of mature (>120 years) to old (>250 years) forests. These forests are uneven aged and multistoried, with regeneration occurring in gaps created by the death of individual trees or fine-scale disturbances such as small fires, windthrow, and avalanches (BC MOF 1995).
NDT2	Ecosystems with infrequent stand initiating events	Forested landscapes in NDT 2 have historically consisted of extensive areas of even-aged stands interspersed with snags and veteran trees that survived previous fire events. However, extended post-fire regeneration periods have produced stands with uneven-aged tendencies because post disturbance recruitment can take many decades (Jull 1990; Parish et al. 1999).
NDT3	Ecosystems with frequent stand initiating events	Forested landscapes within the NDT 3 are characterized by a mosaic of even aged stands of different ages depending on the timing and intensity of the disturbance. NDT 3 ecosystems frequently experience stand-initiating events (approximately every 100 to 150 years) (BC MOF 1995) such as wildfires and severe mountain pine beetle outbreaks.
NDT4	Ecosystems with frequent stand initiating events	NDT 4 ecosystems frequently experience stand-maintaining low-intensity fires. This NDT includes grassland, shrubland, and forested communities (typically large old trees with fire resistant bark). There are no NDT 4 ecosystems within the Project area.
NDT5	Ecosystems with rare disturbance events	The NDT 5 includes the alpine and parkland ecosystems where harsh climatic conditions at high elevations result in slow regeneration.

3.2 ECOSYSTEM MAPPING

Ecosystem mapping is the stratification of the landscape into similar units based upon ecological features such as terrain, soil, and vegetation communities. It provides information on the type and distribution of ecological units and is a valuable tool for resource planning.

Two different mapping methodologies, Predictive Ecosystem Mapping (PEM) and Terrestrial Ecosystem Mapping (TEM) were used to map ecological features in the Project area; PEM for the RSA and TEM for the LSA. Both methodologies use the BEC system as the basis for ecosystem identification. PEM is usually used at smaller scales and is ideal for covering large areas when less resolution is required. TEM is usually used at larger scales where more detailed information is required. Both are described in the following sections.

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

Predictive Ecosystem Mapping is a widely accepted method for predicting the distribution of ecosystems across the landscape. PEM is an automated, computer-based method using available imagery, spatial data, known environmental variables (e.g., terrain, slope and aspect) and ecological knowledge as inputs. For example, a particular wet forested ecosystem may be known to occur in depressions, toe-slopes, or adjacent to water-bodies. Thus, with the relevant environmental data, the likely location and distribution of this ecosystem can be predicted.

The end product can be either raster (pixel) or polygon-based, depending on the available input data, processing methodology, and desired output. A map generated using PEM serves to provide similar ecosystem information as one produced using TEM but is more effective for predicting larger areas.

The Murray River PEM was completed using a raster based approach for the full extent of the RSA (also the wildlife habitat suitability study area). The raster cell size was 20 m, each cell representing 20 m by 20 m on the ground. The PEM was built using the programs and procedures developed by

LandMapper Environmental Solutions Inc. (LMES). The procedures are based on two primary assumptions. The first is that topography is one of the primary controlling factors behind the local flow and accumulation of water, energy, and matter in landscapes (R.A. MacMillan 2003). The flow and accumulation of water shapes the development and properties of soils and site-level environmental conditions. The second is that, where subtle differences among classes are important, human-imposed classification systems are superior to those based on statistical analyses and ordination (R.A. MacMillan 2003). These assumptions, and consequently the LMES Direct-to-Site-Series (DSS) procedures, parallel the logic and decision making processes outlined in the regional field guides (DeLong, MacKinnon, and Jang 1990; DeLong 2004; DeLong et al. 2010) produced by the BC Ministry of Forests (MOF).

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 uses the concept of "degree of membership" to a particular class (R.A. MacMillan et al. 2000). For example, with Boolean logic a particular pixel may be classified as "wet" or "dry," 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 wet," 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).

3.2.1.1 PEM Input Components

The LMES DSS PEM method incorporates digital input layers that can be used to capture the ecological characteristics of the site series found in the area being mapped. The input layers incorporated into the Murray River PEM represent the classification logic presented in the landscape profile diagrams, edatopic grids (representing soil moisture and nutrient regimes), site series flowcharts, and environment tables of the applicable regional field guides (DeLong, Tanner, and Jull 1994; DeLong 2004). The input layers include:

1. regional climate (BEC subzones and variants);
2. land cover;
3. topography and landscape position;
4. potential moisture;
5. provincial terrain surficial material; and
6. exceptions mapping.

Regional Climate

The location and extent of different biogeoclimatic zones, sub-zones, and variants 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.

A small portion of the Engelmann Spruce-Subalpine Fir – Bullmoose Moist Very Cold (ESSFmv2) was delineated as ESSF Moist Very Cold Parkland (ESSFmvp) during the mapping process, based upon satellite imagery, field data, and elevation breaks (>1,600 m elevation) that paralleled the government mapped BEC lines. This was most notable in an area within approximately 600 m of UTM location, 608,691 easting and 6,084,934 northing. It has been treated as ESSFmvp in this report.

Similarly, the Boreal White and Black Spruce (BWBS) zones have recently been reclassified by the province. The refined linework is currently unavailable to the public (B. Rogers, pers. comm.) and therefore, was not incorporated into the mapping. However, the updated BWBS subzone names, site series names, and descriptions were available in *A Field Guide to Ecosystem Identification for the*

Boreal White and Black Spruce Zone of British Columbia (Delong et al. 2010). For example, the BWBS - Peace Moist Warm (BWBSmw1) was re-named BWBS – Moist Warm (BWBSmw). The new names and site series codes have been used throughout this report.

Land Cover

A land cover map was created through digital image classification of satellite imagery. Image classification refers to the process of clustering pixels based on the spectral signatures of the ground feature(s) represented in those pixels. Two common methods are supervised and unsupervised classification. In supervised classification, the analyst defines the classes prior to running an automated statistical clustering process, whereas in unsupervised classification, the analyst groups spectral clusters into meaningful classes after running the clustering algorithm.

SPOT5 multispectral imagery from three dates was acquired: August 19, 2005, July 25, 2008, and June 7, 2009. The three dates were necessary to ensure minimum cloud and snow cover in various portions of the RSA; the images were cut and merged such that the 2009 imagery covered the eastern portion of the RSA, the 2008 covered the western portion, and the 2005 imagery covered the southern portion. The imagery has a spatial resolution (i.e., pixel size) of 10 m.

A supervised image classification was run on the imagery using a maximum likelihood algorithm in PCI Geomatica. Field survey data from 2010 and extrapolated sites served as training sites for the classification. Each date of imagery was classified separately because they differed in spectral signatures for the classes of interest. Six land cover classes were defined: water, herb, shrub, unvegetated, conifer-dominated forest, and deciduous-dominated (or co-dominated) forest. These land cover categories were compiled into a variable called "classify1" (Plate 3.2-1) which was used in the PEM rule sets.

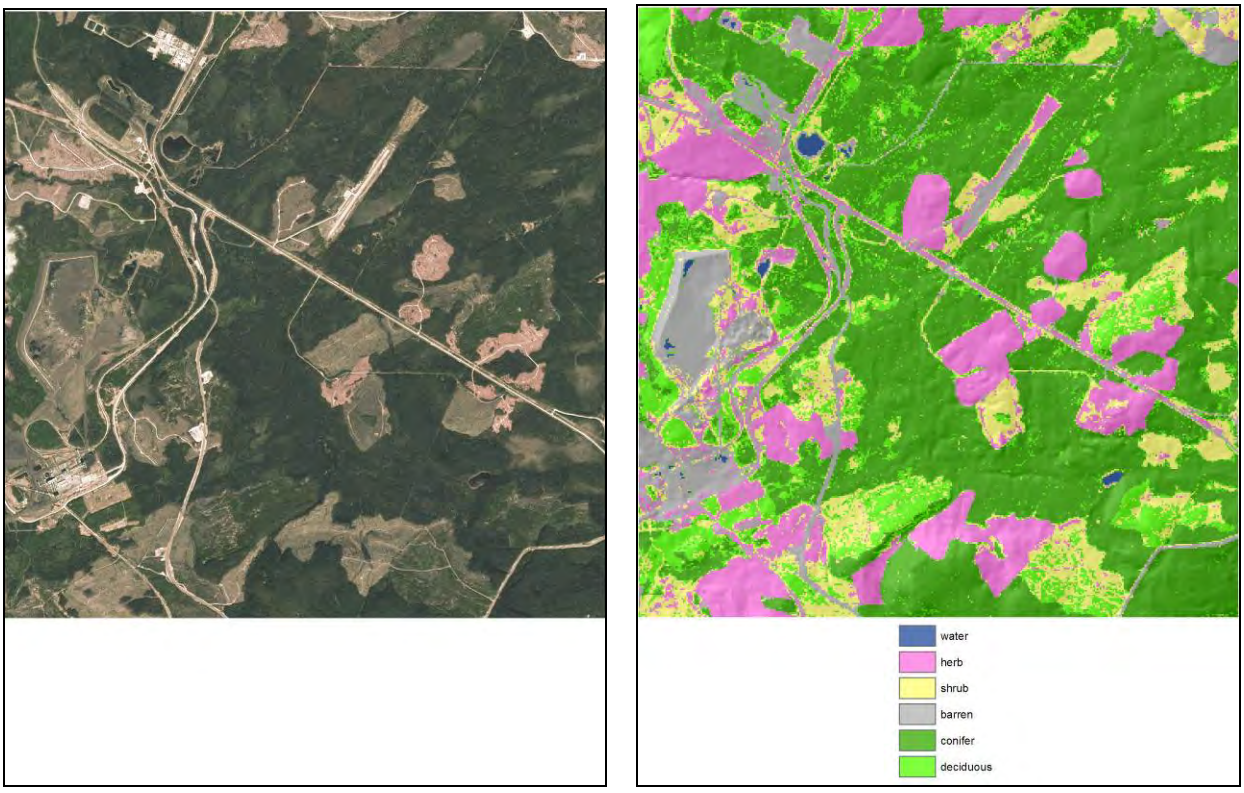


Plate 3.2-1. Example of the available satellite imagery (left) and resulting land cover map ("classify1" variable; right) used as input for the PEM.

Topography and Landscape Position

A Digital Elevation Model (DEM) was acquired from Pacific Geomatics Ltd., with a resolution of 20 m. 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" 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; Plate 3.2-2) 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, Moon and Coupe (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 3.2-3). 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).

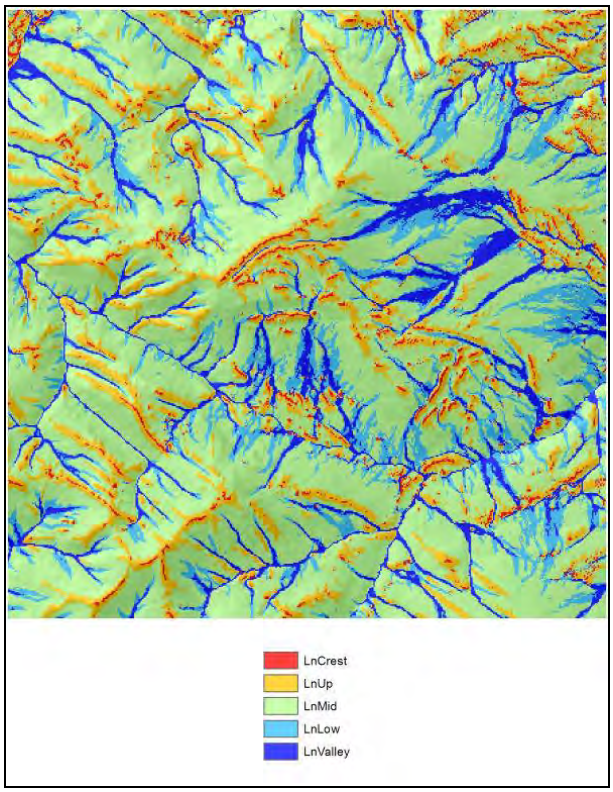


Plate 3.2-2. Example of the LnQArea PEM input variable.

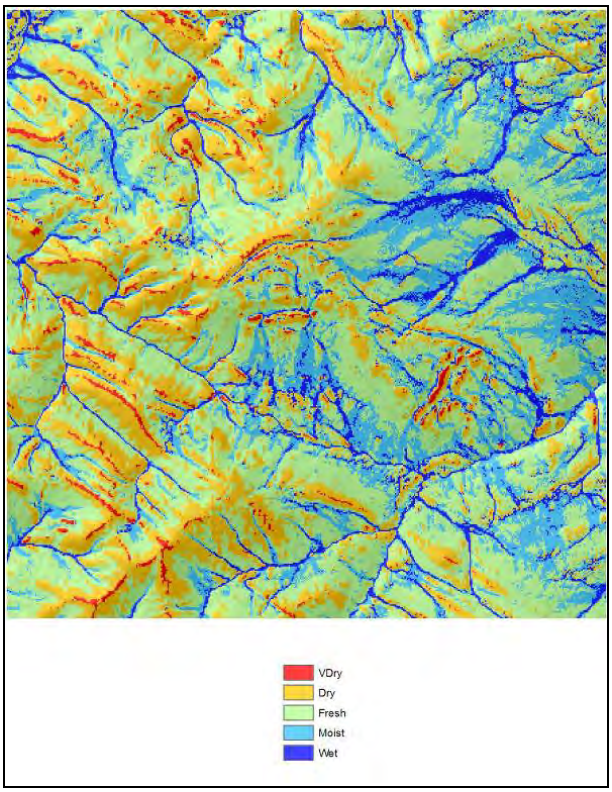


Plate 3.2-3. Example of the Qweti PEM input variable.

Provincial terrain surficial material

Terrain Inventory Mapping (TIM) at 1:50,000 scale was obtained from the BC government GeoBC (2011) website. It covered all but a small northeast portion of the RSA (Figure 3.2-1). Terrain surficial material was used to predict some ecosystems. For example, organic surficial material was used in modelling wetlands. The TIM polygons were assigned one to three deciles, or proportions, of surficial material type. Only the first decile was incorporated into the predictions and was treated as pure polygons.

Exceptions and Overlays

Exceptions mapping was conducted as a final step in the PEM process. It is a manual overlay of particular spatial data that identifies the map unit more efficiently than the modelled predictions. It is like a "cookie cutter" approach, where some features are deleted that were predicted using the LMES DSS modelling program and subsequently assigned different site series and/or structural stages using more reliable data. For example, the model may predict "wetter forest" but the Terrain Resource Information Management (TRIM) wetland data defines it as a swamp, therefore, it is re-classified as a TRIM swamp.

For the Murray River PEM, the following data were overlaid as exceptions to the model predictions:

- water and wetland features from TRIM data;
- Vegetation Resource Inventory (VRI) age data; and
- Canfor PEM structural stage data.

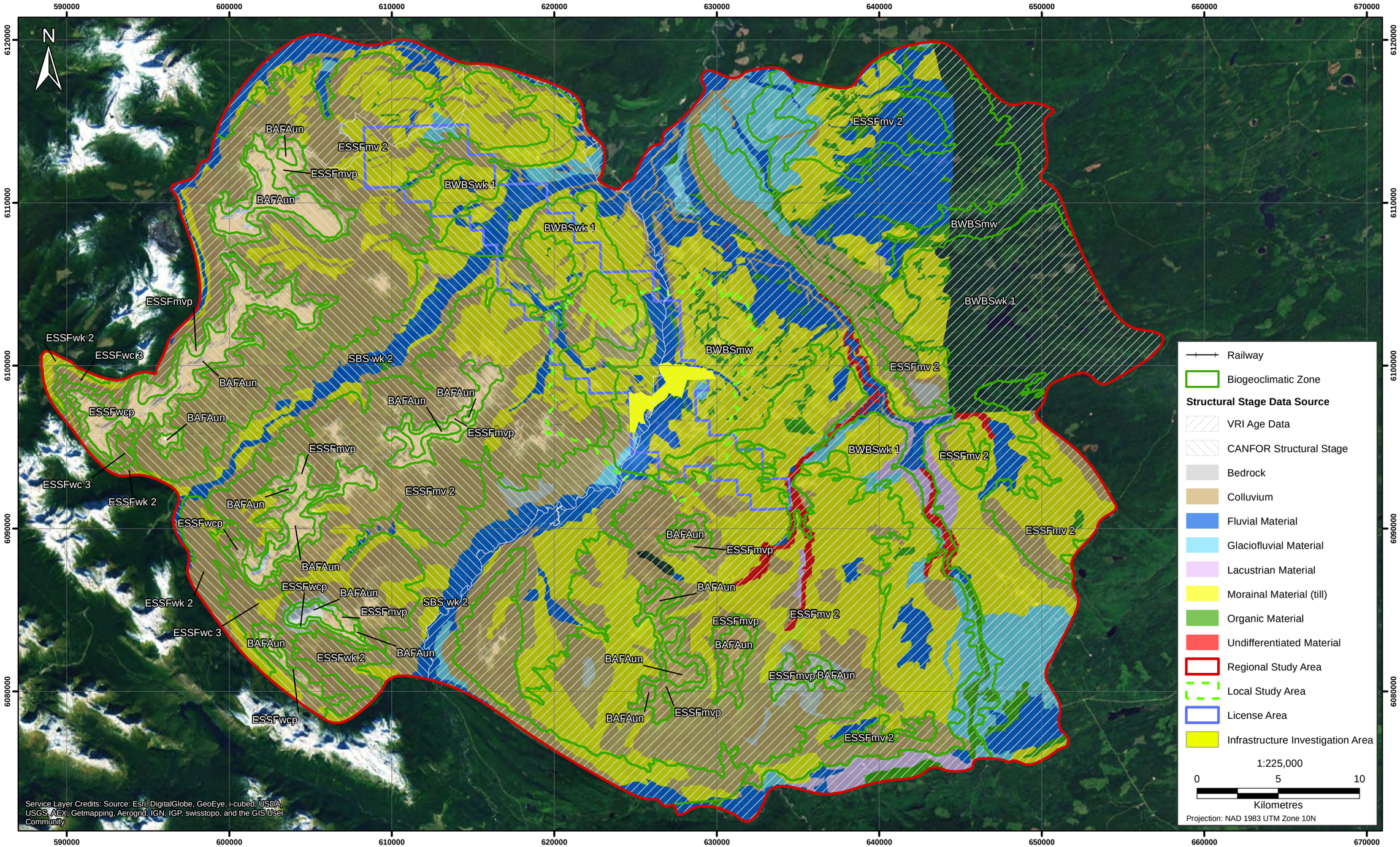
The TRIM lake/reservoir, swamp, river, marsh, and wetlands were used to predict water features. Additional modelling of water and wetland features was incorporated beyond the TRIM data (e.g., image classification for water, organic surficial material). In most cases, water features were predicted by the model in the same locations as the TRIM.

The VRI projected age data were used to predict structural stage for the vegetated areas that were classified as conifer forests or mixed/deciduous forests through image classification (Table 3.2-1). The projected date provided in the VRI data was 2009. For the Murray River PEM, two years was added to the VRI projected ages and subsequently assigned to a structural stage based on age categories derived from BC Ministry of Forests and Range and BC Ministry of Environment (2010). Although structural stage is not defined by age alone, and can also be dependent on the height and other structural characteristics of the vegetation, age data can be used to reasonably predict structural stage for the purposes of wildlife habitat suitability mapping.

Table 3.2-1. Age Class Used to Define Structural Stages from Available VRI Data

Age Class (years)	Structural Stage Assigned[1]
<5	2
5 to 12	3a
12 to 20	3b
20 to 39	4
40 to 79	5
80 to 139	6
140 to 250	7[2]
>250	7[3]

[1] *Age categories derived from BC Ministry of Forests and Range and BC Ministry of Environment 2010.*
[2] *BWBS BEC units.*
[3] *all other BEC units.*



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MURRAY RIVER COAL PROJECT

Figure 3.2-1

PEM Input Data Coverage for Structural Stage and Terrain

The government VRI was available for the RSA except for the area covered by Canfor's Tree Farm Licence (TFL) 48 (Figure 3.2-1). Several attempts were made to obtain the most recent TFL 48 forest cover data but it was not received in time for this project mapping. However, the TFL PEM (Canfor 1999) was available and although it is slightly out-dated, it provides a relatively good estimate of structural stage for the forested areas. Therefore, the Canfor structural stages were incorporated for areas of the Murray River PEM RSA that were: 1) missing VRI data, and 2) classified as conifer and mixed/deciduous stands via image classification.

For areas that were classified as shrub, herb, barren, or water throughout the RSA, the image classification class was used to determine structural stage. For example, a recent cutblock would be predicted and assigned herb or shrub structural stage through satellite image classification, regardless of the older VRI and/or Canfor PEM predictions of mature forest.

3.2.1.2 PEM Input Data Quality

Satellite Imagery

The use of multi-date data resulted in minimal cloud, haze, and snow cover interference. The satellite imagery was ortho-rectified and projected to the same projection as the other digital data. The spatial resolution of this imagery (10 m) means that features smaller than 10 m cannot be detected. This resolution is adequate for ecosystem mapping (i.e., where the landscape is generalized into representative units).

BEC Lines

The scale of provincial BEC mapping (generally 1:250,000) is "conceptual" in that it is based on knowledge of regional climate. Wherever possible, boundaries were localized in areas were the provincial BEC mapping did not align with local conditions (e.g. parkland boundaries). In 2012 the MOFR released an updated version of the BEC lines for the province (Version 8); however, none of the 2012 spatial changes affect the BEC units within the RSA or LSA. In 2010, however, The BWBS zone classification was revised based on new data and inter–regional correlation of BWBS units (DeLong et al. 2010). The information used for the PEM classification uses the new site series resulting from this classification.

PEM Assembly

Assembly of the PEM involved combining and analyzing the various input data layers via two types of rules. Fuzzy attribute rules ("a rules") were constructed to define and delineate the numerical input data into particular, semantic constructs such as "ridge," "steeply sloping," or "very wet" (R.A. MacMillan, Moon, and Coupe 2007). The mapper constructs these "a rules" 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 (relative moisture/nutrient grid) summarizing the site series existing in the region.

Once the attributes have been defined, the prediction of site series can begin. Fuzzy class rules ("c rules") 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 1 contains all the rule sets created for this PEM. The application of these

rules is not appropriate for another geographic area since they were developed using site-specific ecological knowledge, site-specific environmental attributes, and dependent on the image classification developed from the satellite imagery used.

3.2.1.3 PEM Assessment and Refinement

The PEM was assessed and refined throughout its development using:

- field survey data;
- satellite imagery and aerial photographs; and
- TEM information.

Field Survey Data

Field survey data collected during ecosystems and vegetation studies were used to refine the land cover map derived from satellite image classification. The land cover type (e.g., herb, shrub, coniferous-dominated forest, deciduous-dominated forest, 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.

Satellite Imagery and Aerial Photography

The satellite imagery used in the development of the PEM served as a backdrop and provided a general context for the area when viewing the PEM. It was used to immediately assess the reasonableness of the ecosystem predictions after each iteration of running the predictions for each BEC unit.

Aerial photographs at a scale of 1:30,000 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.

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 visually assessed. Where significant differences resulted, the image classification was manually edited.

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

Terrestrial Ecosystem Mapping is the manual delineation of ecosystem boundaries and attributes from aerial photographs. 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 assigned 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 one contains the most dominant ecosystem, while deciles two and three represent the subdominant ecosystems. Each ecosystem is also assigned structural stage, structural stage modifiers, and stand composition modifiers. For non-vegetated and anthropogenically modified polygons, map codes from the provincial database are used.

The LSA was mapped using TEM as required in the Murray River Application Information Requirements (AIR) and the mine permit application (BC Ministry of Energy and Mines 1998). Mapping was conducted

using 1:30,000 scale 2005 colour aerial photographs and was guided by d provincial standards (Howes and Kenk 1997; RIC 1998, 2000). Field survey data were used to refine the mapping, and to provide quality control of mapping classification.

Mapping was completed using PurVIEW software within ArcMap 9.3. PurVIEW enables users to view stereo pairs of digital air photos in 3D at variable scales. A DEM created from the provincial TRIM data was used to provide a control on the vertical plane (z-axis) to enable on-screen digitizing of polygons that are photogrammetricly accurate. Ecosystem polygons were cut from the larger terrain polygons when necessary to ensure identical common boundaries. The dataset was then cleaned to ensure no gaps, slivers or overlaps between polygons exist. The associated database was then populated as per the provincial standards (RIC 1998).

3.2.3 Vegetation Structural Stage

The existing vegetation developmental stage was described using structural stage. For example, a regenerating cut-block and a mature forest on the same site would be mapped as the same ecosystem type, but would have different structural stages. A numeric code is provided for each stage (Table 3.2-2), the details of which are provided in the TEM standards (RIC 1998). Structural stage is a required PEM and TEM attribute (RIC 1999) as it is an important attribute for wildlife (RIC 1998).

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)

Structural stage was assigned during PEM for the RSA, based on the spatial data and satellite imagery as outlined in Section 3.2.1.1. For the LSA, structural stage was determined concurrently with the delineation of site series during TEM through air photo interpretation.

3.3 SENSITIVE ECOSYSTEMS

Sensitive ecosystems are ecosystems that are fragile and/or rare (BC MOE 2010b), as defined by the BC MOE. Ecosystem fragility refers to the sensitivity of an ecosystem with respect to disturbance (McPhee et al. 2000). For this report, sensitive ecosystems include BC CDC, SARA or COSEWIC listed ecosystems as well as riparian areas, wetlands and alpine ecosystems, which are considered locally threatened or sensitive to disturbance.

3.3.1 Listed Ecosystems

A search of the online databases maintained by the BC CDC was conducted, and a list of blue or red-listed ecosystems potentially occurring in the RSA and LSA was compiled (Appendix 2). Red-listed ecosystems are those that have, or are candidates for, extirpated, endangered or threatened status in BC. Blue-listed ecosystems are those of special concern (formerly vulnerable) in BC. Placing taxa on these lists flags them as being at risk and requiring investigation (BC MOE 2007). Rankings depend on

factors such as rarity, intrinsic vulnerability, environmental specificity, threats, and long- and short-term trends in population size or area (BC MOE 2007).

3.3.2 Non-listed Sensitive Ecosystems

3.3.2.1 Riparian Ecosystems

Riparian ecosystems occupy the transitional area between a watercourse (i.e., river or stream) and upland. In general, riparian ecosystems occupy a small proportion of the landscape and contain distinct vegetation communities providing unique wildlife habitat. They serve a number of important ecological functions, such as providing early spring migration pathways, side-channel spawning, rearing habitat, and water temperature regulation as well as bank stability to reduce erosion (Banner and MacKenzie 1998).

For this assessment, riparian area buffers were assigned according to stream order as defined by the Ministry of Environment's 1:50,000 scale watershed atlas in GIS shapefile format. Orders are a measure of the relative size of streams (BC MOFR 2004a). Using a hierarchy of strength, stream order increases as the stream network expands. For example, it takes a joining of two first order streams to form a second order stream. When two second order streams combine, they form a third order stream, and when two third order streams join, they form a fourth and so on. Headwater streams or those streams in the upper reaches of watersheds are classified as orders one through three, while valley bottom streams invariably are assigned to higher orders.

Buffers were assigned to all streams above the third order. Third order streams were chosen because they typically represent the transition to perennial streams from ephemeral, or intermittent, streams, which are common among first and second order classifications.. A 30m buffer was assigned to all 3rd and 4th order streams and a 100 m buffer was assigned to higher order streams. The chosen widths meet the mandated buffer widths outlined in the Riparian Areas Regulation (2004) enacted under section 12 of the *Fish Protection Act* (1997) as well as the *Forest and Range Practices Act (BC MOFR 2004b)*.

3.3.2.2 Wetland Ecosystems

Wetlands are dynamic, low-lying areas on the landscape that are saturated with water long enough to promote wetland or aquatic processes as indicated by poorly-drained soils, hydrophytic vegetation and various kinds of biological activity which are adapted to a wet environment (Warner and Rubec 1997). They include both the wet basin and surrounding transitional areas between wetter zones and upland vegetation (Huel 2000). Wetlands can range from sites that contain 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, regulate water flow on the landscape, and provide erosion control. They also provide habitat for a wide variety of wildlife, including many economically important game species (Natural Resources Canada 2009).

Wetland ecosystems were classified in the field using the Wetlands of BC classification guide (MacKenzie and Moran 2004). These data were then used to refine the TEM and the finer scale wetland mapping. For PEM, wetlands were mapped using inputs from TRIM data, Vegetation Resource Inventory (VRI), terrain and soils mapping data, and TEM data. These are used to guide the image classification exercise so that wetlands occupying a variety of landscape positions and parent materials are modelled.

A description of the quantity, size and location of wetlands as well as the hydrological physical, chemical and biological characteristics of wetlands are discussed in the Murray River Wetland Baseline Report 2011 (Rescan 2011).

3.3.2.3 Alpine Ecosystems

Alpine ecosystems are defined by a general absence of trees, although krummholz forms may exist. Alpine areas are often dominated by un-vegetated areas, such as permanent snow, ice fields, rock outcrops, and barren soil. The ecosystems are dominated by graminoid herb, forb, herb, and dwarf shrub vegetation communities. Alpine ecosystems are considered sensitive due to their slow recovery rates following disturbance which is primarily attributable to the short growing season of the alpine environment. Only vegetated alpine ecosystems will be considered as sensitive for the purposes of this report.

Alpine ecosystems are important seasonal habitat, providing forage, breeding areas, and escape from predators and insects. For example, grizzly bear (*Ursus arctos*) forage extensively in alpine and meadow areas in the summer and fall. Caribou (*Rangifer tarandus*) and mountain goat (*Oreamnos americanus*) both use alpine areas for winter habitat (Klinkenberg 2009).

3.3.3 Ecosystems of Significance to First Nations

Information obtained through community-based data gathering regarding ecosystems of significance will be included in the EA Application as it becomes available.

3.4 FIELD SURVEYS

The terrestrial ecosystems and vegetation field surveys occurred concurrently with the soils baseline field surveys (Rescan 2012). Data were collected in accordance with provincial standards and regional field guides (DeLong, MacKinnon, and Jang 1990; DeLong 2004). Field data were entered into the provincial data entry program VENUS (version 5.1) and quality checked for the following:

- all plant species names entered correctly (checked against the Master species list);
- all GPS UTM coordinates are entered correctly (checked against the field plot card);
- no blanks in any pertinent database fields; and
- no missing plot name, photo number, or UTM coordinate duplicates.

3.4.1 Terrestrial and Predictive Ecosystem Mapping Field Surveys

The primary objective of the field surveys was to ground truth TEM and PEM by providing information on the types, locations and frequency of ecosystems. Survey efforts were 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 over three years during the summers of 2010, 2011 and 2012. Five field trips were completed in total, each of which was between 7 and 12 days in duration.

Field plot 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) or a FS882 form 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 within an area approximately 400 m^2. 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 have been used to refine the delineation of ecosystem units for TEM and assisted in the creation of PEM rule sets.

Plant Species Richness

Species richness is the number of species present within a defined area and is a way to measure environmental homogeneity. Species richness was determined from the plant list collected during field surveys. Differences in species richness between plots can be largely attributed to variations in the abundance of fine-scale habitat features, the development of which is associated with disturbances that may not be beneficial in terms of promoting site productivity and ecological stability.

3.4.2 Listed Plants Species

Online searches were conducted to identify rare plants potentially occurring within the RSA prior to the commencement of field work and again prior to completion of the baseline report. The following databases were utilized:

- the BC Conservation Data Centre (BC CDC 2012);
- the Committee on the Status of Endangered Wildlife in Canada (COSEWIC); and
- the Species at Risk Registry (BC CDC 2012; Environment Canada 2010).

Query parameters for the BC CDC search were set to identify all red- and blue-listed vascular plants potentially occurring within the LSA and RSA. The resulting list of potentially occurring threatened, extirpated, or endangered species (Appendix 3) was used for general and specific surveys. Field surveys for listed plants were conducted in conjunction with general field surveys throughout the LSA in 2010 and 2011. A specific presence/not-detected survey for rare vascular plants of the Murray River proposed mine surface facilities area was performed June 24 to 27, 2011 and August 18 to 22, 2011 using the Alberta Native Plant Council Guidelines for Rare Plant Surveys in Alberta (Alberta Native Plant Council 2000). Surveys were timed to enable the detection of early and late flowering species.

While the potential location of listed vascular species cannot be identified using ecosystem maps, rare plant habitat is often associated with fine-scale and uncommon landscape features that can be linked to the types of features encountered during field surveys. Features such as wetlands, rock outcrops, and seepage areas are examples of uncommon landscape attributes that have a higher potential of supporting rare plant habitat. Initial surveys were completed in all habitat types found in the LSA, then focused on uncommon habitats (based on TEM mapping) and habitats likely to contain listed species identified in the literature search. Once a listed (or potentially listed) species was identified, surveys were focused on similar habitat to determine if other individuals or populations of the species occurred. Where listed plants were suspected in the field, they were documented and photographed. Site details and location were noted and voucher specimens of listed plants were collected at sites where the local population was not at risk. All species that could not be positively identified in the field were collected and identified with the aid of floral keys and a microscope. Species that were identified as rare, and those that were potential rare species, were pressed for expert confirmation.

Rare plant populations can often be very small, making voucher collection questionable. During rare plant surveys, full vouchers (entire plants) were taken if the population is large enough to withstand the loss of an individual, or if the rare species is locally abundant. Some experts recommend collecting vouchers only in populations with greater than 20 individuals; this number was assessed on a species by species basis. Although some rare species are reported to be sensitive to the genetic loss of even one individual, and this loss can precipitate population declines, most species can usually withstand collection of a partial specimen.

3.4.3 Plants of Significance to First Nations

Information obtained through community-based data gathering regarding plants of significance will be included in the EA Application as it becomes available. Given a particular plant species of interest to First Nations, Terrestrial Ecosystem Mapping and field survey data can be used to identify probable habitats and locations in relation to planned Project infrastructure and activities.

3.4.4 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). A list of invasive plants and noxious weeds according to the *British Columbia Weed Control Act* (1985) and the (NEIPC) was compiled prior to the commencement of fieldwork. The plant prioritization categories and associated definitions are summarized in Table 3.4-1.

Table 3.4-1. North East Invasive Plant Council's Plant Prioritization Categories for Invasive Plants

Plant Prioritization Category	Definition
A. Prohibited Invasive Species	Prohibited invasive plants are highly competitive with an ability to spread rapidly.
B. Primary Invasive Species	Primary invasive plants have the ability to spread rapidly but are not as aggressive as prohibited invasive plants.
C. Secondary Invasive Species	Secondary invasive plants can spread easily but the requirement to contain them is usually site specific. Invasive plants under successful biological control and certain native plants may be included in this category.

Source: North East Invasive Plant Committee (2010).

Presence/not detected level surveys were conducted for invasive plants throughout the LSA and at several sites within the RSA. Surveys focused primarily on transportation corridors and disturbed areas, such as forestry cut blocks and gravel pits as well as at TEM and PEM plot locations.

3.5 METAL CONCENTRATIONS IN PLANT TISSUES

The metals analyses determines baseline metal levels in soils, lichens and plants in the area of proposed infrastructure as well as control sites outside of the expected zone of influence of potential project environmental effects. This data comprises the basis to evaluate any changes in metal levels in soils, lichens and plants due to the Project. Soil, lichen and plant tissue samples were collected and analyzed as part of soils, terrestrial and wetland baseline studies conducted for the Project. Results from the baseline metals analysis may be used for country foods assessments and/or future monitoring programs. The samples collected, sampling sites and results of the metal analysis are provided in the *Murray River Coal Project:2010 to 2012 Ecosystem and Vegetation Baseline Report Report* (2013).

4. Results

4. Results

4.1 REGIONAL STUDY AREA

4.1.1 BEC Units within the Regional Study Area

The Murray River RSA overlaps nine BEC units (Table 4.1-1). Six of the BEC units are forested, two are parkland (transition to alpine) and one is alpine. The lower elevation BWBS zone covers the greatest proportion (41%) of the RSA and contributes significant merchantable timber in the local forest industry. The environmental characteristics of each BEC unit are summarized in the following sections.

Table 4.1-1. Ecological Characteristics and Extent of BEC Units within the Regional Study Area

BEC Unit Name	BEC Unit Label	General Ecology	Elevation Range (m)	Mean Annual Precipitation (mm)	Mean Annual Temperature (°C)	Extent (ha)	Extent (%)	Natural Disturbance Type*
Boreal Altai Fescue Alpine – undifferentiated	BAFAun	Alpine		700 to 3,000	-4.0 to 0.0	6,822	3	5
Boreal White and Black Spruce –Moist Warm	BWBSmw	Forest	750 to 1,050	424 to 749	-0.8 to 3.6	32,066	14	3
Boreal White and Black Spruce – Murray Wet Cool	BWBSwk1	Forest	850 to 1,200	644 to 897	2.1 to 3.3	60,897	27	3
Engelmann Spruce – Subalpine Fir – Bullmoose Moist Very Cold	ESSFmv2	Subalpine Forest	1,000 to 1,400	414 to 1,259	-0.9 to 1.9	85,109	37	2
Engelmann Spruce – Subalpine Fir – Moist Very Cold Parkland	ESSFmvp	Parkland Forest				11,996	5	5
Engelmann Spruce Subalpine Fir – Cariboo Wet Cold	ESSFwc3	Subalpine Forest	1,300 to 1,550	1,177 to 1,625	-3.1 to 1.1	3,455	2	1
Engelmann Spruce Subalpine Fir – Wet Cold Parkland	ESSFwcp	Parkland Forest				1,652	1	5

(continued)

Table 4.1-1. Ecological Characteristics and Extent of BEC Units within the Regional Study Area (completed)

BEC Unit Name	BEC Unit Label	General Ecology	Elevation Range (m)	Mean Annual Precipitation (mm)	Mean Annual Temperature (°C)	Extent (ha)	Extent (%)	Natural Disturbance Type*
Engelmann Spruce Subalpine Fir – Misinchinka Wet Cool	ESSFwk2	Subalpine Forest	950 to 1,300	1,190 to 1,738	-0.5 to 1.0	3,594	2	1
Sub-Boreal Spruce – Finlay Peace Wet Cool	SBSwk2	Forest	750 to 1,200	518 to 1,916	-0.1 to 5.0	21,987	10	2

**NDT 3 BEC units include the following: BWBS, MS, SBPS, ESSFdc, ESSFdk, ESSFdm, ESSFdv, ESSFxc,ICHdk, ICHdw, ICHdm, ICHmk1, ICHmk2, ICHmk4, ICHmw1, ICHmw3, ICHxw, SBSdh, SBSdk, SBSdw, SBSmc, SBSmh, SBSmk, SBSmm, SBSmw and SBSwk3; NDT 5 BEC units comprise alpine and parkland units; NDT 1, 2 & 4 BEC units comprise all other BEC units (BC Ministry of Forests and Range and BC Ministry of Environment 2010).*

4.1.1.1 The Boreal Altai Fescue Alpine

The Boreal Altai Fescue Alpine undifferentiated (BAFAun) zone is the most extensive alpine BEC unit within the province. It covers alpine areas of the northern Rocky, Skeena, Omineca, and Cassiar Mountains and the lee side of the northern Coast Mountains (Banner et al. 1993). The BAFA zone is largely treeless; however, trees may occur in krummholz form at the lowest elevations (Pojar and Stewart 1991). The climate is characterized by very long, cold winters, and short, cool summers. Although deeper snowpacks may occur in some areas, a thin windblown snowpack is typical. Ground freezing and cryoturbation (soil frost churning) features are common. Much of the BAFA zone is well-vegetated alpine tundra. The most common plant groups are dwarf willows, grasses, sedges, and lichens (BC MOFR 2006).

4.1.1.2 Boreal White and Black Spruce- Moist Warm

The Boreal White and Black Spruce - Moist Warm (BWBSmw) unit occurs in low-lying areas of northeastern valley bottoms and plateaus on the Alberta Plateau (Marcoux 2010). (Elevation ranges from 750 to 1,050 m. Stands of trembling aspen (*Populus tremuloides*) are common within this BEC unit, largely due to anthropogenic disturbance and fire history, which has created favourable habitat for this species (DeLong et al. 2010). Balsam poplar (*Populus balsamifera*) is common on lower slopes and along river and stream courses (DeLong et al. 2010). White spruce (*Picea glauca*) is typical on moister sites where there has been limited disturbance history, whereas lodgepole pine (*Pinus contorta*) is present as a seral species on drier and poorer sites. Black spruce (*Picea mariana*) forests, commonly with a minor component of tamarack (*Larix laricina*), are often found on organic soils. Black spruce also occurs on upland sites mixed with lodgepole pine where there are cold soils or limited rooting availability. Tamarack can occur, but to a limited extent, as pure stands on very wet rich sites as well as rarely on upland sites.

4.1.1.3 Boreal White and Black Spruce - Murray Wet Cool

The BWBS - Moist Warm (BWBSwk1) variant is found in the foothills and along mid to lower slopes of the Rocky Mountains from where the Rocky Mountains transect the Alberta border to just north of the Peace arm of Williston Lake (Delong et. al 2010). The elevation range is generally 850 to 1,200 m. White spruce dominates mature forests, with lesser amounts of black spruce occurring on wetter and poorer sites. Pure black spruce stands can occur on very wet sites on organic soils. Lodgepole pine is the dominant seral species and forms widespread forests along with minor amounts of white spruce

and/or black spruce. Trembling aspen is common as a seral species at lower elevations, particularly on warmer aspects.

4.1.1.4 Engelmann Spruce – Subalpine Fir - Bullmoose Moist Very Cold

The ESSFmv2 unit occurs predominantly within the Rocky Mountain Foothills, east of the Rocky Mountain divide as far south as Willmore Wilderness Park and as far north as the Peace Arm of Williston Reservoir (DeLong, Tanner, and Jull 1994). The elevation ranges from 950 to 1,550 m and it lies above the SBSwk2 (MacKinnon et al. 1990 *in* (DeLong, Tanner, and Jull 1994) or BWBSwk1 (DeLong, MacKinnon, and Jang 1990)*in* (DeLong, Tanner, and Jull 1994). This variant is the driest and coldest of the lower elevation ESSF variants.

Zonal sites of this variant are dominated by a Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) canopy with a diverse, moderately well-developed understory of shrubs and herbs ((DeLong, Tanner, and Jull 1994). Dry sites are dominated by lodgepole pine and in combination with black spruce on poor sites. Wetter sites are dominated by Engelmann spruce canopy.

4.1.1.5 Engelmann Spruce – Subalpine Fir - Moist Very Cold Parkland

The ESSFmvp unit is the corresponding parkland subzone above the ESSFmv2. As such, the two areas share many characteristics. However, the harsher climate in the parkland subzones limits forest. Patches of trees are interspersed by dwarf shrubs and herb meadows (Banner et al. 1993).

4.1.1.6 Engelmann Spruce Subalpine Fir - Cariboo Wet Cold

The ESSF - Cariboo Wet Cold (ESSFwc3) variant occurs in north-eastern BC, south of the Peace River, within the Misinchinka, Hart and Park Ranges of the Rocky Mountains and the McGregor Plateau. This variant is characterized by a wet cold climate with a long lasting snowpack. Snow may persist for six to nine months (Banner et al. 1993).

The forests that are predominately coniferous are typically dominated by widely spaced subalpine fir. Non-forested ecosystems within the ESSFwc3 include moist subalpine sites, high elevation bedrock outcrops and avalanche tracks.

4.1.1.7 Engelmann Spruce Subalpine Fir - Wet Cold Parkland

The ESSF – Wet Cold Parkland (ESSFwcp) is the parkland subzone above the ESSFwc3. As such, the two areas share many characteristics. However, the harsher climate in the parkland subzones does not allow for the continuous growth of forest. Patches of trees are interspersed by dwarf shrubs and herb meadows (Banner et al. 1993)

4.1.1.8 Engelmann Spruce Subalpine Fir - Misinchinka Wet Cool

The ESSF – Misinchinka Wet Cool (ESSFwk2) mainly occurs west of the Rocky Mountain divide as far south as the Morkill River and as far north as the Ospika Arm of Williston Reservoir. It always occurs below the ESSFwc3. This unit is characterized by a wet and cool climate and has snowpacks in excess of three metres.

The ESSFwk2 experiences rare stand-initiating natural disturbances and thus contains a high proportion of mature (>120 years) to old (>250 years) forests. These forests are predominantly comprised of Engelmann spruce and subalpine fir. In some of the low lying areas between ridges, particularly on north facing slopes extensive communities of Sitka alder *(Alnus crispa* ssp. *sinuata)* dominate the landscape (DeLong, Tanner, and Jull 1994).

4.1.1.9 Sub-Boreal Spruce Zone - Finlay-Peace Wet Cool

The Sub-Boreal Spruce - Finlay-Peace Wet Cool (SBSwk2) variant is characterized by a continental climate that results in cold, snowy winters and warm, moist summers. It occurs at mid-elevations along Williston Lake and other major drainages in the Rocky Mountains, from the Narraway River in the south to the Peace Arm of Williston Lake in the north (DeLong 2004).

The SBSwk2 variant is distinguished from adjacent biogeoclimatic units (BWBSdk1, BWBSmw, BWBSwk1, BWBSwk2, SBSmk1, and SBSmk2) by the presence of more devil's club (*Oplopanax horridus*) and oak fern (*Gymnocarpium dryopteris*) in the understory. The SBSwk2 is also differentiated from the ESSFmv3 by the presence of more devil's club and oak fern and less white-flowered rhododendron (*Rhododendron albiflorum*) on mesic sites.

The SBSwk2 is typically dominated by climax coniferous forests of hybrid spruce (*Picea glauca* x *engelmannii*), lodgepole pine and subalpine fir. Black cottonwood (*Populus balsimifera* ssp. *trichocarpa*) also occurs regularly along streams and rivers.

4.1.2 Site Series and General Ecosystem Types

A total of 113 ecosystems (BEC/site series), including undifferentiated '00' sites series, were mapped in the RSA. The BWBS zone classification has recently been revised based on new data and inter-regional correlation of BWBS units (DeLong et al. 2010). The information summarized in this report uses the new site series resulting from this revision. The ecological characteristics of each site series are summarized in Appendix 4.

In an effort to simplify the ecosystem mapping for reporting purposes, site series have been grouped into General Ecosystem Types. This was done according to their relative moisture status as well as their potential climax structural stage. The following section summarizes the extent of general ecosystem types within the RSA. The results are divided by BEC unit in order to provide additional ecological context.

The RSA is characterized predominantly by mesic forests, covering 42%, or 95,016 ha, of the RSA (Table 4.1-2; Figure 4.1-1). This includes all structural stages of mesic forest, from herb to old forest. The extent of each structural stage is provided in the following section.

4.1.3 Structural Stages

The RSA contains a mix of forested and non-forested structural stages. Mature forests are the most extensive structural stage, covering approximately 35% of the overall RSA (Table 4.1-3; Figure 4.1-2). Shrub is the next most abundant, accounting for approximately 21% of the overall RSA. This includes much of the re-forested extent within the RSA. Old forest, herb, young forest, sparse/bryoid, and pole/sapling comprise the remaining portions of the vegetated landbase, from the greatest to least extent. Non-vegetated area (i.e., water) covers 0.01% of the RSA.

4.1.4 Extent of Sensitive Ecosystems

4.1.4.1 Listed Ecosystems

Seven provincially listed ecosystems were identified by PEM, covering 6% of the RSA (Table 4.1-4). Of these ecosystems, one is red listed (extirpated, endangered or threatened) and six are blue listed (of special concern; Figure 4.1-3). Descriptions of each listed community are provided in the following subsections.

Table 4.1-2. Extent of General Ecosystem Types by BEC Unit in the Regional Study Area

General Ecosystem Type	BEC UNIT									Total RSA Extent (ha)
	BAFAun	BWBSmw	BWBSwk1	ESSFmv2	ESSFmvp	ESSFwc3	ESSFwcp	ESSFwk2	SBSwk2	
Barren	3,854	2,417	1,369	4,427	2,531	112	255	144	1,862	16,970
Dry to Mesic Forest	501				2,598		447			3,546
Dry to Mesic Herb	2,131				2,326		243			4,700
Dry to Mesic Shrub					2,877		495			3,371
Mesic Forest		14,706	27,751	41,017		2,003		2,041	7,498	95,016
Moderately Dry Forest		5,696	3,690	3,911		470		79	5,794	19,641
Moist Forest		3,628	6,728	13,783		835		1,048	4,043	30,065
Moist Forest/Mid Bench Floodplain		593								593
Moist to Wet Herb	331				383		74			788
Moist to Wet Shrub					752		92			844
Slightly Dry to Moist Forest		1,732	15,016	17,488					1,226	35,461
Water	5	953	587	83	20	1	1	0	532	2,182
Wet Forest				3,298	500		42	273		4,114
Wetland	0	2,341	5,756	1,103	10	33	2	8	1,032	10,285
Grand Total	**6,822**	**32,066**	**60,897**	**85,109**	**11,996**	**3,455**	**1,652**	**3,594**	**21,987**	**227,579**

Table 4.1-3. Extent of Structural Stage Types by BEC Unit in the Regional Study Area

Structural Stage	BEC UNIT									Total RSA Extent (ha)	Proportion of RSA (%)
	BAFAun (ha)	BWBSmw (ha)	BWBSwk1 (ha)	ESSFmv2 (ha)	ESSFmvp (ha)	ESSFwc3 (ha)	ESSFwcp (ha)	ESSFwk2 (ha)	SBSwk2 (ha)		
Sparse/Bryoid (1)	3,854	2,417	1,369	4,440	2,531	112	255	144	1,862	16,984	7
Herb (2)	2,462	4,486	4,005	5,689	2,730	132	318	335	3,304	23,462	10
Shrub (3)	501	4,853	10,262	21,112	4,033	1,014	621	519	3,907	46,823	21
Pole/Sapling (4)		619	3,299	436	1				321	4,675	2
Young Forest (5)		1,544	4,179	12,830	444	4	3	35	4,366	23,404	10
Mature Forest (6)	8,068	20,775	38,132	1,770	1,832	312	1,343	7,260	79,493	35	
Old Forest (7)		9,129	16,421	2,387	468	357	142	1,216	436	30,556	13
Non-vegetated	5	953	587	83	20	1	1	0	532	2,182	1
Grand Total	**6,822**	**32,066**	**60,897**	85,109	**11,996**	**3,455**	**1,652**	**3,594**	**21,987**	**227,579**	**100.0**

Table 4.1-4. Extent of BC CDC Listed Ecosystems within the RSA

Ecosystem (site series/site association)	Scientific Name	English Name	BC CDC List	Extent in RSA (ha)
ESSFmv2/06: Ws08	*Abies lasiocarpa - Alnus* spp. - *Equisetum* spp.	Subalpine fir - Alders - Horsetails	Blue	3,298
BWBSmw/110	*Picea glauca - Gymnocarpium dryopteris - Aralia nudicaulis*	White spruce - Oak fern - Sasparilla	Blue	542
BWBSmw/111; BWBSwk1/110[1]	*Picea glauca - Ribes triste - Equisetum* spp.	White spruce - Currant - Horsetail	Blue	8,263
BWBSmw/112[2]	*Populus balsamifera - Picea glauca - Alnus incana - Cornus stolonifera*	Balsam poplar - White spruce - Mountain alder - Dogwood	Red	593
BWBSwk1/103	*Picea glauca – Pinus contorta - Shepherdia canadensis – Aster conspicuus*	White spruce - Lodgepole pine - Soopolallie - Showy aster	Blue	370
SBSwk2/02	*Pinus contorta / Vaccinium membranaceum / Cladina spp.*	lodgepole pine / black huckleberry / reindeer lichens	Blue	474
Wb06	*Larix laricina - Aulacomnium palustre*	Tamarack - Glow moss	Blue	120
Sum				**13,660**

Note: Seral site series are not included (e.g., BWBSwk1/101$, etc).
[1] *This map unit is an over-estimate because it is included in the predicted lumped site series of BWBSwk1/110/111.*
[2] *This map unit is an over-estimate because it is included in the predicted lumped site series of BWBSmw/111$/112.*

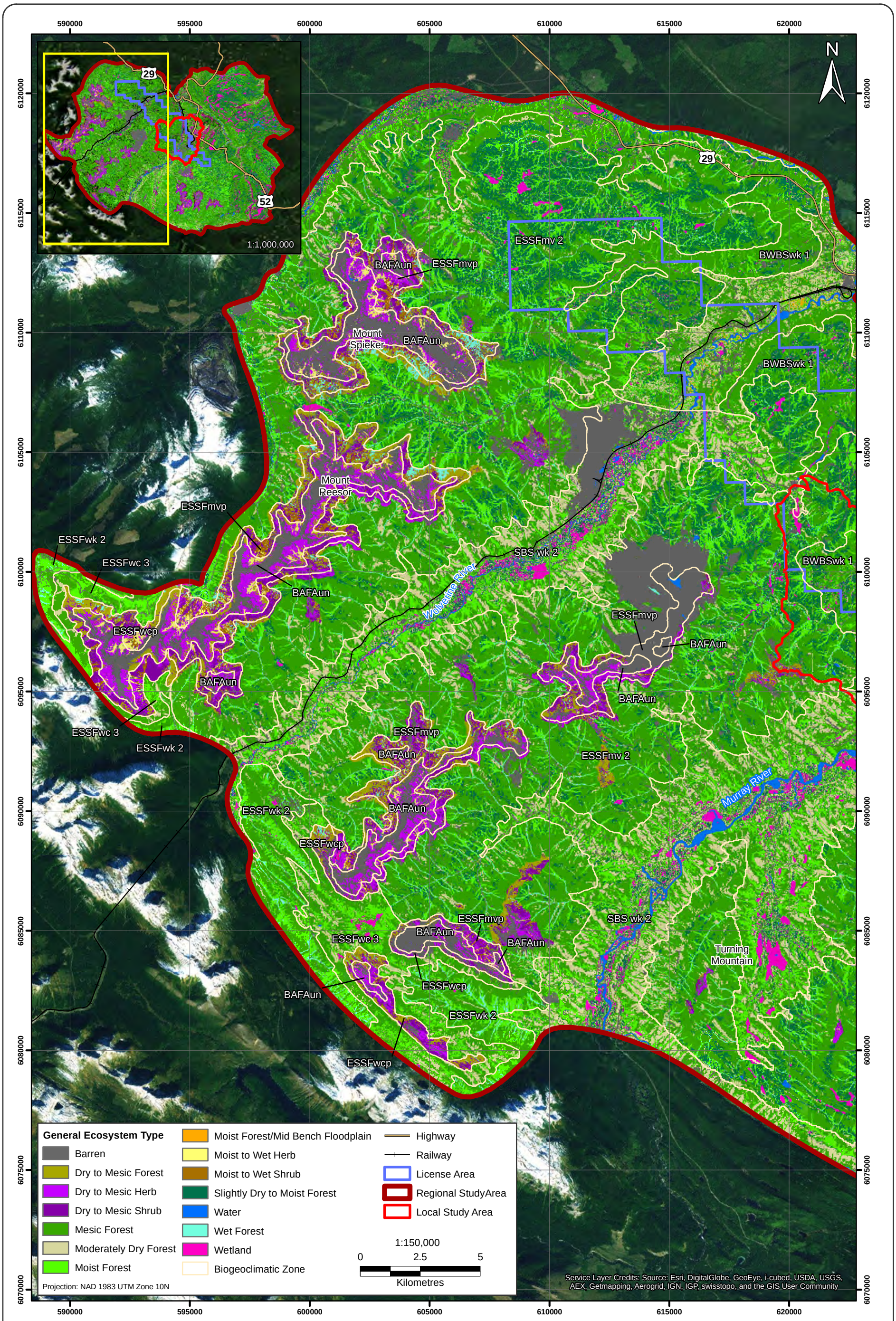

Figure 4.1-1a

hd Mining

MURRAY RIVER COAL PROJECT

Distribution of General Ecosystem Types in the Regional Study Area Map 1

Figure 4.1-1a

Rescan an ERM company

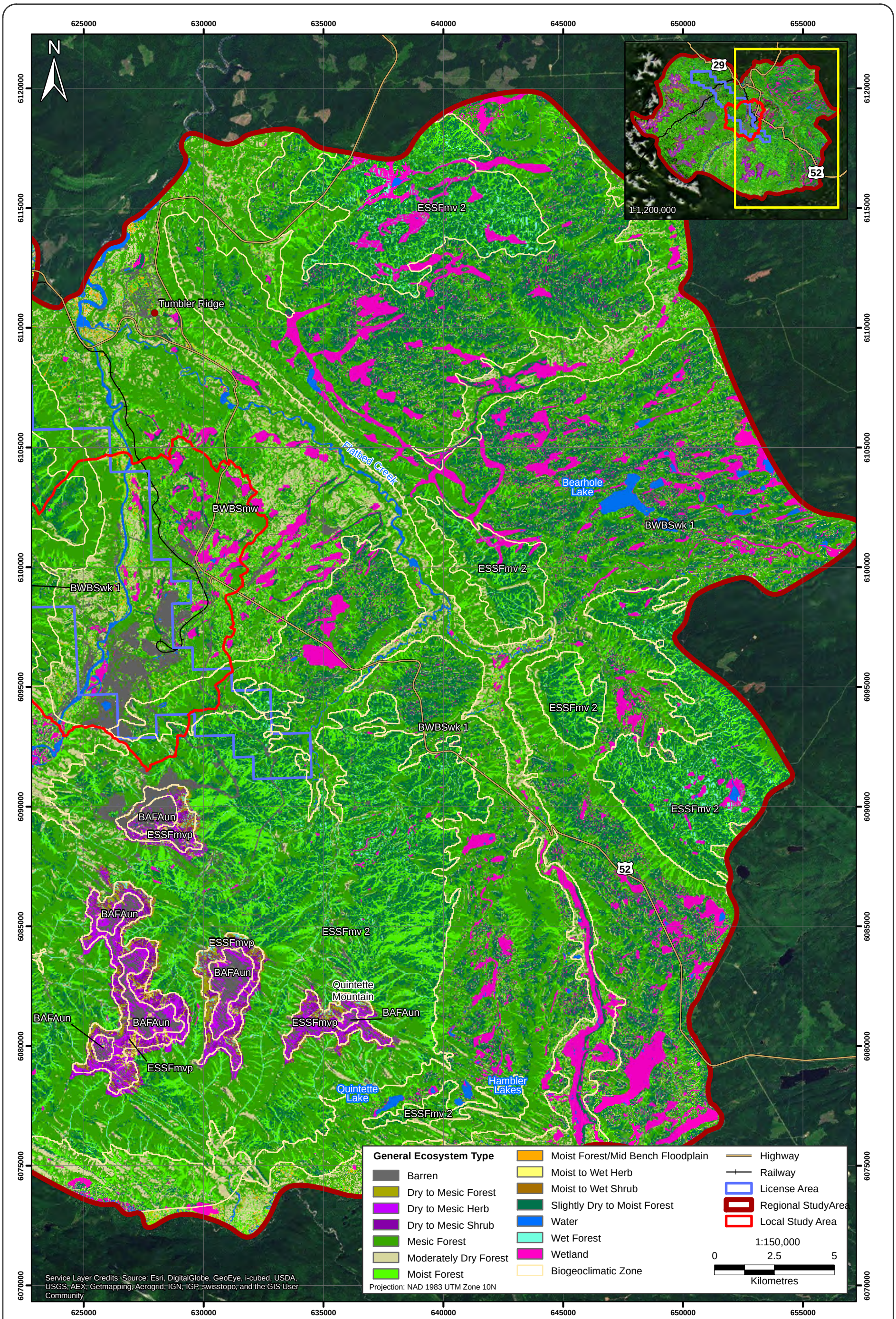

Figure 4.1-1b

hd Mining

MURRAY RIVER COAL PROJECT

Distribution of General Ecosystem Types in the Regional Study Area Map 2

Figure 4.1-1b

Rescan an ERM company

PROJECT # 0791-007-45 *GIS #* MUR-20-019a *VERSION #* T0.10 February 26 2013

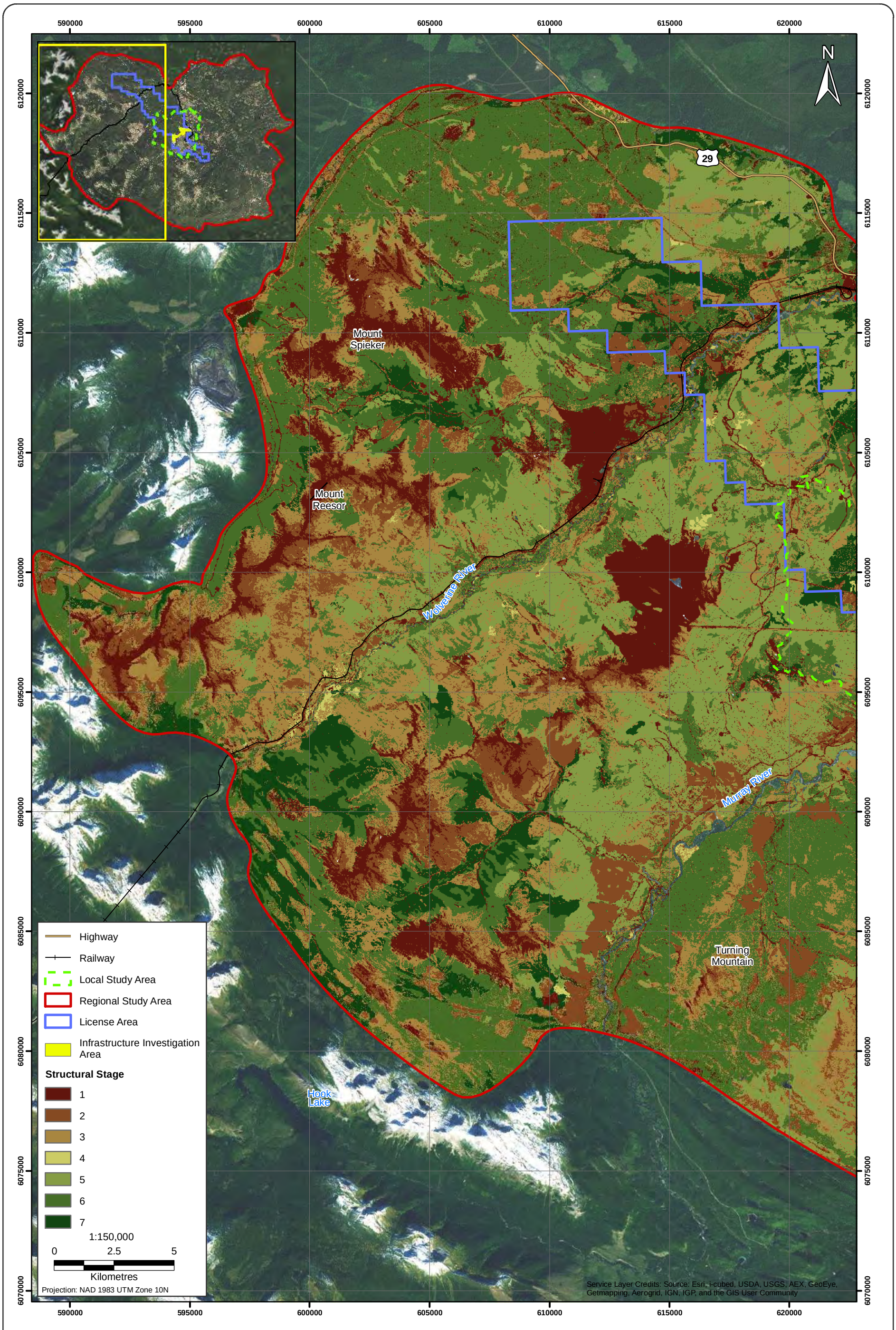

Figure 4.1-2a

MURRAY RIVER COAL PROJECT

Structural Stages in the Regional Study Area
Map 1

Figure 4.1-2a

Rescan™ Engineers & Scientists

PROJECT # 0194106-0003-0009 *GIS #* MUR-20-019b *VERSION #* T0.10 April 11 2013

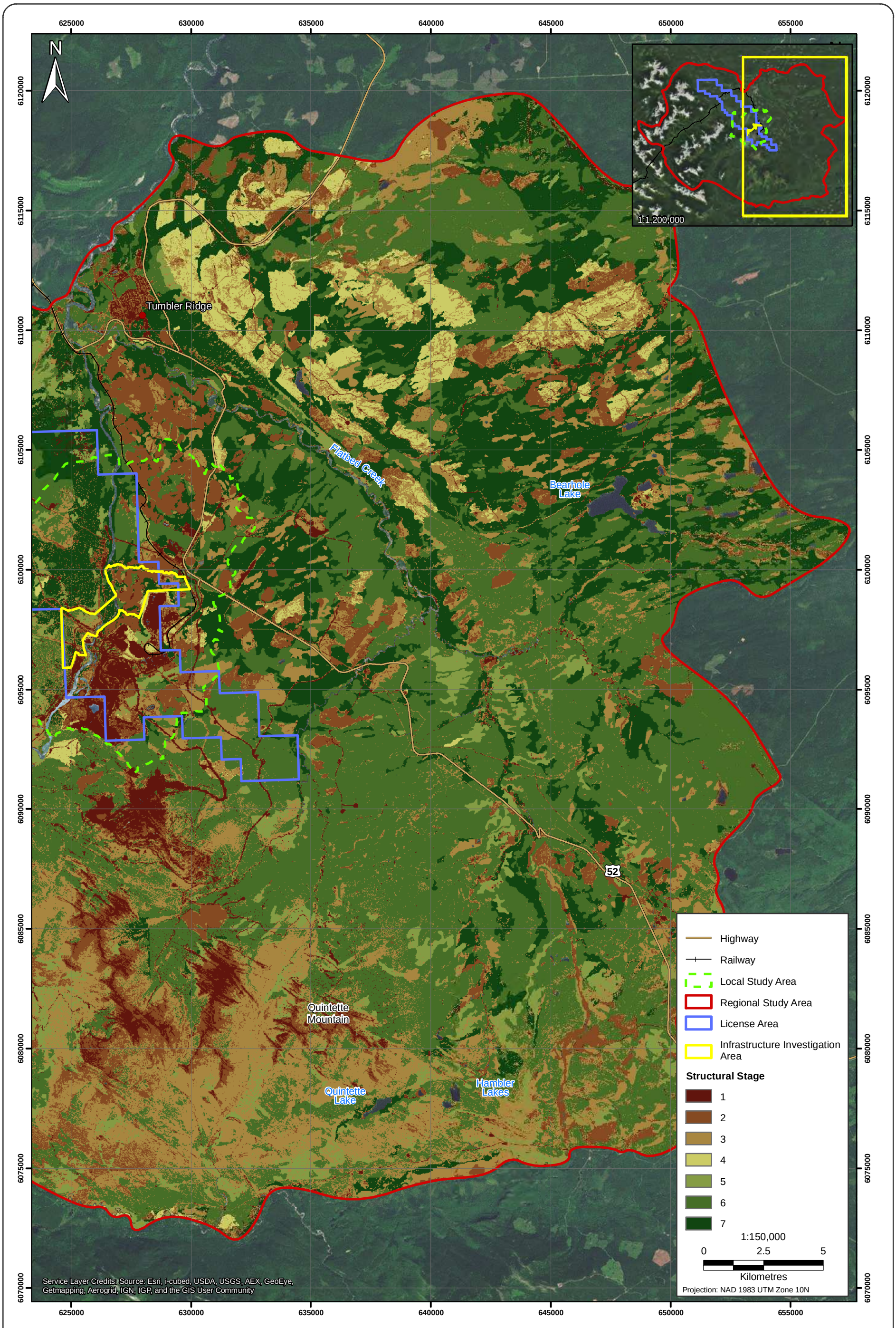

Figure 4.1-2b

hd Mining

MURRAY RIVER COAL PROJECT

Structural Stages in the Regional Study Area Map 2

Figure 4.1-2b

Rescan™ Engineers & Scientists

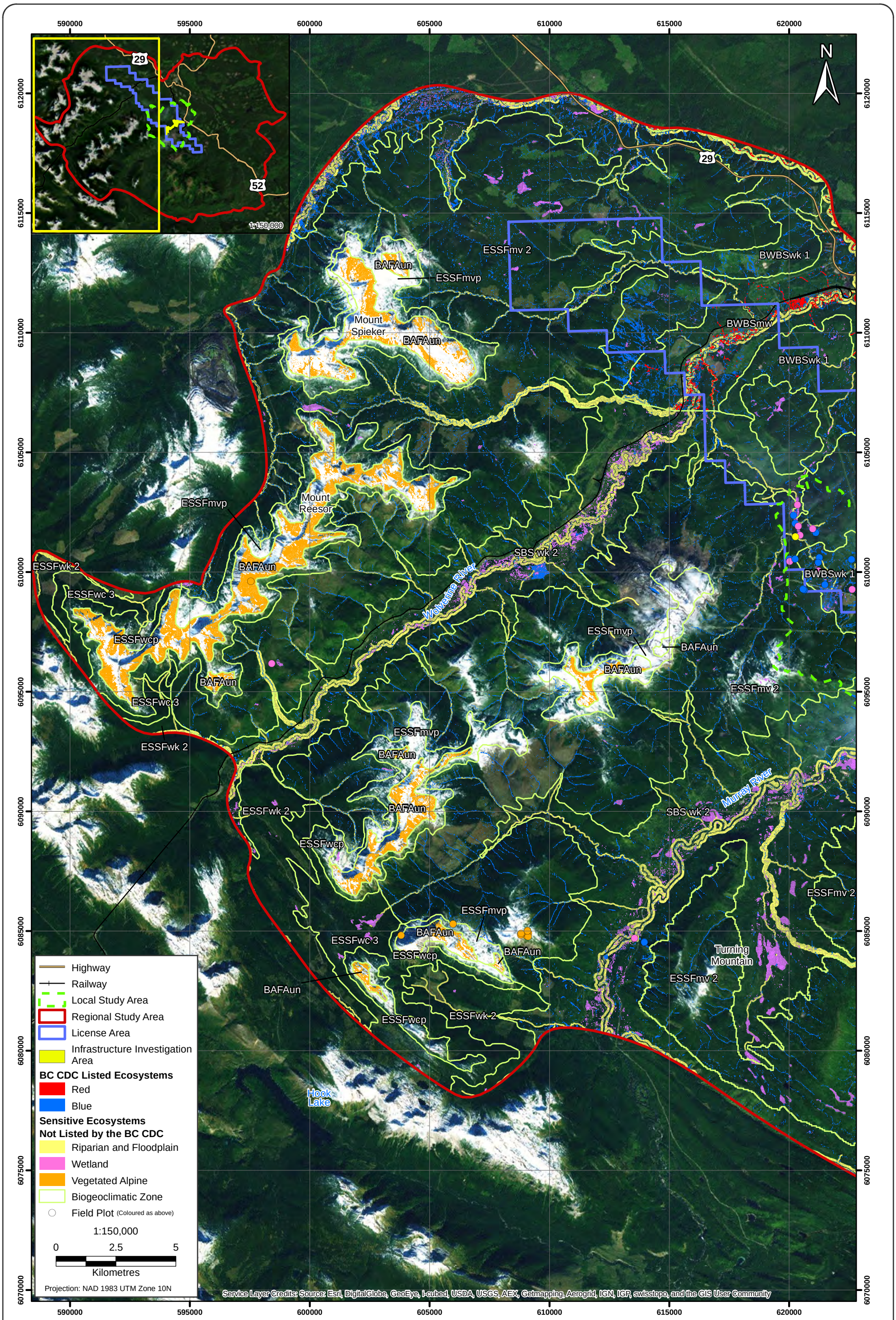

Figure 4.1-3a

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Sensitive Ecosystems of the Regional Study Area - Map 1

Figure 4.1-3a

Rescan an ERM company

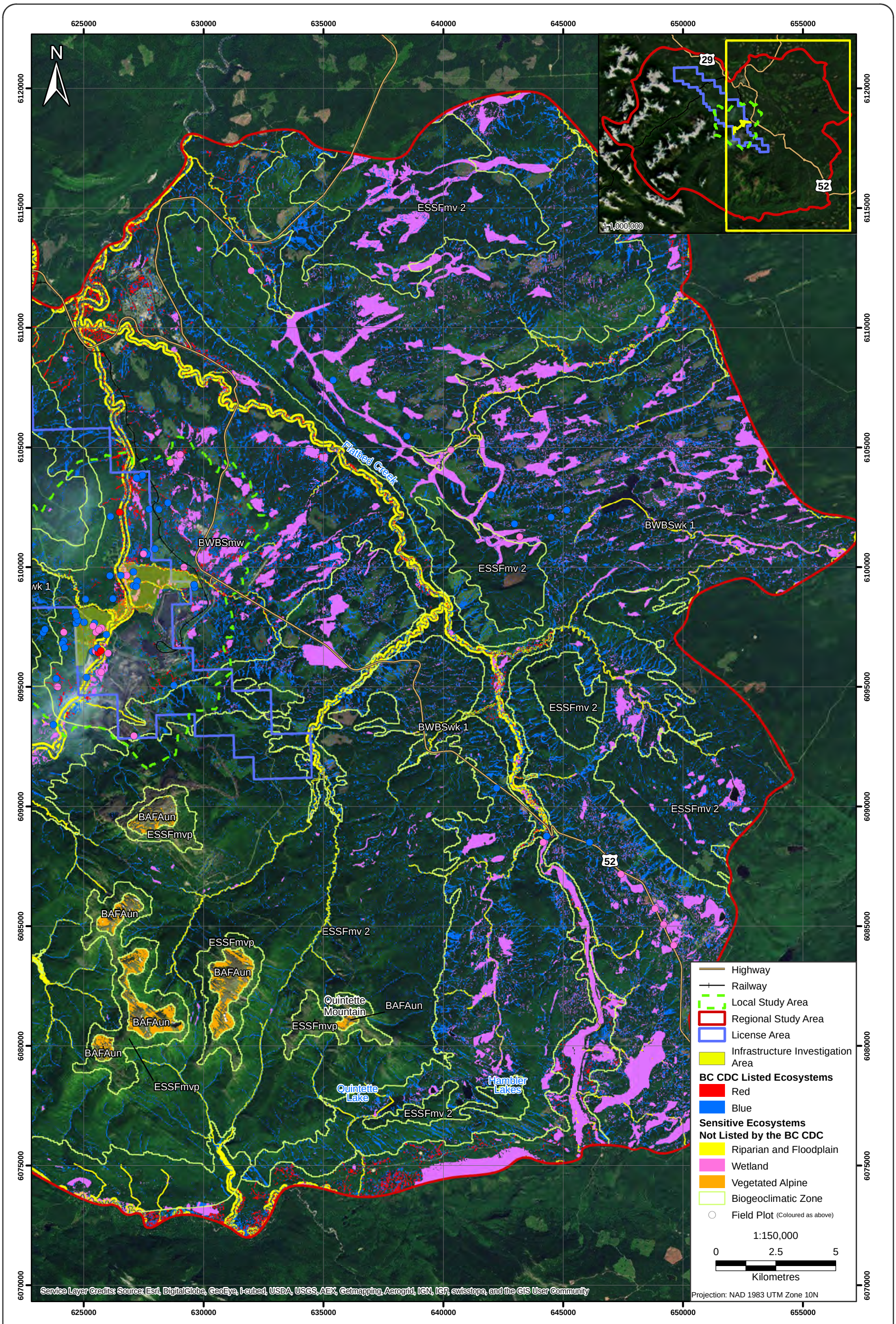

Figure 4.1-3b

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MURRAY RIVER COAL PROJECT

Sensitive Ecosystems of the Regional Study Area - Map 2

Figure 4.1-3b

Rescan an ERM company

ESSFmv2/06 (Ws08): Subalpine Fir – Alders - Horsetails

The subalpine fir – alders – horsetails unit can be referred to as either ESSFmv2/06 site series or the Ws08 swamp wetland classification from Mackenzie and Moran (2004). This wet forested ecosystem occurs on level sites or in depressions (Plates 4.1-1 and 4.1-2; Table 4.1-5). Soils are hygric to hydric, and saturated throughout much of the growing season. Engelmann spruce forms an open canopy with lodgepole pine. The shrub, herb and moss layers are often dense and contain mountain alder (*Alnus incana* ssp. *tenuifolia*), rhododendron (*Rhododendron* sp.), horsetail (*Equisetum* spp.) and oak fern (*Gymnocarpium dryopteris)*. The moss layer is comprised of knight's plume (*Ptilium crista-castrensis*) and step moss (*Hylocomium splendens*).

Plate 4.1-1. ESSFmv2 06: Subalpine fir-Alders-Horsetails ecosystem identified at Site 63.

Plate 4.1-2. ESSFmv2 06: Subalpine fir-Alders-horsetails ecosystem identified at Site 98.

Table 4.1-5. Environmental Characteristics and BC CDC Status: Subalpine Fir – Alders - Horsetails Ecosystem

Status:	blue listed
SMR:	subhygric to hygric
SNR:	mesic to rich
Percent Slope:	0-12
Slope Position:	level or depressional
Soil Classification:	Humic Gleysols
Soil Texture:	coarse to medium
Parent Material:	fluvial (moraine)
Water Table:	at or near the surface throughout the growing season
Wildlife Values:	High values for breeding birds; moderate values for arboreal mammals such as red squirrel, marten and fisher; moderate value for spring forage for larger mammals such as bears and ungulates.

BWBSmw/110: White Spruce – Oak Fern – Sarsaparilla

This forested ecosystem typically occurs on the middle to lower portion of north facing slopes (Table 4.1-6). Soil nutrients are generally rich as a result of nutrient inputs associated landscape position. The soil moisture regime ranges from mesic to subhygric. White spruce occupies the tree layer (Plates 4.1-3 and 4.1-4). The shrub layer is moderately dense and contains species such as highbush cranberry, mountain ash (*Sorbus scopulina*), devil's club (*Oplopanax horridus*) and red swamp currant (*Ribes triste*). The herb layer is dense and commonly includes bunchberry (*Cornus canadensis)*, false Solomon's seal (*Smilicina racemosa*), trailing raspberry, palmate coltsfoot and bluejoint reedgrass. Step moss and red-stemmed feathermoss (*Pleurozium schreberi*) occupy the moss layer.

Plate 4.1-3. BWBSmw/110: White Spruce-Oak Fern - Sarsaparilla ecosystem identified at Site 016.

Plate 4.1-4. BWBSmw/110: White Spruce-Oak Fern - Sarsaparilla ecosystem identified at Site S-42.

Table 4.1-6. Environmental Characteristics and BC CDC Status: White Spruce-Oak Fern - Sarsaparilla Ecosystem

Status:	blue-listed
SMR:	mesic to subhygric
SNR:	rich
Percent Slope:	3- 25
Slope Position:	mid to lower
Soil Classification:	variable
Parent Material:	variable, but low coarse fragment content
Soil Texture:	variable
Water Table:	soil profile de-saturated for much of the growing season
Wildlife Values:	Moderate to High value for moose winter habitat (at lowest elevations). High to moderate value for marten and arboreal furbeares. Moderate value for breeding forest birds.

BWBSmw/111; BWBSwk1/110: White Spruce – Red Swamp Currant - Horsetails

White spruce – Red Swamp Currant - Horsetails forests are common within the BWBSmw and BWBSwk1 (Delong et.al. 2010). They are identified on lower slopes and transitions to the floodplains of small and medium watercourses. Soils are derived from fluvial and lacustrine parent materials, with coarse to fine textures (Table 4.1-7). Soils are weakly to strongly hydromorphic, and display the associated pedogenic properties, including mottles and gleyed horizons. The canopy is dominated by white spruce, and can be open to dense (Plates 4.1-5 and 4.1-6). Due to the variation in light regimes imposed, the understory can be vigorous to sparse, and includes prickly rose, highbush-cranberry, tall bluebells (*Mertensia paniculata*), red swamp currant, and black twinberry. A ground cover is moderately well developed to dense, which typically includes horsetails, twinflower (*Linnaea borealis*), trailing raspberry, and bunchberry. Step moss usually dominates the sparse to continuous moss layer.

Plate 4.1-5. BWBSmw/111: White spruce - Red Swamp Currant - Horsetail ecosystem at Site 054.

Plate 4.1-6. BWBSmw/111: White spruce - Red Swamp Currant - Horsetail ecosystem at Site 106.

Table 4.1-7. Environmental Characteristics and BC CDC Status: White Spruce – Currant - Horsetail

Status:	blue listed
SMR:	hygric to hydric
SNR:	mesic to rich
Percent Slope:	0 to 3
Slope Position:	level
Soil Classification:	Brunisols, Gleysols (Regosols)
Soil Texture:	silt loams to gravelly
Parent Material:	fluvial, lacustrine
Water Table:	present through much of the growing season
Wildlife Values:	High to moderate value for moose winter range at lower elevation. High value for arboreal furbearers such as red squirrel, marten and fisher. Moderate forage values for bear and ungulates during the growing season and moderate to high value for breeding forest birds.

BWBSmw/112 (Fm02): Balsam Poplar - White Spruce - Mountain Alder - Dogwood

This middle-bench floodplain forest can be referred to as BWBSmw/112 site series or Fm02 by Mackenzie and Moran (2004) wetland classification. It occurs on major rivers that experience regular flooding events and occasional over bank flooding (Plates 4.1-7 and 4.1-8; Table 4.1-8). It occurs on sandy or gravelly flats adjacent to streams and rivers that have relatively short flood durations followed by subterranean irrigation (MacKenzie and Moran 2004). Cottonwood forms an open canopy with scattered hybrid white spruce in the shrub and tree layer. Red osier dogwood (*Cornus stolonifera*), black twinberry (*Lonicera involucrata*) and highbush cranberry (*Viburnum edule*), dominate the majority of the shrub layer, with prickly rose (*Rosa acicularis*), Saskatoon berry (*Amelanchier alnifolia*) and common snowberry (*Symphoricarpos albus*) occurring to a lesser extent. Bluejoint reedgrass (*Calamagrostis canadensis*), palmate coltsfoot (*Petasites frigidus* var. *palmatus*) and purple peavine (*Lathyrus nevadensis*) occur in the herb layer.

Plate 4.1-7. Fm02: Balsam poplar - White spruce - Mountain alder - Dogwood ecosystem at Site 40.

Plate 4.1-8. Fm02: Balsam poplar -White spruce - Mountain alder - Dogwood ecosystem at Site 280.

Table 4.1-8. Environmental Characteristics and BC CDC Status: Balsam Poplar - White Spruce - Mountain Alder - Dogwood Ecosystem

Status:	red listed
SMR:	mesic to hydric
SNR:	rich to very rich
Percent Slope:	0 to 3
Slope Position:	level
Soil Classification:	Cumulic Regosols, Gleyed Brunisols
Soil Texture:	sandy to gravelly
Parent Material:	fluvial
Water Table:	present through much of the growing season
Wildlife Values:	High (Valuable for moose winter habitat, later successional stages provide cavities in large stems to support fisher and bear denning as well as roosting habitat for bats and nesting areas for birds. Diverse vegetation provides forage for a wide number of species.

BWBSwk1/103: White spruce - Lodgepole Pine - Soopolallie - Showy Aster

This uncommon forested ecosystem is restricted to warm aspects but where it occurs, it can be relatively large in extent (Table 4.1-9). It generally occurs on mid to upper slopes and on moderately coarse- to coarse-textured soils derived from morainal or glaciofluvial parent materials. The open canopy is dominated by lodgepole pine and a well-developed to dense undergrowth includes soopolallie (*Shepherdia canadensis*), prickly rose, showy aster (*Aster conspicuous*), and birch-leaved spirea (*Spirea betulifolia*). A well-developed ground cover includes twinflower, bunchberry, and often dwarf blueberry (*Vaccinium caespitosum*). The sparse to dense moss layer is dominated by red-stemmed feathermoss.

No field photos were available.

Table 4.1-9. Environmental Characteristics and BC CDC Status: BWBSwk1/103 White Spruce – Lodgepole Pine – Soopalallie – Showy Aster

Status:	blue listed
SMR:	submesic
SNR:	poor to rich
Percent Slope:	variable
Slope Position:	mid to upper slopes; warm aspect
Soil Classification:	not available
Soil Texture:	moderately coarse- to coarse-textured
Parent Material:	Morainal, glaciofluvial
Water Table:	no
Wildlife Values:	The climax successional stand provides moderate value to ungulates with some winter value if the stand occurs within capable elevation. Understory provides some berry production providing low to moderate late season bear habitat value. Pine stands will have moderate value for arboreal furbearers (marten, red squirrel and fisher), and pine stand will support nesting by some species of forest birds.

SBSwk2/02: Lodgepole Pine - Black Huckleberry - Reindeer Lichens

This forested ecosystem is regionally uncommon and occurs on very dry to dry and poor soils on level or upper slope positions (Table 4.1-10). The canopy is dominated by lodgepole pine and the shrub understory consists of a low to moderate cover of soopolallie, prickly rose, highbush-cranberry, and lodgepole pine. The sparse herb layer typically consists of kinnikinnick (*Arctostaphylos uva-ursi*), bunchberry, and rough-leaved ricegrass (*Oryzopsis asperifolia*). The high cover moss layer is dominated by red-stemmed feather moss.

No field photos were available.

Table 4.1-10. Environmental Characteristics and BC CDC Status: Lodgepole Pine – Black Huckleberry- Reindeer Lichens

SMR:	subxeric–xeric
SNR:	poor–very poor
Percent Slope:	0–6 (usually 0)
Slope Position:	level or upper
Soil Classification:	not available
Soil Texture:	coarse
Parent Material:	glaciofluvial, (fluvial)
Wildlife Values:	Moderate to high value for caribou winter range depending upon lichen production. Berry production provides low to moderate late season (summer and fall) value for bear. Moderate to low value as moose winter habitat considering limited browse production. Pine stand provides moderate value for arboreal furbearers (marten, red squirrel and fisher) and pine will support some nesting by forest birds.

Wb06: Tamarack - Water Sedge - Fen Moss

The Tamarack – Water sedge – Fen moss is a regionally common Bog/Poor Fen Site Association of the eastern BWBS. Within fen/bog complexes it represents the areas of higher hydrodynamism when compared to the adjacent stagnant domed bogs. It is often found along peatland streams, water tracks, or groundwater inflow seeps (Plates 4.1-9 and 4.1-10; Table 4.1-11). Sites are hummocky, with tamarack (*Larix laricina*) and black spruce growing on elevated sites and sedges rooting in the wet hollows. The water table remains high throughout the growing season, which prevents decomposition of organic matter. As a result, soils tend to be deep mesisols of woody peat and sedge. They are often forested, dominated by Tamarack up to 15 m high, with a lesser component of black spruce. A mixed low-shrub understorey dominated by *Betula nana* can be well developed. Forbs, dwarf shrubs, and smaller sedges occupy elevated hummocks, while sedges occupy the wetter microsites.

The Wb06 is transitional to fen, and is considered such in certain wetland classifications. Most notably, the hydrology, specifically the relatively high hydrodynamism, is more characteristics of a fen than of a bog.

Plate 4.1-9. Wb06: Tamarack – water sedge – fen moss identified at Site 90.

Plate 4.1-10. Wb06: Tamarack – water sedge – fen moss identified at Site 104.

Table 4.1-11. Environmental Characteristics and BC CDC Status: Wb06 Tamarack - Water Sedge - Fen Moss

Status:	blue listed
SMR:	hydric
SNR:	poor
Percent Slope:	0
Slope Position:	level
Structural Stage:	4 to 7
Soil Classification:	Brunisols, Gleysols
Soil Texture:	Silty clay loam to sandy loam
Parent Material:	moraine, fluvial
Water Table:	present through much of the growing season
Wildlife Values:	Moderate values for ungulates and bears during growing season, moderate to high values for moose winter values if at lower elevations. Moderate value for arboreal furbearers (marten, red squirrel) and moderate to high value for breeding forest birds.

4.1.4.2 Non-listed Ecosystems

Riparian and Floodplain Ecosystems

Riparian and floodplain ecosystems not listed by the BC CDC occupy 7,930 ha (3%) of the RSA. The majority of the area is associated with riparian area of stream orders 5 to 7 (Table 4.1-12).

Table 4.1-12. Extent of Riparian and Floodplain Ecosystems in the RSA

Stream Orders Associated with Riparian Area	Buffer Size	Total Riparian and Floodplain Buffer Area (ha)	Listed Riparian and Floodplain Ecosystems Area (ha)	Net Riparian and Floodplain Buffer Area (ha)
3rd and 4th	30 m	4,016	684	3,333
5th, 6th, and 7th	100 m	5,147	550	4,597
Total		**9,163**	**1,233**	**7,930**

Wetland Ecosystems

Wetland ecosystems not listed by the BC CDC and not included in the riparian area calculations cover 9,320 ha (4%) of the regional landscape (Table 4.1-13). The wetland mapping in the RSA is a generic, broad level mapping, primarily based on provincial TRIM wetlands. The wetland mapping at the local context provides more details of the types, the extent and distribution of wetlands. This can be found at a finer scale in the wetlands baseline report (Rescan 2011).

Alpine Ecosystems

Three vegetated alpine ecosystems not listed by the BC CDC and not already accounted for in the sensitive wetland summary were mapped by PEM (Table 4.1-14). They occupy 2,915 ha (1%) of the RSA, none of which exist in the LSA.

4.2 LOCAL STUDY AREA

4.2.1 Extent of BEC Units within the Local Study Area

The Murray River LSA overlaps four BEC units (Table 4.2-1). The majority (58%) of the LSA is located within the BWBSmw subzone, with nearly equal amounts within the BWBSwk1 and ESSFmv2 variants and a small area within the SBSwk2 variant.

4.2.2 Extent of Site Series and General Ecosystem Types

Sixty ecosystems (BEC unit/site series), including the various undifferentiated units, were mapped in the LSA, including 10 wetland ecosystems and 14 non-vegetated or anthropogenically modified units. The ecological characteristics of each site series are summarized in Appendix 5. The spatial distribution of site series is displayed in the Terrestrial Ecosystem Map (Appendix 6).

As for the RSA, site series have been grouped into general ecosystem types for the LSA according to their relative moisture status and potential climax structural stage. The following section summarizes the extent of general ecosystem types within the LSA. The results are divided by BEC unit in order to provide additional ecological context.

Table 4.1-13. Extent of Wetland Ecosystems

			BEC Unit (ha)									Grand Total (ha)
	Map Code	Ecosystem Name	BAFAun	BWBSmw	BWBSwk1	ESSFmv2	ESSFmvp	ESSFwc3	ESSFwcp	ESSFwk2	SBSwk2	
Total Wetland (including listed and riparian)	N/A		0.3	2,339	5,740	1,110	10	33	2	8	909	10,152
Listed and/or Riparian Wetland	SBSwk2/06 (Ws07)	Sxw - Horsetail (Ws07 - Common horsetail - Leafy moss)									65	65
	MA	TRIM Marsh		102	45	2					8	158
	SA	TRIM Swamp		68	43	7					13	131
	WB	Wetland Bog		27	16	5						48
	WE	TRIM Wetland		65	96	1		4			26	192
	WF	Wetland Fen		1								1
	WH	Wetland Herb		0.04							21	21
	WS	Wetland Swamp			120	0.3					94	215
	Sum			**264**	**321**	**17**		**4**			**227**	**832**
Wetland Net of Listed and Riparian	SBSwk2/06 (Ws07)	Sxw - Horsetail (Ws07 - Common horsetail - Leafy moss)									94	94
	MA	TRIM Marsh		229	189	66	4				23	511
	SA	TRIM Swamp		672	1,170	303	0.4				106	2,253
	WB	Wetland Bog		719	242	537						1,498
	WE	TRIM Wetland	0.3	412	949	186	6	29	2	8	206	1,798
	WF	Wetland Fen		43								43
	WH	Wetland Herb		0.3		0.1					71	72
	WS	Wetland Swamp			2,869	1					182	3,053
	Sum		**0.3**	**2,076**	**5,419**	**1,094**	**10**	**29**	**2**	**8**	**682**	**9,320**

Table 4.1-14. Extent of Vegetated Non-listed and Non-Wetland Alpine Ecosystems

General Ecosystem Type within the BAFAun Subzone	RSA Extent (ha)
Herb	2,102
Subalpine fir krummholz	490
Wetter herb	323
Grand Total	**2,915**

Table 4.2-1. Extent of BEC Units within the Local Study Area

BEC Unit Name	Extent (ha)	Extent (%)
Boreal White and Black Spruce – Moist Warm (BWBSmw)	7,000	58
Boreal White and Black Spruce – Murray Wet Cool (BWBSwk1)	2,458	20
Engelmann Spruce – Subalpine Fir – Bullmoose Moist Very Cold (ESSFmv2)	2,456	20
Sub-Boreal Spruce – Finlay Peace Wet Cool (SBSwk2)	178	2
Total	**12,092**	**100**

The LSA consists of hills and low mountains accented by elongated ridges. Much of the area is characterized by mesic forested ecosystems interspersed with anthropogenic developments such as seismic lines, roads, transmission lines, oil, gas and hydro power developments (Table 4.2-2). Anthropogenically modified areas occur throughout the LSA and are particularly common in the south eastern section, associated with the Quintette Mine.

Table 4.2-2. Extent of General Ecosystem Types by BEC Unit in the Local Study Area

	BEC UNIT				
General Ecosystem Type	BWBSmw	BWBSwk1	ESSFmv2	SBSwk2	Grand Total
Anthropogenically Modified	1,401	166	52	16	1,635
Barren	16	0	5	0	21
Exposed Soil	0	0	5	0	5
Low Bench Floodplain	14	0	0	0	14
Mesic Forest	2,215	1,151	1,270	42	4,678
Mid Bench Floodplain	217	0	0	7	224
Moderately Dry Forest	1,269	583	286	50	2,189
Moist Forest	751	128	339	53	1,271
Rock	0	0	0	0	0
Slightly Dry to Moist Forest	757	408	431	4	1,600
Water	187	7	5	0	199
Wet Forest	0	0	47	0	47
Wetland Bog	134	0	13	5	152
Wetland Fen	2	1	2	1	6
Wetland Marsh	23	0	1	0	24
Wetland Swamp	14	14	0	0	28
Total	**7,000**	**2,458**	**2,456**	**178**	**12,092**

History of natural disturbances such as wildfires, windthrow, insect epidemics (notably pine beetle (*Dendroctonus ponderosae*)), and tree disease are widespread throughout both the RSA and LSA.

Valleys in the LSA are similar to those in the RSA in that they are generally wide and often deeply incised by rivers and streams (e.g. the Murray River, Wolverine River and Flatbed Creek). Floodplain forests, although limited in extent, dominate the banks of larger rivers and streams in the LSA and RSA. A variety of ecosystems occupy the hilly landscapes, including moderately dry forests, moist forests and slightly dry to moist forests, which are common in both the LSA and RSA.

Plains and gentle slopes cover approximately 60% of the land. Undulating landscapes, occur over approximately 25% of the LSA. Only about 10% of the LSA consists of irregularly shaped, steeper landscapes such as ridges and hummocks, which also contain many of the drier ecosystem types (barren and moderately dry forest). In contrast, most of the dry ecosystem (barren, dry to mesic forest, dry to mesic herb and dry to mesic shrub) within the RSA occur at higher elevation within the alpine and subalpine areas (BAFA and ESSFwvp).

Extent of Structural Stages

The LSA contains a mix of forested and non-forested structural stages. Young and mature forests are the most extensive structural stages, each accounting for approximately 29% of the overall LSA (Table 4.2-3). In the RSA, shrub ecosystems dominated the landscape, occupying 21% of the RSA whereas shrub-dominated structural stages are the next most abundant, accounting for approximately 13% of the overall LSA. Sparse/bryoid, herb, pole/sapling, and old forests comprise the remaining portions of the vegetated landbase. Non-vegetated areas (e.g., water features and anthropogenically modified areas) cover 9% of the land base. The distribution of structural stages is illustrated in Appendix 6.

Table 4.2-3. Extent of Structural Stage Types by BEC Unit in the Local Study Area

Structural Stage	BEC UNIT				Total LSA Extent (ha)	Total LSA Extent (%)
	BWBSmw (ha)	BWBSwk1 (ha)	ESSFmv2 (ha)	SBSwk2 (ha)		
Sparse/Bryoid (1)	596	10	23	9	638	5.3
Herb (2)	421	172	12	0	605	5.0
Shrub (3)	1,169	329	81	14	1,593	13.2
Pole/Sapling (4)	669	201	134	7	1,011	8.4
Young Forest (5)	1,510	968	930	62	3,470	28.6
Mature Forest (6)	1,689	624	1,177	71	3,561	29.4
Old Forest (7)	150	0	0	2	152	1.3
Non-vegetated	796	154	99	13	1,062	8.8
Total	**7,000**	**2,458**	**2,456**	**178**	**12,092**	**100.0**

4.2.3 Extent of Sensitive Ecosystems

4.2.3.1 Ecological Characteristics and Extent of Listed Ecosystems

Eight provincially listed ecological communities were identified within the LSA, covering approximately 1,749 ha (Table 4.2-4). Of these ecosystems, one is red listed (extirpated, endangered or threatened) and seven are blue listed (of special concern). Many of the same listed communities were identified in

the RSA through PEM mapping and descriptions were provided in Section 4.1.4. One additional community (Wb06) was identified in the LSA through the TEM; a description is provided here.

Table 4.2-4. Extent of BC CDC Listed Ecosystems in the LSA

Ecosystem (site series/ site association)	Scientific Name	English Name	BC CDC List	Extent in LSA (ha)
ESSFmv2/06; Ws08	*Abies lasiocarpa - Alnus* spp. - *Equisetum* spp.	Subalpine fir - Alders - Horsetails	Blue	98
BWBSmw/110	*Picea glauca - Gymnocarpium dryopteris - Aralia nudicaulis*	White spruce - Oak fern - Sasparilla	Blue	452
BWBSmw/111; BWBSwk1/110	*Picea glauca - Ribes triste - Equisetum* spp.	White spruce - Red Swamp Currant - Horsetails	Blue	518
BWBSmw/112; Fm02	*Populus balsamifera - Picea glauca - Alnus incana - Cornus stolonifera*	Balsam poplar - White spruce - Mountain alder - Dogwood	Red	177
BWBSwk1/103	*Picea glauca - Pinus contorta / Shepherdia canadensis / Aster conspicuus*	white spruce - lodgepole pine / soopolallie / showy aster	Blue	309
SBSwk2/02	*Pinus contorta / Vaccinium membranaceum / Cladina* spp.	lodgepole pine / black huckleberry / reindeer lichens	Blue	27
Wb06	*Larix laricina - Aulacomnium palustre*	Tamarack - Glow moss	Blue	162
Wb09	*Picea mariana - Equisetum arvense - Sphagnum spp.*	Black spruce - Common horsetail - Peat-mosses	Blue	6
Total				**1,749**

Wb09: Black Spruce - Common Horsetail - Peat-mosses

The Black spruce – Common horsetail – Peat-moss is an uncommon Bog/Poor Swamp Site Association found in small palustrine basins and at the periphery of larger peatlands (MacKenzie and Moran 2004). Although this ecosystem is transitional to forested swamps, it has abundant bog-affiliated species, very poor tree growth, and stagnant hydrology (Plates 4.2-1 and 4.2-2).

It is often found in strongly hummocky sites, with conifers and typical bog species occurring on elevated sites and minerotrophic (mineral-receiving groundwater) indicator plants in the hollows (Table 4.2-5). Hummock species include stunted black spruce, Labrador tea (*Ledum groenlandicum*), and peat moss (*Sphagnum* spp.). Common horsetail (*Equisetum arvense*) is always present between hummocks. Soils can be deep *Sphagnum* peat (down to 3 m) or shallow veneers over fine-textured mineral materials. Mesisols and Gleysols are also common. Standing water can persist between hummocks, but the hummocks are never flooded.

Plate 4.2-1. Wb09: Black Spruce – Common Horsetail – Peat-mosses identified at Site 053.

Plate 4.2-2. Wb09: Black Spruce – Common Horsetail – Peat-mosses identified at Site104.

Table 4.2-5. Environmental Characteristics and BC CDC Status: Wb09 Black Spruce - Common Horsetail - Peat-mosses

SMR:	hydric
SNR:	poor
Percent Slope:	Data not available
Slope Position:	level
Soil Classification:	Soils can be deep *Sphagnum* peat (to 3 m) or shallow veneers over fine-textured mineral materials. Mesisols and leysols are equally common.
Soil Texture:	Fine textured
Water Table:	Standing water can persist between hummocks (elevated sites are never flooded).
Parent Material:	Organic
Wildlife Values:	The site has low to moderate values for ungulates during winter as the stand does not support preferred winter browse or snow interception cover. It has moderate values for bears in spring primarily from presence of horsetail as valuable spring forage, but the site has low values for bears during other seasons. Low values are anticipated for arboreal furbearers (marten, squirrel, and fisher). The site may support a diverse community of breeding birds in spring, and moist forest floor will likely be attractive to amphibians including western toad.

4.2.3.2 Extent of Non-listed Ecosystems

Riparian and Floodplain Ecosystems

Riparian and floodplain ecosystems not listed by the BC CDC occupy 309 ha (Table 4.2-6). There are 147 ha associated with the buffer applied to 3rd and 4th order streams, and 162 ha for higher stream orders.

Table 4.2-6. Extent of Riparian and Floodplain Ecosystems

Stream Orders Associated with Riparian Area	Buffer Size	Total Riparian and Floodplain Buffer Area (ha)	Listed Riparian and Floodplain Ecosystems Area (ha)	Net Riparian and Floodplain Buffer Area (ha)
3rd and 4th	30 m	182	35	147
5th, 6th, and 7th	100 m	281	119	162
Total		463	154	**309**

Wetland Ecosystems

Wetland ecosystems not listed by the BC CDC and not accounted for in the riparian area calculations, occupy 111 ha (1%) of the LSA (Table 4.2-7). The ecological characteristics of wetlands are further described in Mackenzie and Moran (2004) and the extent and distribution of wetlands are summarized in the wetlands baseline report (Rescan 2011).

Table 4.2-7. Extent of Wetland Ecosystems

Scientific Name	English Name	Ecosystem Unit	LSA (ha)
Picea mariana - Carex aquatilis - Sphagnum	Black spruce – Water sedge – Peat-moss	Wb05	2.4
Lodgepole pine – Water sedge – Peat-moss	*Pinus contorta - Carex aquatilis - Sphagnum*	Wb07	0
Black spruce – Soft-leaved sedge – Peat-moss	*Picea mariana - Carex disperma - Sphagnum*	Wb08	13.9
Barclay's willow – Water sedge – Glow moss	*Salix barclayi - Carex aquatilis - Aulacomnium palustre*	Wf04	25.0
Beaked sedge – Water sedge	*Carex utriculata - Carex aquatilis*	Wm01	43.7
Drummond's willow – Beaked sedge	*Salix drummondiana - Carex utriculata*	Ws04	6.2
Spruce – Common horsetail – Leafy moss	*Picea* X- *Equisetum arvense - Mnium*	Ws07	19.3
Total Area			**110.5**

4.3 ECOSYSTEMS AND VEGETATION FIELD SURVEYS

4.3.1 Terrestrial Ecosystem and Predictive Ecosystem Mapping Field Surveys

Field survey data were collected to refine the ecosystem mapping in the RSA and LSA as well as to identify ecosystems and plants of special concern. A total of 332 ecosystem mapping plots were visited, 136 of which were ground plots and the remainder were visuals and wetland assessment plots (Appendix 6 and 7). Survey intensity level 2 (RIC 1998) was completed within the Potential Mine Surface Development Area, where the majority of the development is expected to occur. Survey intensity level 3 was completed for the remainder of the LSA.

4.3.2 Sensitive Ecosystems Identified in the Field

4.3.2.1 Listed Ecosystems

Ten provincially listed ecological communities were identified in the field. Of these ecosystems, one is red listed (extirpated, endangered or threatened) and nine are blue listed (of special concern; Table 4.3-1; Figure 4.1-3). Two ecosystems, Black spruce - lingonberry - peat-mosses (*Picea mariana - Vaccinium vitis-idaea - Sphagnum* spp.; Wb03) and swamp horsetail - beaked sedge (*Equisetum fluviatile - Carex utriculata*; Wm02) were identified through field surveys and are described in Table 4.3-1

Table 4.3-1. BC CDC Listed Ecosystems Identified in the Field

Ecosystem (site series/site association)	Scientific Name	English Name	BC CDC List	No. of Plots
ESSFmv2/06: Ws08	*Abies lasiocarpa - Alnus* spp. - *Equisetum* spp.	Subalpine fir - Alders - Horsetails	Blue	4
BWBSwk1/103	*Picea glauca - Pinus contorta - Shepherdia canadensis - Aster conspicuus*	White spruce - Lodgepole pine - Soopolallie - Showy aster	Blue	6
BWBSmw/112	*Populus balsamifera - Picea glauca - Alnus incana - Cornus stolonifera*	Balsam poplar - White spruce - Mountain alder - Dogwood	Red	3
BWBSmw/111; BWBSwk1/110[1]	*Picea glauca - Ribes triste - Equisetum* spp.	White spruce - Currant - Horsetail	Blue	18
BWBSmw/110	*Picea glauca - Gymnocarpium dryopteris - Aralia nudicaulis*	White spruce - Oak fern - Sasparilla	Blue	9
SBSwk2/02	*Pinus contorta / Vaccinium membranaceum / Cladina spp.*	lodgepole pine / black huckleberry / reindeer lichens	Blue	1
Wm02	*Equisetum fluviatile - Carex utriculata*	swamp horsetail - beaked sedge	Blue	1
Wb09	*Picea mariana - Equisetum arvense - Sphagnum spp.*	Black spruce - Common horsetail - Peat-mosses	Blue	3
Wb06	*Larix laricina - Aulacomnium palustre*	Tamarack - Glow moss	Blue	3
Wb03	*Picea mariana - Vaccinium vitis-idaea - Sphagnum spp.*	black spruce - lingonberry - peat-mosses	Blue	1
Total				49

Wb03: Black Spruce - Ligonberry - Peat-mosses

This bog wetland community is widespread in the Taiga and Boreal Plains but uncommon further south (MacKenzie and Moran 2004). It occurs in topographic depressions with little groundwater influence. Its characteristics are summarized in Table 4.3-2.

Stunted black spruce, typically <10 m tall, is always present over an open herb layer and continuous peat moss layer. Labrador tea, cloudberry (*Rubus chamaemorus*), and lingonberry (*Vaccinium vitis-idaea*) are the most abundant species in the understory. Sites are hummocky, but the hummocks and hollows are usually close in moisture content due to the thick peat moss layer. Few minerotrophic indicators are present. However, high tree cover on some sites shades out peat moss, and feathermosses become dominant. Surface peat on elevated hummocks or domes may dry out, thereby becoming dominated by *Cladonia* and *Cladina* lichens.

Underlying permafrost is common for these sites and often contributes to a domed surface shape. There is typically a deep blanket of acidic peat moss and little to no surface water present. Soil types are Fibrisols or Organic Cryosols. This site was identified at P-26 within the local study area but no photos are available.

Table 4.3-2. Environmental Characteristics and BC CDC Status: Wb03 Black Spruce - Ligonberry – Peat-mosses

SMR:	hydric
SNR:	very poor
Percent Slope:	<2%
Slope Position:	level
Soil Classification:	Fibrisols, Organic Cryosols
Soil Texture:	n/a - organic
Water Table:	little to none
Parent Material:	Typically organic
Wildlife Values:	Low habitat value for most ungulates during winter due to lack of browse, although terrestrial lichen may provide value for caribou when snow pack is non-limiting. Patchy forest cover of black spruce supports low to very low habitat suitability for arboreal fur bearers (marten, squirrel, fisher). Berry production may provide moderate value for spring and fall use by black bear and grizzly. Black spruce islands will be used by some upland nesting birds, particularly those most attracted to edges. Moist area can have value for amphibians and may support breeding if open water occurs.

Wm02: Swamp Horsetail – Beaked Sedge

This marsh site association occurs in back-levee depressions along sediment laden, low-gradient streams, protected bays of large lakes, or flooded fens (MacKenzie and Moran 2004).

Plant diversity is typically low. Sites are typically dominated by swamp horsetail (*Equisetum fluviatile*) and occasionally in combination with beaked sedge (*Carex utriculata*), Pondweed (*Potamogeton spp.),* and water milfoil (*Myriophyllum* spp.) are often scattered throughout (Plates 4.3-1 and 4.3-2; Table 4.3-3). Soils are derived from silty or fine-sandy fluvial, deep limnic deposits at open margins of lakes, or recently flooded peat.

Plate 4.3-1. Wm02: Swamp horsetail – beaked sedge identified at Site 102.

Plate 4.3-2. Wm02: Swamp horsetail – beaked sedge identified at Site 102.

Table 4.3-3. Environmental Characteristics and BC CDC Status: Wm02 Swamp Horsetail – Beaked Sedge

SMR:	Hydric to hygric
SNR:	Rich to very rich
Percent Slope:	<2%
Slope Position:	level
Soil Classification:	Rego Gleysols, Terric Humisols
Soil Texture:	n/a - organic
Water Table:	little to none
Parent Material:	No available data
Wildlife Values:	Low value for ungulates, with the exception of moose which may exploit this habitat during the growing season. Also, dependent on good shrub production at the edge of the site, it may have moderate winter value. No value for arboreal furbearers. Dependent on seasonal inundation, it may have some value for aquatic species, especially muskrat. Production of horsetails and sedges is valuable for bears and likely to have moderately high to high spring value for grizzly bear. Proximity to water suggests value for nesting waterfowl and waterbirds if sedge cover is adequate. Moist sites will be valuable to amphibians and may support small pools for breeding.

4.3.2.2 Non-listed Ecosystems

Riparian and Floodplain Ecosystems

Two non-listed riparian and floodplain ecosystems were identified in the field (Appendix 7, Figure 4.1-3), one in the ESSFmv2 and one in the BWBSmw.

Wetland Ecosystems

Eighteen non-listed wetland ecosystems were identified in the field (Appendix 7) among 34 locations (Figure 4.1-3).

Vegetated Alpine Ecosystems

Nine non-listed vegetated alpine ecosystems were identified in the field (Appendix 7) among nine locations (Figure 4.1-3).

4.3.3 Species Richness

A total of 388 plant species, (including those that were identified to genus only), were identified within the RSA. The complete list of species and plant types is summarized in Appendix 8.

4.3.4 BC CDC Listed Plant Surveys

Field surveys for listed plants were conducted in conjunction with general field surveys throughout the LSA in 2010 and 2011. A specific rare vascular plants survey was conducted in high priority areas within the potential mine surface development area was performed according to the Alberta Native Plant Council Guidelines for Rare Plant Surveys in Alberta (Alberta Native Plant Council 2000).

Over 240 vascular species were identified during the surveys. Samples of four potential listed species were collected and pressed for expert identification at the UBC herbarium. One blue-listed species, *Botrychium crenulatum* (dainty moonwort), was confirmed from the samples (Plate 4.3-3). A total of 99 *B. crenulatum* individuals were observed in 31 populations in two habitat types (Figure 4.3-1).

The most common habitat was disturbed margins of roads throughout the LSA (Plate 4.3-4). These areas were generally dominated by a variety of weedy and or introduced species and occurred in moist, shaded areas. Past and ongoing disturbance was significant, ranging from regular clearing of road-side vegetation, to dumping of old concrete, cars and other garbage. Every occurrence was mixed with larger numbers of the commonly occurring *B. lunaria* and occasionally *B. virginianum*, neither of which are listed species.

The less common habitat type (accounting for 12 of the 99 individuals in 5 locations) was mature broadleaf forests that are relatively common along the inactive floodplain of Murray River (Plate 4.3-5). These forest stands are dominated by cottonwood and trembling aspen, and contain lush, moist understories of a wide variety of shrubs and herbs. Both the number of *B. crenulatum* individuals and locations found during the surveys likely under-represent the true abundance in this habitat type due to difficulties identifying the species in thick ground cover.

4.3.5 Invasive Plant Surveys

Thirteen non-native plants were documented during field surveys (Table 4.3-4). These species were compared with the NEIPC's Invasive Plant Prioritization Categories to determine the level of invasiveness of each species. Of these plants, four are tracked by the NEIPC, three of which are also regulated by the Weed Control Act (Figure 4.3-1). One native plant (pineapple weed) tracked by the NEIPC was also documented.

Plate 4.3-3. Blue listed B. crenulatum (Dainty Moonwort) on left and B. lunaria (Common Moonwort) on right.

Plate 4.3-4. Typical site conditions for B. crenulatum occurrences along road margins.

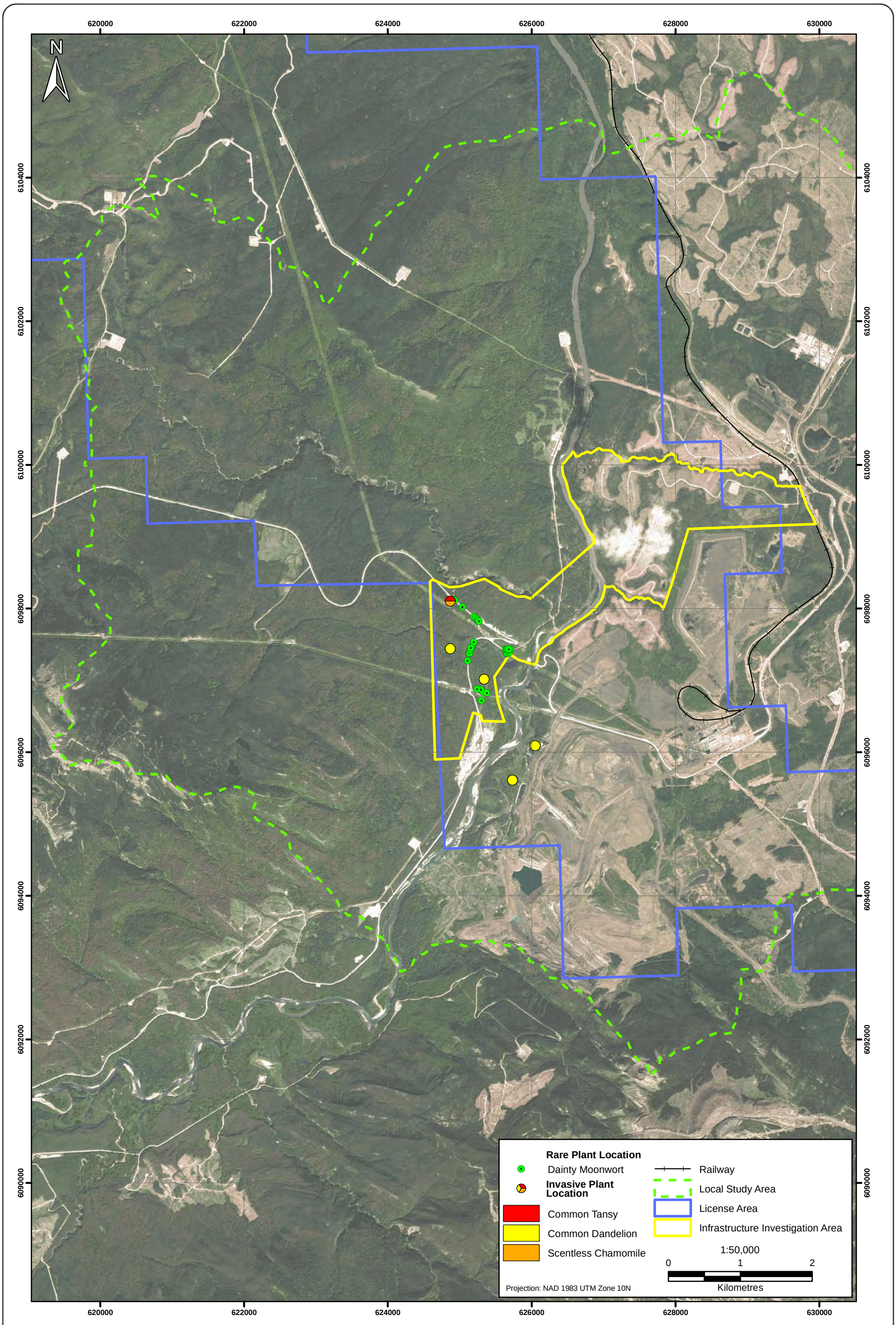

Figure 4.3-1

hdMining

MURRAY RIVER COAL PROJECT

Plants of Conservation Interest within the Local Study Area

Figure 4.3-1

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Plate 4.3-5. Typical site conditions for Botrychium crenulatum in forested areas.

Table 4.3-4. Invasive Plants within the Local Study Area

Common Name	Scientific Name	North East Invasive Plant Council	Weed Control Act
Common Tansy	*Tanacetum vulgare*	Prohibited	Noxious in other parts of the province.
Canada Thistle	*Cirsium arvense*	Primary Invasive	Noxious
Scentless Chamomile	*Tripleurospermum inodorum*	Primary Invasive	Noxious
Bull Thistle	*Cirsium vulgare*	Secondary Invasive	n/a
Pineapple Weed	*Matricaria discoidea*	Secondary Invasive	n/a
Common Dandelion	*Taraxacum officinale*	n/a	n/a
Black Medic	*Medicago lupulina*	n/a	n/a
White Sweet-clover	*Melilotus alba*	n/a	n/a
Yellow Sweet-clover	*Melilotus officinalis*	n/a	n/a
Aslike Clover	*Trifolium hybridum*	n/a	n/a
Red Clover	*Trifolium pratense*	n/a	n/a
Water Speedwell	*Veronica anagallis-aquatica*	n/a	n/a
Shepard's Purse	*Capsella bursa-pastoris*	n/a	n/a
Western Blue Flax	*Linum lewisii subsp. Lewisii*	n/a	n/a

Invasive plants can aggressively establish in disturbed areas, thereby decreasing biodiversity, crop and range productivity (Polster 2005). Invasive plants are a considerable threat to natural habitats (Canadian Food Inspection Agency 2008). Non-native plant species can influence ecosystem diversity, structure, and function through invasion and hybridization. Invasive plants can alter the structure of a natural ecosystem and ultimately change the way in which the site is utilized by wildlife, insects, and microorganisms. Changes to nutrient cycling, hydrology, erosion and fire regimes may also occur

(Canadian Food Inspection Agency 2008). The key biological features of weeds identified in the LSA that are regulated by the Weed Control Act and/or tracked by the NEIPC are described below.

4.3.5.1 Common Tansy

Common Tansy was documented at one site within the LSA at a small vehicle pull out on the Murray River Road. Common tansy is listed as noxious in the Bulkley-Nechako, Central Kootenay, Columbia-Shuswap, East Kootenay, North Okanagan regional districts but has yet to be listed in the Peace Forest Region (1985).

Common tansy is an aggressive competitor that prefers disturbed sites with well drained, rich soils (Cranston, Ralph, and Wikeem 2002) but is also known to establish in drier pastures, forests and agriculture areas (North East Invasive Plant Committee 2010). This perennial plant prefers disturbed sites with well drained, rich soils (Cranston, Ralph, and Wikeem 2002). It is common at low elevations in the southern half of the region and sporadic in the northeast.

4.3.5.2 Canada Thistle

Canada thistle was documented at one site along the Murray River Road near the conveyor belt access gate. Canada thistle is an aggressive competitor for nutrients and water (California Invasive Plant Council 2008). It grows on a variety of soil types in a range of habitats such as cultivated fields, meadows, pastures, roadsides, and stream banks (SK Ministry of Agriculture 2008a). It has deep; horizontal, creeping roots that make control of this weed very difficult (Bubar et al. 2000).

4.3.5.3 Scentless Chamomile

Chamomile was also documented at the same gravel pit as the common tansy within the LSA. Chamomile typically grows on roadsides, disturbed areas and amongst perennial forage crops. Chamomile is known to reduce biodiversity through the formation of monocultures along waterbodies, riparian areas or in areas that are exposed to periodic inundation (Invasive Plant Council of BC 2009).

4.3.5.4 Bull Thistle

Bull thistle was documented at one site along the Murray River Road near the conveyor belt access gate. Bull thistle is considered one of the less aggressive thistles and typically does not remain in any given area for an extended period of time (Lym and Zollinger 2000). Bull thistle grows on a variety of soil types, ranging from gravelly to clay textured (BC MOAFF and Open Learning Agency 2002), and in a range of habitats including cultivated fields, roadsides and cutblocks.

4.3.5.5 Pineapple Weed

Pineapple weed is an annual plant believed to be native to northeast Asia (Centre for Organic Horticulture). This plant occupies dry roadsides and disturbed areas at low to mid elevations and is widespread in the region (E-Flora BC 2011). Although, pineapple weed is listed by the NEIPC, it is considered a low priority and is not managed within the province.

5. Summary

5. Summary

5.1 BROAD SCALE ECOSYSTEM INFORMATION

The RSA overlaps nine Biogeoclimatic Ecosystem Classification (BEC) units, six of which are forested, two are parkland (transition to alpine), and one is alpine. The dominant BEC unit within the RSA is the Engelmann Spruce – Subalpine Fir – Bullmoose Moist Very Cold subzone covers the (ESSFmv2) followed by the Boreal White and Black Spruce – Murray Wet Cool (BWBSwk1).The RSA is characterized predominantly by mesic forests followed by slightly dry to moist forests. The most extensive structural stage is mature forests, followed by shrubs (which includes many of the re-forested areas within the RSA).

The LSA is located within four BEC units, the majority of which is the BWBS –Moist Warm (BWBSmw), with lesser amounts of BWBS – Murray Wet Cool (BWBSwk1), ESSFmv2, and Sub-Boreal Spruce – Finlay Peace Wet Cool (SBSwk2). The LSA is characterized predominantly by mesic forests and moderately dry forests. Anthropogenically modified areas, including existing mines, seismic lines, roads, transmission lines, oil, gas and hydro power developments, are interspersed throughout the LSA and are particularly common in the south eastern section. History of natural disturbances such as wildfires, windthrow, insect epidemics, notably pine beetle (*Dendroctonus ponderosae*), and disease are widespread.

5.2 SENSITIVE ECOSYSTEMS AND PLANTS OF CONSERVATION INTEREST

Ten ecosystems listed by the British Columbia Conservation Data Centre (BC CDC) were identified, one of which is red listed (extirpated, endangered or threatened) and the remainder of which are blue listed (of special concern). Seven of these ecosystems were mapped within the RSA and eight were mapped within the LSA. All ten ecosystems were identified through field survey.

Four additional sensitive ecosystem classes, considered locally threatened or sensitive to disturbance, were identified through mapping and field surveys. These include riparian and floodplain ecosystems, wetlands, and vegetated alpine not listed by the BC CDC.

Surveys for rare and invasive plants resulted in the identification of one blue-listed species, *Botrychium crenulatum* (dainty moonwort) and 14 exotic species of which three are regulated by the Weed Control Act and five of which are tracked by the NEIPC.

5.3 PLANT TISSUE, LICHENS AND SOILS METALS ANALYSIS

Plant tissue, lichen and soil samples were collected and analyzed as part of the terrestrial, soils and wetland baseline studies conducted for the Project. This information is used to quantify background tissue metal concentrations within the LSA and at reference sites outside of the LSA. The samples collected, sampling sites and results of the metal analysis are provided in the *Murray River Coal Project: 2010 to 2012 Ecosystem and Vegetation Baseline Report Report* (2013).

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Definitions of the acronyms and abbreviations used in this reference list can be found in the Glossary and Abbreviations section.

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Appendix 1

Predictive Ecosystem Mapping (PEM) Rule Sets

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Appendix 1a. Predictive Ecosystem Mapping Rules for BAFAunp

Zone File 1000

FUZZY CLASS TABLE (CRULES)

F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING
FH1011	SubM2Mes	20	1	1011	Dry to mesic treed
FH1011	shrub	30	1	1011	Dry to mesic treed
FH1012	Mesic	20	2	1012	Dry to mesic herb
FH1012	herb	30	2	1012	Dry to mesic herb
FH1021	Submesic	20	3	1021	Dry to mesic treed
FH1021	SlopeGT10	20	3	1021	Dry to mesic treed
FH1021	shrub	30	3	1021	Dry to mesic treed
FH1022	Submesic	20	4	1022	Dry to mesic herb
FH1022	SlopeGT10	20	4	1022	Dry to mesic herb
FH1022	herb	30	4	1022	Dry to mesic herb
FH1024	Subxeric	20	5	1024	Dry to mesic herb
FH1024	herb	30	5	1024	Dry to mesic herb
FH1051	Subhygric	20	6	1051	Moist to wet herb
FH1051	shrub	30	6	1051	Moist to wet herb
FH1052	Subhygric	20	7	1052	Moist to wet herb
FH1052	herb	30	7	1052	Moist to wet herb
FH1062	SlopeLT2	20	8	1062	Moist to wet herb
FH1062	Hygric	20	8	1062	Moist to wet herb
FH1062	herb	30	8	1062	Moist to wet herb
FH1063	water	80	9	1063	Barren/Sparsely Vegetated
FH1064	barren	80	10	1064	Barren/Sparsely Vegetated
FH1065	conifer	80	11	1065	Dry to mesic treed

FUZZY ATTRIBUTE TABLE (ARULES)

SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	LNQAREA	LnC2UM	5	7.50	7.50	7.50	0.00	7.60	0.10
2	formfile	LNQAREA	LnUM2L	1	8.60	8.60	8.60	7.50	9.70	1.10
3	formfile	LNQAREA	LnM2L	1	9.00	9.00	9.00	8.00	10.00	1.00
4	formfile	LNQAREA	LnML2T	1	9.75	9.75	9.75	9.00	10.50	0.75
5	formfile	LNQAREA	LnL2T	1	10.50	10.50	10.50	10.00	11.00	0.50
6	formfile	LNQAREA	LnV	4	11.00	11.00	11.00	10.00	16.79	1.00
7	formfile	LNQAREA	LnUM2T	1	9.45	9.45	9.45	7.50	11.40	1.95
8	formfile	QWETI	Subxeric	5	4.50	4.50	4.50	0.00	4.51	0.01
9	formfile	QWETI	Submesic	1	5.00	5.00	5.00	4.50	5.50	0.50
10	formfile	QWETI	SubM2Mes	1	6.50	6.50	6.50	4.50	8.50	2.00
11	formfile	QWETI	Mesic	1	6.65	6.65	6.65	5.50	7.80	1.15
12	formfile	QWETI	Subhygric	1	8.90	8.90	8.90	7.80	10.00	1.10
13	formfile	QWETI	Hygric	4	10.00	10.00	10.00	9.00	26.00	1.00
14	formfile	PROF	Prof_cv	5	-20.00	-20.00	-20.00	-86.00	-19.00	1.00
15	formfile	PROF	Prof_st	1	1.75	1.75	1.75	-5.50	9.00	7.25
16	formfile	PROF	Prof_cx	4	30.00	30.00	30.00	29.00	86.00	1.00
17	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
18	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
19	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
20	formfile	SLOPE	SlopeLT10	5	10.00	10.00	10.00	0.00	10.50	0.50
21	formfile	SLOPE	SlopeGT10	4	11.00	11.00	11.00	10.00	100.00	1.00
22	formfile	SLOPE	SlopeLT20	5	20.00	20.00	20.00	0.00	20.50	0.50
23	formfile	SLOPE	SlopeGT20	4	21.00	21.00	21.00	20.00	100.00	1.00
24	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.50	0.50
25	formfile	SLOPE	SlopeGT30	4	31.00	31.00	31.00	30.00	100.00	1.00
26	formfile	SLOPE	SlopeLT50	5	50.00	50.00	50.00	0.00	50.50	0.50
27	formfile	SLOPE	SlopeGT50	4	51.00	51.00	51.00	50.00	100.00	1.00
28	formfile	SLOPE	SlopeLT2	5	2.00	2.00	2.00	0.00	2.50	0.50
29	formfile	SLOPE	SlopeGT2	4	3.00	3.00	3.00	2.00	100.00	1.00
30	geofile	Classify1	conifer	1	5.00	5.00	5.00	4.99	5.01	0.01
31	geofile	Classify1	deciduous	1	7.00	7.00	7.00	6.99	7.01	0.01
32	geofile	Classify1	water	1	1.00	1.00	1.00	0.99	1.01	0.01
33	geofile	Classify1	herb	1	2.00	2.00	2.00	1.99	2.01	0.01
34	geofile	Classify1	shrub	1	3.00	3.00	3.00	2.99	3.01	0.01
35	geofile	Classify1	barren	1	4.00	4.00	4.00	3.99	4.01	0.01

Appendix 1b. Predictive Ecosystem Mapping Rules for BWBSmw
Zone File 2000

FUZZY CLASS TABLE (CRULES)					
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING
FH2021	Vdry	40	1	2021	102
FH2021	shrub	30	1	2021	102
FH2031	Dry	30	2	2031	103
FH2031	Warm	30	2	2031	103
FH2031	Up2Low	30	2	2031	103
FH2031	shrub	30	2	2031	103
FH2041	Dry2Moist	30	3	2041	104
FH2041	SlopeLT6	30	3	2041	104
FH2041	NE_Aspect	30	3	2041	104
FH2041	shrub	30	3	2041	104
FH2011	Dry2Moist	30	4	2011	101
FH2011	SlopeGT6	30	4	2011	101
FH2011	NE_Aspect	30	4	2011	101
FH2011	shrub	30	4	2011	101
FH2012	Fresh4	40	5	2012	101
FH2012	Up2Low	30	5	2012	101
FH2012	shrub	30	5	2012	101
FH2000	M2VMoist	40	6	2000	110
FH2000	SlopeLT6	20	6	2000	110
FH2000	Low	30	6	2000	110
FH2000	NE_Aspect	30	6	2000	110
FH2000	shrub	30	6	2000	110
FH2100	Wet	30	7	2100	111 (112)
FH2100	SlopeLT6	20	7	2100	111 (112)
FH2100	Fluvial	20	7	2100	111 (112)
FH2100	Channel	20	7	2100	111 (112)
FH2100	shrub	30	7	2100	111 (112)
FH2001	M2VMoist	30	8	2001	110
FH2001	NE_Aspect	30	8	2001	110
FH2001	SlopeGT50	30	8	2001	110
FH2001	shrub	30	8	2001	110
FH2190	SlopeLT6	20	9	2190	Shrub wetland bog/fen
FH2190	Organic	50	9	2190	Shrub wetland bog/fen
FH2190	shrub	30	9	2190	Shrub wetland bog/fen
FH2043	SlopeGT6	30	10	2043	104
FH2043	Organic	50	10	2043	104
FH2043	shrub	30	10	2043	104
FH2032	SlopeLT6	15	11	2032	103/102
FH2032	Dry2Moist	20	11	2032	103/102
FH2032	Fluvial	30	11	2032	103/102
FH2032	NonChan	15	11	2032	103/102

FUZZY CLASS TABLE (CRULES)					
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING
FH2032	shrub	30	11	2032	103/102
FH2013	SlopeGT6	15	12	2013	101
FH2013	Fluvial	30	12	2013	101
FH2013	NonChan	15	12	2013	101
FH2013	shrub	30	12	2013	101
FH2008	barren	80	13	2008	barren
FH2009	water	80	14	2009	water
FH2221	Vdry	40	15	2221	102
FH2221	herb	30	15	2221	102
FH2231	Dry	30	16	2231	103
FH2231	Warm	30	16	2231	103
FH2231	Fluvial	30	16	2231	103
FH2231	SlopeGT30	30	16	2231	103
FH2231	herb	30	16	2231	103
FH2241	Dry2Moist	30	17	2241	104
FH2241	SlopeLT6	30	17	2241	104
FH2241	NE_Aspect	30	17	2241	104
FH2241	herb	30	17	2241	104
FH2211	Dry2Moist	30	18	2211	101
FH2211	SlopeGT6	30	18	2211	101
FH2211	NE_Aspect	30	18	2211	101
FH2211	herb	30	18	2211	101
FH2212	Fresh4	30	19	2212	101
FH2212	Up2Low	30	19	2212	101
FH2212	herb	30	19	2212	101
FH2201	M2VMoist	40	20	2201	110
FH2201	SlopeLT6	20	20	2201	110
FH2201	Low	30	20	2201	110
FH2201	NE_Aspect	30	20	2201	110
FH2201	herb	30	20	2201	110
FH2202	Wet	30	21	2202	111 (112)
FH2202	SlopeLT6	20	21	2202	111 (112)
FH2202	Fluvial	20	21	2202	111 (112)
FH2202	Channel	20	21	2202	111 (112)
FH2202	herb	30	21	2202	111 (112)
FH2203	M2VMoist	30	22	2203	110
FH2203	NE_Aspect	30	22	2203	110
FH2203	SlopeGT50	30	22	2203	110
FH2203	herb	30	22	2203	110
FH2204	SlopeLT6	20	23	2204	bog/fen

Appendix 1b. Predictive Ecosystem Mapping Rules for BWBSmw

Zone File 2000

FUZZY CLASS TABLE (CRULES)

F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING
FH2204	Organic	50	23	2204	Herb wetland bog/fen
FH2204	herb	30	23	2204	Herb wetland bog/fen
FH2242	SlopeGT6	30	24	2242	104
FH2242	Organic	50	24	2242	104
FH2242	herb	30	24	2242	104
FH2232	SlopeLT6	15	25	2232	103/102
FH2232	Dry2Moist	20	25	2232	**103/102**
FH2232	Fluvial	30	25	2232	103/102
FH2232	NonChan	15	25	2232	103/102
FH2232	herb	30	25	2232	103/102
FH2213	SlopeGT6	15	26	2213	101
FH2213	Fluvial	30	26	2213	101
FH2213	NonChan	15	26	2213	101
FH2213	herb	30	26	2213	101
FH2233	Dry	30	27	2233	103
FH2233	Fluvial	30	27	2233	103
FH2233	shrub	30	27	2233	103
FH2234	Dry	30	28	2234	103
FH2234	Fluvial	30	28	2234	103
FH2234	herb	30	28	2234	103

FUZZY ATTRIBUTE TABLE (ARULES)

SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	LNQAREA	Crest	5	6.00	6.00	6.00	0.00	6.10	0.10
2	formfile	LNQAREA	Mid2Up	1	7.50	7.50	7.50	6.00	9.00	1.50
3	formfile	LNQAREA	Up2Low	1	7.75	7.75	7.75	6.00	9.50	1.75
4	formfile	LNQAREA	Low	1	10.00	10.00	10.00	9.00	11.00	1.00
5	formfile	LNQAREA	Toe	4	11.00	11.00	11.00	10.00	17.04	1.00
6	formfile	QWETI	Vdry	5	4.00	4.00	4.00	0.00	4.01	0.01
7	formfile	QWETI	Dry	1	5.00	5.00	5.00	4.00	6.00	1.00
8	formfile	QWETI	Fresh4	1	7.00	7.00	7.00	6.00	8.00	1.00
9	formfile	QWETI	Dry2Moist	1	7.50	7.50	7.50	6.00	9.00	1.50
10	formfile	QWETI	M2VMoist	1	9.00	9.00	9.00	8.00	10.00	1.00
11	formfile	QWETI	Wet	4	11.00	11.00	11.00	10.00	26.00	1.00
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	formfile	NEW_ASP	Warm	1	187.50	187.50	187.50	130.00	285.00	77.50
16	geofile	Classify1	water	1	1.00	1.00	1.00	0.99	51.01	0.01
17	geofile	Classify1	herb	1	2.00	2.00	2.00	1.99	2.01	0.01
18	geofile	Classify1	shrub	1	3.00	3.00	3.00	2.99	3.01	0.01
19	geofile	Classify1	barren	1	4.00	4.00	4.00	3.99	4.01	0.01
20	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.50	0.50
21	formfile	SLOPE	SlopeGT30	4	31.00	31.00	31.00	30.00	277.00	1.00
22	formfile	SLOPE	SlopeLT6	5	6.00	6.00	6.00	0.00	6.50	0.50
23	formfile	SLOPE	SlopeGT6	4	7.00	7.00	7.00	6.00	277.00	1.00
24	formfile	SLOPE	SlopeLT50	5	50.00	50.00	50.00	0.00	50.50	0.50
25	formfile	SLOPE	SlopeGT50	4	51.00	51.00	51.00	60.00	277.00	1.00
26	formfile	PROF	Prof_cv	5	-6.00	-6.00	-6.00	-80.00	-5.00	1.00
27	formfile	PROF	Prof_cx	4	17.00	17.00	17.00	16.00	88.00	1.00
28	geofile	Terrain	Bedrock	1	1.00	1.00	1.00	0.99	1.01	0.01
29	geofile	Terrain	Colluv	1	2.00	2.00	2.00	1.99	2.01	0.01
30	geofile	Terrain	Fluvial	1	3.00	3.00	3.00	2.99	3.01	0.01
31	geofile	Terrain	FG	1	4.00	4.00	4.00	3.99	4.01	0.01
32	geofile	Terrain	Lacust	1	5.00	5.00	5.00	4.99	5.01	0.01
33	geofile	Terrain	GlacLac	1	6.00	6.00	6.00	5.99	6.01	0.01
34	geofile	Terrain	Organic	1	7.00	7.00	7.00	6.99	7.01	0.01
35	geofile	Terrain	Moraine	1	8.00	8.00	8.00	7.99	8.01	0.01
36	geofile	Terrain	Other	1	9.00	9.00	9.00	8.99	9.01	0.01
37	relzfile	Z2St	Channel	5	8.00	8.00	8.00	0.00	8.50	0.50
38	relzfile	Z2St	NonChan	4	9.00	9.00	9.00	8.00	573.00	1.00

Appendix 1c. Predictive Ecosystem Mapping Rules for BWBSmw
Zone File 2500

FUZZY CLASS TABLE (CRULES)

F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING
FH2521	Vdry	40	1	2521	102
FH2522	Dry	30	2	2522	102
FH2522	SlopeLT6	30	2	2522	102
FH2522	Fluvial	30	2	2522	102
FH2531	Dry	30	3	2531	103
FH2531	Warm	30	3	2531	103
FH2531	Up2Low	30	3	2531	103
FH2532	Dry	30	4	2532	103
FH2532	Warm	30	4	2532	103
FH2532	Fluvial	30	4	2532	103
FH2532	SlopeGT30	30	4	2532	103
FH2541	Dry2Moist	30	5	2541	104
FH2541	NE_Aspect	30	5	2541	104
FH2541	SlopeGT50	30	5	2541	104
FH2542	Dry2Moist	30	6	2542	104
FH2542	SlopeLT6	30	6	2542	104
FH2542	NE_Aspect	30	6	2542	104
FH2511	Dry2Moist	30	7	2511	101
FH2511	SlopeGT6	30	7	2511	101
FH2511	NE_Aspect	30	7	2511	101
FH2512	Fresh4	30	8	2512	101
FH2512	Up2Low	30	8	2512	101
FH2533	Fresh4	30	9	2533	103
FH2533	Warm	30	9	2533	103
FH2551	M2VMoist	40	10	2551	110
FH2551	SlopeLT6	20	10	2551	110
FH2551	Low	30	10	2551	110
FH2551	NE_Aspect	30	10	2551	110
FH2500	Wet	30	11	2500	111
FH2500	SlopeLT6	20	11	2500	111
FH2500	Warm	30	11	2500	111
FH2500	Fluvial	20	11	2500	111
FH2500	Channel	20	11	2500	111
FH2501	Wet	30	12	2501	111
FH2501	Toe	30	12	2501	111
FH2501	Fluvial	20	12	2501	111
FH2552	M2VMoist	30	13	2552	110
FH2552	NE_Aspect	30	13	2552	110
FH2552	SlopeGT50	30	13	2552	110
FH2504	SlopeLT6	20	14	2504	Wetland treed
FH2504	Organic	50	14	2504	Wetland treed
FH2502	Wet	30	15	2502	111/112
FH2502	Fluvial	10	15	2502	111/112
FH2502	Channel	15	15	2502	111/112

FUZZY CLASS TABLE (CRULES)

F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING
FH2543	SlopeGT6	30	16	2543	104
FH2543	Organic	50	16	2543	104
FH2513	Fresh4	30	17	2513	101
FH2513	SlopeLT6	30	17	2513	101
FH2513	NE_Aspect	30	17	2513	101
FH2534	SlopeLT6	15	18	2534	103/102
FH2534	Dry2Moist	20	18	2534	103/102
FH2534	Fluvial	30	18	2534	103/102
FH2534	NonChan	15	18	2534	103/102
FH2514	SlopeGT6	15	19	2514	101
FH2514	Fluvial	30	19	2514	101
FH2514	NonChan	15	19	2514	101

FUZZY ATTRIBUTE TABLE (ARULES)

SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	LNQAREA	Crest	5	6.00	6.00	6.00	0.00	6.10	0.10
2	formfile	LNQAREA	Mid2Up	1	7.50	7.50	7.50	6.00	9.00	1.50
3	formfile	LNQAREA	Up2Low	1	7.75	7.75	7.75	6.00	9.50	1.75
4	formfile	LNQAREA	Low	1	10.00	10.00	10.00	9.00	11.00	1.00
5	formfile	LNQAREA	Toe	4	11.00	11.00	11.00	10.00	17.04	1.00
6	formfile	QWETI	Vdry	5	4.00	4.00	4.00	0.00	4.01	0.01
7	formfile	QWETI	Dry	1	5.00	5.00	5.00	4.00	6.00	1.00
8	formfile	QWETI	Fresh4	1	7.00	7.00	7.00	6.00	8.00	1.00
9	formfile	QWETI	Dry2Moist	1	7.50	7.50	7.50	6.00	9.00	1.50
10	formfile	QWETI	M2VMoist	1	9.00	9.00	9.00	8.00	10.00	1.00
11	formfile	QWETI	Wet	4	11.00	11.00	11.00	10.00	26.00	1.00
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	formfile	NEW_ASP	Warm	1	187.50	187.50	187.50	130.00	285.00	77.50
16	geofile	Classify1	conifer	1	5.00	5.00	5.00	4.99	5.01	0.01
17	geofile	Classify1	deciduous	1	7.00	7.00	7.00	6.99	7.01	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	SlopeLT6	5	6.00	6.00	6.00	0.00	6.50	0.50
21	formfile	SLOPE	SlopeGT6	4	7.00	7.00	7.00	6.00	277.00	1.00
22	formfile	SLOPE	SlopeLT50	5	50.00	50.00	50.00	0.00	50.50	0.50
23	formfile	SLOPE	SlopeGT50	4	51.00	51.00	51.00	60.00	277.00	1.00
24	formfile	PROF	Prof_cv	5	-6.00	-6.00	-6.00	-80.00	-5.00	1.00
25	formfile	PROF	Prof_cx	4	17.00	17.00	17.00	16.00	88.00	1.00
26	geofile	Terrain	Bedrock	1	1.00	1.00	1.00	0.99	1.01	0.01
27	geofile	Terrain	Colluv	1	2.00	2.00	2.00	1.99	2.01	0.01
28	geofile	Terrain	Fluvial	1	3.00	3.00	3.00	2.99	3.01	0.01
29	geofile	Terrain	FG	1	4.00	4.00	4.00	3.99	4.01	0.01
30	geofile	Terrain	Lacust	1	5.00	5.00	5.00	4.99	5.01	0.01
31	geofile	Terrain	GlacLac	1	6.00	6.00	6.00	5.99	6.01	0.01
32	geofile	Terrain	Organic	1	7.00	7.00	7.00	6.99	7.01	0.01
33	geofile	Terrain	Moraine	1	8.00	8.00	8.00	7.99	8.01	0.01
34	geofile	Terrain	Other	1	9.00	9.00	9.00	8.99	9.01	0.01
35	relzfile	Z2St	Channel	5	8.00	8.00	8.00	0.00	8.50	0.50
36	relzfile	Z2St	NonChan	4	9.00	9.00	9.00	8.00	573.00	1.00

Appendix 1d. Predictive Ecosystem Mapping Rules for BWBSwk1

Zone File 3000

FUZZY CLASS TABLE (CRULES)					
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING
FH3001	water	80	1	3001	water
FH3002	barren	80	2	3002	barren
FH3021	Sxe2Sme	20	3	3021	102
FH3021	LnCrest	30	3	3021	102
FH3021	shrub	40	3	3021	102
FH3031	Sxe2Sme	20	4	3031	103
FH3031	SW_Aspect	30	4	3031	103
FH3031	SlopeGT30	20	4	3031	103
FH3031	shrub	40	4	3031	103
FH3041	Sxe2Sme	20	5	3041	104
FH3041	NE_Aspect	30	5	3041	104
FH3041	SlopeGT30	20	5	3041	104
FH3041	shrub	40	5	3041	104
FH3042	SMes2SHy	20	6	3042	104
FH3042	NE_Aspect	30	6	3042	104
FH3042	SlopeGT50	20	6	3042	104
FH3042	shrub	40	6	3042	104
FH3011	SMes2SHy	20	7	3011	101
FH3011	NE_Aspect	30	7	3011	101
FH3011	SlopeLT50	20	7	3011	101
FH3011	shrub	40	7	3011	101
FH3012	Mesic	20	8	3012	101
FH3012	shrub	40	8	3012	101
FH3012	SlopeGT10	20	8	3012	101
FH3012	Upland	30	8	3012	101
FH3013	SMes2SHy	20	9	3013	101
FH3013	LnMid	30	9	3013	101
FH3013	LnUp	30	9	3013	101
FH3013	shrub	40	9	3013	101
FH3043	LnMid	30	10	3043	104
FH3043	Subhygric	40	10	3043	104
FH3043	NE_Aspect	30	10	3043	104
FH3043	shrub	40	10	3043	104
FH3110	Lnlow	30	11	3110	110/111
FH3110	Subhygric	40	11	3110	110/111
FH3110	shrub	40	11	3110	110/111
FH3111	LnLow	20	12	3111	110/111
FH3111	Hygric	40	12	3111	110/111
FH3111	shrub	40	12	3111	110/111

FUZZY CLASS TABLE (CRULES)					
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING
FH3044	SMes2SHy	20	13	3044	104
FH3044	SlopeLT5	20	13	3044	104
FH3044	shrub	40	13	3044	104
FH3045	Mesic	20	14	3045	104
FH3045	shrub	40	14	3045	104
FH3045	SlopeLT10	20	14	3045	104
FH3045	Upland	30	14	3045	104
FH3014	Mesic	20	15	3014	101
FH3014	shrub	40	15	3014	101
FH3014	Lowland	30	15	3014	101
FH3022	Sxe2Sme	20	16	3022	102
FH3022	LnCrest	30	16	3022	102
FH3022	herb	40	16	3022	102
FH3014	SMes2SHy	20	17	3014	101
FH3014	NE_Aspect	30	17	3014	101
FH3014	SlopeLT50	20	17	3014	101
FH3014	herb	40	17	3014	101
FH3015	Mesic	20	18	3015	101
FH3015	herb	40	18	3015	101
FH3015	SlopeGT10	20	18	3015	101
FH3015	Upland	30	18	3015	101
FH3016	SMes2SHy	20	19	3016	101
FH3016	LnMid	30	19	3016	101
FH3016	LnUp	30	19	3016	101
FH3016	herb	40	19	3016	101
FH3017	Mesic	20	20	3017	101
FH3017	herb	40	20	3017	101
FH3017	Lowland	30	20	3017	101
FH3032	Sxe2Sme	20	21	3032	103
FH3032	SW_Aspect	30	21	3032	103
FH3032	SlopeGT30	20	21	3032	103
FH3032	herb	40	21	3032	103
FH3046	Sxe2Sme	20	22	3046	104
FH3046	NE_Aspect	30	22	3046	104
FH3046	SlopeGT30	20	22	3046	104
FH3046	herb	40	22	3046	104
FH3047	SMes2SHy	20	23	3047	104
FH3047	NE_Aspect	30	23	3047	104
FH3047	SlopeGT50	20	23	3047	104
FH3047	herb	40	23	3047	104

Appendix 1d. Predictive Ecosystem Mapping Rules for BWBSwk1

Zone File 3000

FUZZY CLASS TABLE (CRULES)

F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING
FH3048	LnMid	30	24	3048	104
FH3048	Subhygric	**40**	24	3048	104
FH3048	NE_Aspect	30	24	3048	104
FH3048	herb	40	24	3048	104
FH3112	Lnlow	30	25	3112	110/111
FH3112	Subhygric	**40**	25	3112	110/111
FH3112	herb	40	25	3112	110/111
FH3113	LnLow	20	26	3113	110/111
FH3113	Hygric	**40**	26	3113	110/111
FH3113	herb	40	26	3113	110/111
FH3049	SMes2SHy	20	27	3049	104
FH3049	SlopeLT5	20	27	3049	104
FH3049	herb	40	27	3049	104
FH3050	Mesic	20	28	3050	104
FH3050	herb	40	28	3050	104
FH3050	SlopeLT10	20	28	3050	104
FH3050	Upland	30	28	3050	104
FH3200	Hygric	40	29	3200	Wetland shrub/herb swamp
FH3200	SlopeLT2	20	29	3200	Wetland shrub/herb swamp
FH3200	Prof_cv	40	29	3200	Wetland shrub/herb swamp
FH3300	Organic	80	30	3300	Wetland shrub/herb bog

FUZZY ATTRIBUTE TABLE (ARULES)

SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	LNQAREA	LnCrest	5	6.30	6.30	6.30	0.00	6.40	0.10
2	formfile	LNQAREA	LnUp	1	6.90	6.90	6.90	6.30	7.50	0.60
3	formfile	LNQAREA	LnMid	1	8.50	8.50	8.50	7.50	9.50	1.00
4	formfile	LNQAREA	Lnlow	1	10.00	10.00	10.00	9.50	10.50	0.50
5	formfile	LNQAREA	LnV	4	10.00	10.00	10.00	9.50	16.79	1.00
6	formfile	QWETI	Sxe2Sme	5	5.50	5.50	5.50	0.00	5.51	0.1
7	formfile	QWETI	Mesic	1	6.65	6.65	6.65	5.50	7.80	1.15
8	formfile	QWETI	Subhygric	1	8.90	8.90	8.90	7.80	10.00	1.10
9	formfile	QWETI	SMes2SHy	1	7.00	7.00	7.00	5.00	9.00	2.00
10	formfile	QWETI	Hygric	4	10.00	10.00	10.00	9.00	26.00	1.00
11	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
12	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
13	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
14	geofile	Classify1	water	1	1.00	1.00	1.00	0.99	1.01	0.01
15	geofile	Classify1	herb	1	2.00	2.00	2.00	1.99	2.01	0.01
16	geofile	Classify1	shrub	1	3.00	3.00	3.00	2.99	3.01	0.01
17	geofile	Classify1	barren	1	4.00	4.00	4.00	3.99	4.01	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	SlopeLT50	5	50.00	50.00	50.00	0.00	50.50	0.50
29	formfile	SLOPE	SlopeGT50	4	51.00	51.00	51.00	50.00	100.00	1.00
30	formfile	PROF	Prof_cv	5	-10.00	-10.00	-10.00	-85.33	-9.00	1.00
31	formfile	PROF	Prof_cx	4	17.00	17.00	17.00	16.00	88.00	1.00
32	relzfile	PCTZ2PIT	Upland	4	50.00	50.00	50.00	49.00	100.00	1.00
33	relzfile	PCTZ2PIT	Lowland	5	49.00	49.00	49.00	0.00	49.50	0.50
34	geofile	Terrain	Organic	1	7.00	7.00	7.00	6.99	7.01	0.01
35	relzfile	Z2St	Channel	5	8.00	8.00	8.00	0.00	8.50	0.50
36	relzfile	Z2St	NonChan	4	9.00	9.00	9.00	8.00	573.00	1.00
37	formfile	SLOPE	SlopeLT2	5	2.00	2.00	2.00	0.00	2.50	0.50
38	formfile	SLOPE	SlopeGT2	4	3.00	3.00	3.00	2.00	277.00	1.00

Appendix 1e. Predictive Ecosystem Mapping Rules for BWBSwk1

Zone File 3500

FUZZY CLASS TABLE (CRULES)						
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	Predicting	Stand
FH3521	Sxe2Sme	20	1	3521	102	Conifer
FH3521	LnCrest	30	1	3521	102	Conifer
FH3521	conifer	40	1	3521	102	Conifer
FH3531	Sxe2Sme	20	2	3531	103	Conifer
FH3531	SW_Aspect	30	2	3531	103	Conifer
FH3531	SlopeGT30	20	2	3531	103	Conifer
FH3531	conifer	40	2	3531	103	Conifer
FH3541	Sxe2Sme	20	3	3541	104	Conifer
FH3541	NE_Aspect	30	3	3541	104	Conifer
FH3541	SlopeGT30	20	3	3541	104	Conifer
FH3541	conifer	40	3	3541	104	Conifer
FH3542	SMes2SHy	20	4	3542	104	Conifer
FH3542	NE_Aspect	30	4	3542	104	Conifer
FH3542	SlopeGT50	20	4	3542	104	Conifer
FH3542	conifer	40	4	3542	104	Conifer
FH3511	SMes2SHy	20	5	3511	101	Conifer
FH3511	NE_Aspect	30	5	3511	101	Conifer
FH3511	SlopeLT50	20	5	3511	101	Conifer
FH3511	conifer	40	5	3511	101	Conifer
FH3512	Mesic	20	6	3512	101	Conifer
FH3512	conifer	40	6	3512	101	Conifer
FH3512	SlopeGT10	20	6	3512	101	Conifer
FH3512	Upland	30	6	3512	101	Conifer
FH3513	SMes2SHy	20	7	3513	101	Conifer
FH3513	LnMid	30	7	3513	101	Conifer
FH3513	LnUp	30	7	3513	101	Conifer
FH3513	conifer	40	7	3513	101	Conifer
FH3543	LnMid	30	8	3543	104	Conifer
FH3543	Subhygric	40	8	3543	104	Conifer
FH3543	NE_Aspect	30	8	3543	104	Conifer
FH3543	conifer	40	8	3543	104	Conifer
FH3610	Lnlow	30	9	3610	110/111	Conifer
FH3610	Subhygric	40	9	3610	110/111	Conifer
FH3610	conifer	40	9	3610	110/111	Conifer
FH3612	LnLow	20	10	3612	110/111	Conifer
FH3612	Hygric	40	10	3612	110/111	Conifer
FH3612	conifer	40	10	3612	110/111	Conifer
FH3544	SMes2SHy	20	11	3544	104	conifer
FH3544	SlopeLT5	20	11	3544	104	conifer
FH3544	conifer	40	11	3544	104	conifer
FH3545	Mesic	20	12	3545	104	Conifer
FH3545	conifer	40	12	3545	104	Conifer
FH3545	SlopeLT10	20	12	3545	104	Conifer
FH3545	Upland	30	12	3545	104	Conifer
FH3514	Mesic	20	13	3514	101	Conifer
FH3514	conifer	40	13	3514	101	Conifer
FH3514	Lowland	30	13	3514	101	Conifer
FH3721	Sxe2Sme	20	14	3721	102$	Deciduous
FH3721	LnCrest	30	14	3721	102$	Deciduous
FH3721	deciduous	40	14	3721	102$	Deciduous

FUZZY CLASS TABLE (CRULES)						
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	Predicting	Stand
FH3711	SMes2SHy	20	15	3711	101$	Deciduous
FH3711	NE_Aspect	30	15	3711	101$	Deciduous
FH3711	SlopeLT50	20	15	3711	101$	Deciduous
FH3711	deciduous	40	15	3711	101$	Deciduous
FH3712	Mesic	20	16	3712	101$	Deciduous
FH3712	deciduous	40	16	3712	101$	Deciduous
FH3712	SlopeGT10	20	16	3712	101$	Deciduous
FH3712	Upland	30	16	3712	101$	Deciduous
FH3713	SMes2SHy	20	17	3713	101$	Deciduous
FH3713	LnMid	30	17	3713	101$	Deciduous
FH3713	LnUp	30	17	3713	101$	Deciduous
FH3713	deciduous	40	17	3713	101$	Deciduous
FH3714	Mesic	20	18	3714	101$	Deciduous
FH3714	deciduous	40	18	3714	101$	Deciduous
FH3714	Lowland	30	18	3714	101$	Deciduous
FH3731	Sxe2Sme	20	19	3731	103$	Deciduous
FH3731	SW_Aspect	30	19	3731	103$	Deciduous
FH3731	SlopeGT30	20	19	3731	103$	Deciduous
FH3731	deciduous	40	19	3731	103$	Deciduous
FH3741	Sxe2Sme	20	20	3741	104$	Deciduous
FH3741	NE_Aspect	30	20	3741	104$	Deciduous
FH3741	SlopeGT30	20	20	3741	104$	Deciduous
FH3741	deciduous	40	20	3741	104$	Deciduous
FH3742	SMes2SHy	20	21	3742	104$	Deciduous
FH3742	NE_Aspect	30	21	3742	104$	Deciduous
FH3742	SlopeGT50	20	21	3742	104$	Deciduous
FH3742	deciduous	40	21	3742	104$	Deciduous
FH3743	LnMid	30	22	3743	104$	Deciduous
FH3743	Subhygric	40	22	3743	104$	Deciduous
FH3743	NE_Aspect	30	22	3743	104$	Deciduous
FH3743	deciduous	40	22	3743	104$	Deciduous
FH3761	Lnlow	30	23	3761	110$/111$	Deciduous
FH3761	Subhygric	40	23	3761	110$/111$	Deciduous
FH3761	deciduous	40	23	3761	110$/111$	Deciduous
FH3762	LnLow	20	24	3762	110$/111$	Deciduous
FH3762	Hygric	40	24	3762	110$/111$	Deciduous
FH3762	deciduous	40	24	3762	110$/111$	Deciduous
FH3744	SMes2SHy	20	25	3744	104$	Deciduous
FH3744	SlopeLT5	20	25	3744	104$	Deciduous
FH3744	deciduous	40	25	3744	104$	Deciduous
FH3745	Mesic	20	26	3745	104$	Deciduous
FH3745	deciduous	40	26	3745	104$	Deciduous
FH3745	SlopeLT10	20	26	3745	104$	Deciduous
FH3745	Upland	30	26	3745	104$	Deciduous
FH3800	Hygric	40	27	3800	Treed Wetland swamp	
FH3800	SlopeLT2	20	27	3800	Treed Wetland swamp	
FH3800	Prof_cv	40	27	3800	Treed Wetland swamp	
FH3801	Organic	80	28	3801	Wetland treed bog	

Appendix 1e. Predictive Ecosystem Mapping Rules for BWBSwk1

Zone File 3500

FUZZY ATTRIBUTE TABLE (ARULES)										
SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	LNQAREA	LnCrest	5	6.30	6.30	6.30	0.00	6.40	0.10
2	formfile	LNQAREA	LnUp	1	6.90	6.90	6.90	6.30	7.50	0.60
3	formfile	LNQAREA	LnMid	1	8.50	8.50	8.50	7.50	9.50	1.00
4	formfile	LNQAREA	Lnlow	1	10.00	10.00	10.00	9.50	10.50	0.50
5	formfile	LNQAREA	LnV	4	10.00	10.00	10.00	9.50	16.79	1.00
6	formfile	QWETI	Sxe2Sme	5	5.50	5.50	5.50	0.00	5.51	0.1
7	formfile	QWETI	Mesic	1	6.65	6.65	6.65	5.50	7.80	1.15
8	formfile	QWETI	Subhygric	1	8.90	8.90	8.90	7.80	10.00	1.10
9	formfile	QWETI	SMes2SHy	1	7.00	7.00	7.00	5.00	9.00	2.00
10	formfile	QWETI	Hygric	4	10.00	10.00	10.00	9.00	26.00	1.00
11	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
12	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
13	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
14	geofile	Classify1	conifer	1	5.00	5.00	5.00	4.99	5.01	0.01
15	geofile	Classify1	deciduous	1	7.00	7.00	7.00	6.99	7.01	0.01
16	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.50	0.50
17	formfile	SLOPE	SlopeGT30	4	31.00	31.00	31.00	30.00	277.00	1.00
18	formfile	SLOPE	SlopeLT5	5	5.00	5.00	5.00	0.00	5.50	0.50
19	formfile	SLOPE	SlopeGT5	4	6.00	6.00	6.00	5.00	277.00	1.00
20	formfile	SLOPE	SlopeLT10	5	10.00	10.00	10.00	0.00	10.50	0.50
21	formfile	SLOPE	SlopeGT10	4	11.00	11.00	11.00	10.00	277.00	1.00
22	formfile	SLOPE	SlopeLT15	5	15.00	15.00	15.00	0.00	15.50	0.50
23	formfile	SLOPE	SlopeGT15	4	16.00	16.00	16.00	15.00	277.00	1.00
24	formfile	SLOPE	SlopeLT20	5	20.00	20.00	20.00	0.00	20.50	0.50
25	formfile	SLOPE	SlopeGT20	4	21.00	21.00	21.00	20.00	277.00	1.00
26	formfile	SLOPE	SlopeLT50	5	50.00	50.00	50.00	0.00	50.50	0.50
27	formfile	SLOPE	SlopeGT50	4	51.00	51.00	51.00	50.00	100.00	1.00
28	formfile	PROF	Prof_cv	5	-10.00	-10.00	-10.00	-85.33	-9.00	1.00
29	formfile	PROF	Prof_cx	4	17.00	17.00	17.00	16.00	88.00	1.00
30	relzfile	PCTZ2PIT	Upland	4	50.00	50.00	50.00	49.00	100.00	1.00
31	relzfile	PCTZ2PIT	Lowland	5	49.00	49.00	49.00	0.00	49.50	0.50
32	geofile	Terrain	Organic	1	7.00	7.00	7.00	6.99	7.01	0.01
33	relzfile	Z2St	Channel	5	8.00	8.00	8.00	0.00	8.50	0.50
34	relzfile	Z2St	NonChan	4	9.00	9.00	9.00	8.00	573.00	1.00
35	formfile	SLOPE	SlopeLT2	5	2.00	2.00	2.00	0.00	2.50	0.50
36	formfile	SLOPE	SlopeGT2	4	3.00	3.00	3.00	2.00	277.00	1.00

Appendix 1f. Predictive Ecosystem Mapping Rules for ESSFmv2

Zone File 4000

FUZZY CLASS TABLE (CRULES)					
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING
FH4001	barren	50	1	4001	Parkland barren ESSFmvp
FH4001	GT1600	40	1	4001	Parkland barren ESSFmvp
FH4002	barren	40	2	4002	barren (ESSFmv2)
FH4002	LT1600	40	2	4002	barren
FH4021	Subxeric	20	3	4021	02 shrub
FH4021	shrub	30	3	4021	02 shrub
FH4021	LT1600	40	3	4021	02 shrub
FH4022	Subxeric	20	4	4022	02 herb
FH4022	herb	30	4	4022	02 herb
FH4022	LT1600	40	4	4022	02 herb
FH4023	Submesic	20	5	4023	02 shrub
FH4023	SlopeGT50	20	5	4023	02 shrub
FH4023	shrub	30	5	4023	02 shrub
FH4023	LT1600	40	5	4023	02 shrub
FH4024	Submesic	20	6	4024	02 herb
FH4024	SlopeGT50	20	6	4024	02 herb
FH4024	herb	30	6	4024	02 herb
FH4024	LT1600	40	6	4024	02 herb
FH4012	SubM2Mes	20	7	4012	01/03/04 shrub
FH4012	SlopeLT50	20	7	4012	01/03/04 shrub
FH4012	shrub	30	7	4012	01/03/04 shrub
FH4012	LT1600	40	7	4012	01/03/04 shrub
FH4013	SubM2Mes	20	8	4013	01/03/04 herb
FH4013	SlopeLT50	20	8	4013	01/03/04 herb
FH4013	herb	30	8	4013	01/03/04 herb
FH4013	LT1600	40	8	4013	01/03/04 herb
FH4014	SlopeGT20	30	9	4014	01 shrub
FH4014	SubM2Mes	20	9	4014	01 shrub
FH4014	shrub	30	9	4014	01 shrub
FH4014	LT1600	40	9	4014	01 shrub
FH4015	SlopeGT20	30	10	4015	01 herb
FH4015	SubM2Mes	20	10	4015	01 herb
FH4015	herb	30	10	4015	01 herb
FH4015	LT1600	40	10	4015	01 herb
FH4016	Submesic	20	11	4016	01 shrub
FH4016	SlopeLT50	20	11	4016	01 shrub
FH4016	shrub	30	11	4016	01 shrub
FH4016	LT1600	40	11	4016	01 shrub

FUZZY CLASS TABLE (CRULES)					
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING
FH4017	Submesic	20	12	4017	01 herb
FH4017	SlopeLT50	20	12	4017	01 herb
FH4017	herb	30	12	4017	01 herb
FH4017	LT1600	40	12	4017	01 herb
FH4041	SlopeLT20	30	13	4041	04 shrub
FH4041	Mesic	20	13	4041	04 shrub
FH4041	shrub	30	13	4041	04 shrub
FH4041	LT1600	40	13	4041	04 shrub
FH4042	SlopeLT20	30	14	4042	04 herb
FH4042	Mesic	20	14	4042	04 herb
FH4042	herb	30	14	4042	04 herb
FH4042	LT1600	40	14	4042	04 herb
FH4051	SlopeGT10	20	15	4051	05 shrub
FH4051	Subhygric	20	15	4051	05 shrub
FH4051	shrub	30	15	4051	05 shrub
FH4051	LT1600	40	15	4051	05 shrub
FH4052	SlopeGT10	20	16	4052	05 herb
FH4052	Subhygric	20	16	4052	05 herb
FH4052	herb	30	16	4052	05 herb
FH4052	LT1600	40	16	4052	05 herb
FH4053	SlopeGT2	20	17	4053	05 shrub
FH4053	Hygric	20	17	4053	05 shrub
FH4053	shrub	30	17	4053	05 shrub
FH4053	LT1600	40	17	4053	05 shrub
FH4054	SlopeGT2	20	18	4054	05 herb
FH4054	Hygric	20	18	4054	05 herb
FH4054	herb	30	18	4054	05 herb
FH4054	LT1600	40	18	4054	05 herb
FH4031	SlopeLT10	20	19	4031	03 shrub
FH4031	SubM2Mes	20	19	4031	03 shrub
FH4031	shrub	30	19	4031	03 shrub
FH4031	LT1600	40	19	4031	03 shrub
FH4032	SlopeLT10	20	20	4032	03 herb
FH4032	SubM2Mes	20	20	4032	03 herb
FH4032	herb	30	20	4032	03 herb
FH4032	LT1600	40	20	4032	03 herb
FH4061	Hygric	20	21	4061	06 shrub
FH4061	Prof_cv	20	21	4061	06 shrub
FH4061	shrub	30	21	4061	06 shrub
FH4061	LT1600	40	21	4061	06 shrub

Appendix 1f. Predictive Ecosystem Mapping Rules for ESSFmv2

Zone File 4000

FUZZY CLASS TABLE (CRULES)

F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING
FH4062	Hygric	20	22	4062	06 herb
FH4062	Prof_cv	20	22	4062	06 herb
FH4062	herb	30	22	4062	06 herb
FH4062	LT1600	40	22	4062	06 herb
FH4063	SlopeLT2	20	23	4063	06 shrub
FH4063	Hygric	20	23	4063	06 shrub
FH4063	shrub	30	23	4063	06 shrub
FH4063	LT1600	40	23	4063	06 shrub
FH4064	SlopeLT2	20	24	4064	06 herb
FH4064	Hygric	20	24	4064	06 herb
FH4064	herb	30	24	4064	06 herb
FH4064	LT1600	40	24	4064	06 herb
FH4055	Subhygric	20	25	4055	05 shrub
FH4055	shrub	30	25	4055	05 shrub
FH4055	LT1600	40	25	4055	05 shrub
FH4056	Subhygric	20	26	4056	05 herb
FH4056	herb	30	26	4056	05 herb
FH4056	LT1600	40	26	4056	05 herb
FH4100	Mesic	20	27	4100	Submesic to mesic shrub
FH4100	shrub	30	27	4100	Submesic to mesic shrub
FH4100	GT1600	40	27	4100	Submesic to mesic shrub
FH4200	Mesic	20	28	4200	Submesic to mesic Herb
FH4200	herb	30	28	4200	Submesic to mesic Herb
FH4200	GT1600	40	28	4200	Submesic to mesic Herb
FH4101	SubH2Hyg	20	29	4101	Wetter shrub
FH4101	shrub	30	29	4101	Wetter shrub
FH4101	GT1600	40	29	4101	Wetter shrub
FH4201	SubH2Hyg	20	30	4201	Wetter Herb
FH4201	herb	30	30	4201	Wetter Herb
FH4201	GT1600	40	30	4201	Wetter Herb

FUZZY ATTRIBUTE TABLE (ARULES)

SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	LNQAREA	LnC2UM	5	7.50	7.50	7.50	0.00	7.60	0.10
2	formfile	LNQAREA	LnUM2L	1	8.60	8.60	8.60	7.50	9.70	1.10
3	formfile	LNQAREA	LnM2L	1	9.00	9.00	9.00	8.00	10.00	1.00
4	formfile	LNQAREA	LnML2T	1	9.75	9.75	9.75	9.00	10.50	0.75
5	formfile	LNQAREA	LnL2T	1	10.50	10.50	10.50	10.00	11.00	0.50
6	formfile	LNQAREA	LnV	4	11.00	11.00	11.00	10.00	16.79	1.00
7	formfile	LNQAREA	LnUM2T	1	9.45	9.45	9.45	7.50	11.40	1.95
8	formfile	QWETI	Subxeric	5	4.50	4.50	4.50	0.00	4.51	0.01
9	formfile	QWETI	Submesic	1	5.00	5.00	5.00	4.50	5.50	0.50
10	formfile	QWETI	SubM2Mes	1	6.50	6.50	6.50	4.50	8.50	2.00
11	formfile	QWETI	Mesic	1	6.65	6.65	6.65	5.50	7.80	1.15
12	formfile	QWETI	Mesic2Hyg	4	7.00	7.00	7.00	6.00	12.00	1.00
13	formfile	QWETI	SubH2Hyg	4	9.00	9.00	9.00	8.50	26.00	0.50
14	formfile	QWETI	Subhygric	1	8.90	8.90	8.90	7.80	10.00	1.10
15	formfile	QWETI	Hygric	4	10.00	10.00	10.00	9.00	26.00	1.00
16	formfile	PROF	Prof_cv	5	-20.00	-20.00	-20.00	-86.00	-19.00	1.00
17	formfile	PROF	Prof_st	1	1.75	1.75	1.75	-5.50	9.00	7.25
18	formfile	PROF	Prof_cx	4	30.00	30.00	30.00	29.00	86.00	1.00
19	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
20	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
21	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
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	100.00	1.00
24	formfile	SLOPE	SlopeLT20	5	20.00	20.00	20.00	0.00	20.50	0.50
25	formfile	SLOPE	SlopeGT20	4	21.00	21.00	21.00	20.00	100.00	1.00
26	formfile	SLOPE	SlopeLT50	5	50.00	50.00	50.00	0.00	50.50	0.50
27	formfile	SLOPE	SlopeGT50	4	51.00	51.00	51.00	50.00	100.00	1.00
28	formfile	SLOPE	SlopeLT2	5	2.00	2.00	2.00	0.00	2.50	0.50
29	formfile	SLOPE	SlopeGT2	4	3.00	3.00	3.00	2.00	100.00	1.00
30	geofile	Classify1	water	1	1.00	1.00	1.00	0.99	1.01	0.01
31	geofile	Classify1	herb	1	2.00	2.00	2.00	1.99	2.01	0.01
32	geofile	Classify1	shrub	1	3.00	3.00	3.00	2.99	3.01	0.01
33	geofile	Classify1	barren	1	4.00	4.00	4.00	3.99	4.01	0.01
34	geofile	Elev	LT1600	5	1600.00	1600.00	1600.00	0.00	1600.50	0.50
35	geofile	Elev	GT1600	4	1601.00	1601.00	1601.00	1600.00	2093.00	1.00
36	geofile	Elev	LT1700	5	1700.00	1700.00	1700.00	0.00	1600.50	0.50
37	geofile	Elev	GT1700	4	1701.00	1701.00	1701.00	1700.00	2093.00	1.00

Appendix 1g. Predictive Ecosystem Mapping Rules for ESSFmv2

Zone File 4500

FUZZY CLASS TABLE (CRULES)						
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING	Stand
FH4511	SlopeGT20	30	1	4511	01 conifer	Conifer
FH4511	SubM2Mes	20	1	4511	01 conifer	Conifer
FH4511	conifer	30	1	4511	01 conifer	Conifer
FH4511	LT1600	40	1	4511	01 conifer	Conifer
FH4512	SlopeGT20	30	2	4512	01 conifer shrub	Deciduous
FH4512	SubM2Mes	20	2	4512	01 conifer shrub	Deciduous
FH4512	deciduous	30	2	4512	01 conifer shrub	Deciduous
FH4512	LT1600	40	2	4512	01 conifer shrub	Deciduous
FH4513	Submesic	20	3	4513	01 conifer	Conifer
FH4513	SlopeLT50	20	3	4513	01 conifer	Conifer
FH4513	conifer	30	3	4513	01 conifer	Conifer
FH4513	LT1600	40	3	4513	01 conifer	Conifer
FH4514	Submesic	20	4	4514	01 conifer shrub	Deciduous
FH4514	SlopeLT50	20	4	4514	01 conifer shrub	Deciduous
FH4514	deciduous	20	4	4514	01 conifer shrub	Deciduous
FH4514	LT1600	40	4	4514	01 conifer shrub	Deciduous
FH4515	SlopeLT50	20	5	4515	01/03/04 conifer	Conifer
FH4515	SubM2Mes	20	5	4515	01/03/04 conifer	Conifer
FH4515	conifer	30	5	4515	01/03/04 conifer	Conifer
FH4515	LT1600	40	5	4515	01/03/04 conifer	Conifer
FH4516	SlopeLT50	20	6	4516	01 conifer shrub	Deciduous
FH4516	SubM2Mes	20	6	4516	01 conifer shrub	Deciduous
FH4516	deciduous	20	6	4516	01 conifer shrub	Deciduous
FH4516	LT1600	40	6	4516	01 conifer shrub	Deciduous
FH4521	Submesic	20	7	4521	02 conifer	Conifer
FH4521	SlopeGT50	20	7	4521	02 conifer	Conifer
FH4521	conifer	30	7	4521	02 conifer	Conifer
FH4521	LT1600	40	7	4521	02 conifer	Conifer
FH4522	Submesic	20	8	4522	02 conifer shrub	Deciduous
FH4522	SlopeGT50	20	8	4522	02 conifer shrub	Deciduous
FH4522	deciduous	30	8	4522	02 conifer shrub	Deciduous
FH4522	LT1600	40	8	4522	02 conifer shrub	Deciduous
FH4523	Subxeric	20	9	4523	02 conifer	Conifer
FH4523	conifer	30	9	4523	02 conifer	Conifer
FH4523	LT1600	40	9	4523	02 conifer	Conifer
FH4524	Subxeric	20	10	4524	02 conifer shrub	Deciduous
FH4524	deciduous	30	10	4524	02 conifer shrub	Deciduous
FH4524	LT1600	40	10	4524	02 conifer shrub	Deciduous
FH4531	SlopeLT10	20	11	4531	03 conifer	Conifer
FH4531	SubM2Mes	20	11	4531	03 conifer	Conifer
FH4531	conifer	30	11	4531	03 conifer	Conifer
FH4531	LT1600	40	11	4531	03 conifer	Conifer
FH4532	SlopeLT10	20	12	4532	03 conifer shrub	Deciduous
FH4532	SubM2Mes	20	12	4532	03 conifer shrub	Deciduous
FH4532	deciduous	30	12	4532	03 conifer shrub	Deciduous
FH4532	LT1600	40	12	4532	03 conifer shrub	Deciduous
FH4541	SlopeLT20	30	13	4541	04 conifer	Conifer
FH4541	Mesic	20	13	4541	04 conifer	Conifer
FH4541	conifer	30	13	4541	04 conifer	Conifer
FH4541	LT1600	40	13	4541	04 conifer	Conifer

FUZZY CLASS TABLE (CRULES)						
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING	Stand
FH4542	SlopeLT20	30	14	4542	04 conifer shrub	Deciduous
FH4542	Mesic	20	14	4542	04 conifer shrub	Deciduous
FH4542	deciduous	30	14	4542	04 conifer shrub	Deciduous
FH4542	LT1600	40	14	4542	04 conifer shrub	Deciduous
FH4551	Subhygric	20	15	4551	05 conifer	Conifer
FH4551	conifer	30	15	4551	05 conifer	Conifer
FH4551	LT1600	40	15	4551	05 conifer	Conifer
FH4552	Subhygric	20	16	4552	05 conifer shrub	Deciduous
FH4552	deciduous	30	16	4552	05 conifer shrub	Deciduous
FH4552	LT1600	40	16	4552	05 conifer shrub	Deciduous
FH4553	SlopeGT10	20	17	4553	05 conifer	Conifer
FH4553	Subhygric	20	17	4553	05 conifer	Conifer
FH4553	conifer	30	17	4553	05 conifer	Conifer
FH4553	LT1600	40	17	4553	05 conifer	Conifer
FH4554	SlopeGT10	20	18	4554	05 conifer shrub	Deciduous
FH4554	Subhygric	20	18	4554	05 conifer shrub	Deciduous
FH4554	deciduous	30	18	4554	05 conifer shrub	Deciduous
FH4554	LT1600	40	18	4554	05 conifer shrub	Deciduous
FH4555	SlopeGT2	20	19	4555	05 conifer	Conifer
FH4555	Hygric	20	19	4555	05 conifer	Conifer
FH4555	conifer	30	19	4555	05 conifer	Conifer
FH4555	LT1600	40	19	4555	05 conifer	Conifer
FH4556	SlopeGT2	20	20	4556	05 conifer shrub	Deciduous
FH4556	Hygric	20	20	4556	05 conifer shrub	Deciduous
FH4556	deciduous	30	20	4556	05 conifer shrub	Deciduous
FH4556	LT1600	40	20	4556	05 conifer shrub	Deciduous
FH4561	SlopeLT2	20	21	4561	06 conifer	Conifer
FH4561	Hygric	20	21	4561	06 conifer	Conifer
FH4561	conifer	30	21	4561	06 conifer	Conifer
FH4561	LT1600	40	21	4561	06 conifer	Conifer
FH4562	SlopeLT2	20	22	4562	06 conifer shrub	Deciduous
FH4562	Hygric	20	22	4562	06 conifer shrub	Deciduous
FH4562	deciduous	30	22	4562	06 conifer shrub	Deciduous
FH4562	LT1600	40	22	4562	06 conifer shrub	Deciduous
FH4563	Hygric	20	23	4563	06 conifer	Conifer
FH4563	Prof_cv	20	23	4563	06 conifer	Conifer
FH4563	conifer	30	23	4563	06 conifer	Conifer
FH4563	LT1600	40	23	4563	06 conifer	Conifer
FH4564	Hygric	20	24	4564	06 conifer shrub	Deciduous
FH4564	Prof_cv	20	24	4564	06 conifer shrub	Deciduous
FH4564	deciduous	30	24	4564	06 conifer shrub	Deciduous
FH4564	LT1600	40	24	4564	06 conifer shrub	Deciduous
FH4600	Mesic	20	25	4600	Mesic parkland/woodland	Not used
FH4600	GT1600	40	25	4600	Mesic parkland/woodland	Not used
FH4601	Submesic	20	26	4601	Drier parkland/woodland	Not used
FH4601	SlopeGT50	20	26	4601	Drier parkland/woodland	Not used
FH4601	GT1600	40	26	4601	Drier parkland/woodland	Not used
FH4603	SubH2Hyg	20	27	4603	Wetter parkland/woodland	Not used
FH4603	SlopeLT30	20	27	4603	Wetter parkland/woodland	Not used
FH4603	GT1600	40	27	4603	Wetter parkland/woodland	Not used

Appendix 1g. Predictive Ecosystem Mapping Rules for ESSFmv2

Zone File 4500

FUZZY CLASS TABLE (CRULES)						
F_NAME	**FUZATTR**	**ATTRWT**	**FACET_NO**	**F_CODE**	**PREDICTING**	**Stand**
FH4606	Submesic	20	28	4606	Mesic parkland/woodland	Not used
FH4606	SlopeLT50	20	28	4606	Mesic parkland/woodland	Not used
FH4606	GT1600	40	28	4606	Mesic parkland/woodland	Not used
FH4607	Subxeric	20	29	4607	Drier parkland/woodland	Not used
FH4607	GT1600	40	29	4607	Drier parkland/woodland	Not used
FH4700	Organic	60	30	4700	Wetland treed	

FUZZY ATTRIBUTE TABLE (ARULES)										
SORTORDER	**FILE_IN**	**ATTR_IN**	**CLASS_OUT**	**MODEL_NO**	**B**	**B_LOW**	**B_HI**	**B1**	**B2**	**D**
1	formfile	LNQAREA	LnC2UM	5	7.50	7.50	7.50	0.00	7.60	0.10
2	formfile	LNQAREA	LnUM2L	1	8.60	8.60	8.60	7.50	9.70	1.10
3	formfile	LNQAREA	LnM2L	1	9.00	9.00	9.00	8.00	10.00	1.00
4	formfile	LNQAREA	LnML2T	1	9.75	9.75	9.75	9.00	10.50	0.75
5	formfile	LNQAREA	LnL2T	1	10.50	10.50	10.50	10.00	11.00	0.50
6	formfile	LNQAREA	LnV	4	11.00	11.00	11.00	10.00	16.79	1.00
7	formfile	LNQAREA	LnUM2T	1	9.45	9.45	9.45	7.50	11.40	1.95
8	formfile	QWETI	Subxeric	5	4.50	4.50	4.50	0.00	4.51	0.01
9	formfile	QWETI	Submesic	1	5.00	5.00	5.00	4.50	5.50	0.50
10	formfile	QWETI	SubM2Mes	1	6.50	6.50	6.50	4.50	8.50	2.00
11	formfile	QWETI	Mesic	1	6.65	6.65	6.65	5.50	7.80	1.15
12	formfile	QWETI	Subhygric	1	8.90	8.90	8.90	7.80	10.00	1.10
13	formfile	QWETI	SubH2Hyg	4	9.00	9.00	9.00	8.50	26.00	0.50
14	formfile	QWETI	Hygric	4	10.00	10.00	10.00	9.00	26.00	1.00
15	formfile	PROF	Prof_cv	5	-20.00	-20.00	-20.00	-86.00	-19.00	1.00
16	formfile	PROF	Prof_st	1	1.75	1.75	1.75	-5.50	9.00	7.25
17	formfile	PROF	Prof_cx	4	30.00	30.00	30.00	29.00	86.00	1.00
18	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
19	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
20	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
21	formfile	SLOPE	SlopeLT10	5	10.00	10.00	10.00	0.00	10.50	0.50
22	formfile	SLOPE	SlopeGT10	4	11.00	11.00	11.00	10.00	100.00	1.00
23	formfile	SLOPE	SlopeLT20	5	20.00	20.00	20.00	0.00	20.50	0.50
24	formfile	SLOPE	SlopeGT20	4	21.00	21.00	21.00	20.00	100.00	1.00
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	100.00	1.00
27	formfile	SLOPE	SlopeLT50	5	50.00	50.00	50.00	0.00	50.50	0.50
28	formfile	SLOPE	SlopeGT50	4	51.00	51.00	51.00	50.00	100.00	1.00
29	formfile	SLOPE	SlopeLT2	5	2.00	2.00	2.00	0.00	2.50	0.50
30	formfile	SLOPE	SlopeGT2	4	3.00	3.00	3.00	2.00	100.00	1.00
31	geofile	Classify1	conifer	1	5.00	5.00	5.00	4.99	5.01	0.01
32	geofile	Classify1	deciduous	1	7.00	7.00	7.00	6.99	7.01	0.01
33	geofile	Elev	LT1600	5	1600.00	1600.00	1600.00	0.00	1600.50	0.50
34	geofile	Elev	GT1600	4	1601.00	1601.00	1601.00	1600.00	2093.00	1.00
35	geofile	Terrain	Organic	1	7.00	7.00	7.00	6.99	7.01	0.01

Appendix 1h. Predictive Ecosystem Mapping Rules for ESSFmvp

Zone File 5000

FUZZY CLASS TABLE (CRULES)

F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING
FH5011	Mesic	20	1	5011	Mesic shrub
FH5011	shrub	30	1	5011	Mesic shrub
FH5012	Mesic	20	2	5012	Mesic herb
FH5012	herb	30	2	5012	Mesic herb
FH5021	Submesic	20	3	5021	Drier shrub
FH5021	SlopeGT50	20	3	5021	Drier shrub
FH5021	shrub	30	3	5021	Drier shrub
FH5022	Submesic	20	4	5022	Drier herb
FH5022	SlopeGT50	20	4	5022	Drier herb
FH5022	herb	30	4	5022	Drier herb
FH5023	Subxeric	20	5	5023	Drier shrub
FH5023	shrub	30	5	5023	Drier shrub
FH5024	Subxeric	20	6	5024	Drier herb
FH5024	herb	30	6	5024	Drier herb
FH5051	Subhygric	20	7	5051	Wetter shrub
FH5051	shrub	30	7	5051	Wetter shrub
FH5052	Subhygric	20	8	5052	Wetter herb
FH5052	herb	30	8	5052	Wetter herb
FH5061	SlopeLT2	20	9	5061	Wetter shrub
FH5061	Hygric	20	9	5061	Wetter shrub
FH5061	shrub	30	9	5061	Wetter shrub
FH5062	SlopeLT2	20	10	5062	Wetter herb
FH5062	Hygric	20	10	5062	Wetter herb
FH5062	herb	30	10	5062	Wetter herb
FH5063	water	80	11	5063	water
FH5064	barren	80	12	5064	barren

FUZZY ATTRIBUTE TABLE (ARULES)

SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	LNQAREA	LnC2UM	5	7.50	7.50	7.50	0.00	7.60	0.10
2	formfile	LNQAREA	LnUM2L	1	8.60	8.60	8.60	7.50	9.70	1.10
3	formfile	LNQAREA	LnM2L	1	9.00	9.00	9.00	8.00	10.00	1.00
4	formfile	LNQAREA	LnML2T	1	9.75	9.75	9.75	9.00	10.50	0.75
5	formfile	LNQAREA	LnL2T	1	10.50	10.50	10.50	10.00	11.00	0.50
6	formfile	LNQAREA	LnV	4	11.00	11.00	11.00	10.00	16.79	1.00
7	formfile	LNQAREA	LnUM2T	1	9.45	9.45	9.45	7.50	11.40	1.95
8	formfile	QWETI	Subxeric	5	4.50	4.50	4.50	0.00	4.51	0.01
9	formfile	QWETI	Submesic	1	5.00	5.00	5.00	4.50	5.50	0.50
10	formfile	QWETI	SubM2Mes	1	6.50	6.50	6.50	4.50	8.50	2.00
11	formfile	QWETI	Mesic	1	6.65	6.65	6.65	5.50	7.80	1.15
12	formfile	QWETI	Subhygric	1	8.90	8.90	8.90	7.80	10.00	1.10
13	formfile	QWETI	Hygric	4	10.00	10.00	10.00	9.00	26.00	1.00
14	formfile	PROF	Prof_cv	5	-20.00	-20.00	-20.00	-86.00	-19.00	1.00
15	formfile	PROF	Prof_st	1	1.75	1.75	1.75	-5.50	9.00	7.25
16	formfile	PROF	Prof_cx	4	30.00	30.00	30.00	29.00	86.00	1.00
17	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
18	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
19	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
20	formfile	SLOPE	SlopeLT10	5	10.00	10.00	10.00	0.00	10.50	0.50
21	formfile	SLOPE	SlopeGT10	4	11.00	11.00	11.00	10.00	100.00	1.00
22	formfile	SLOPE	SlopeLT20	5	20.00	20.00	20.00	0.00	20.50	0.50
23	formfile	SLOPE	SlopeGT20	4	21.00	21.00	21.00	20.00	100.00	1.00
24	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.50	0.50
25	formfile	SLOPE	SlopeGT30	4	31.00	31.00	31.00	30.00	100.00	1.00
26	formfile	SLOPE	SlopeLT50	5	50.00	50.00	50.00	0.00	50.50	0.50
27	formfile	SLOPE	SlopeGT50	4	51.00	51.00	51.00	50.00	100.00	1.00
28	formfile	SLOPE	SlopeLT2	5	2.00	2.00	2.00	0.00	2.50	0.50
29	formfile	SLOPE	SlopeGT2	4	3.00	3.00	3.00	2.00	100.00	1.00
30	geofile	Classify1	water	1	1.00	1.00	1.00	0.99	1.01	0.01
31	geofile	Classify1	herb	1	2.00	2.00	2.00	1.99	2.01	0.01
32	geofile	Classify1	shrub	1	3.00	3.00	3.00	2.99	3.01	0.01
33	geofile	Classify1	barren	1	4.00	4.00	4.00	3.99	4.01	0.01

Appendix 1i. Predictive Ecosystem Mapping Rules for ESSFmvp

Zone File 5500

FUZZY CLASS TABLE (CRULES)

F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING	Stand
FH5511	Mesic	20	1	5511	Dry to mesic forest/treed	Conifer
FH5521	Submesic	20	2	5521	Dry to mesic forest/treed	Conifer
FH5521	SlopeGT50	20	2	5521	Dry to mesic forest/treed	Conifer
FH5523	Subxeric	20	3	5523	Dry to mesic forest/treed	Conifer
FH5551	Subhygric	20	4	5551	Wetter forest/treed	Conifer
FH5551	SlopeLT30	20	4	5551	Wetter forest/treed	Conifer
FH5552	Subhygric	20	5	5552	Dry to mesic forest/treed	Conifer
FH5552	SlopeGT30	20	5	5552	Dry to mesic forest/treed	Conifer
FH5553	Hygric	20	6	5553	Wetter forest/treed	Conifer
FH5554	Submesic	20	7	5554	Dry to mesic forest/treed	Conifer
FH5554	SlopeLT50	20	7	5554	Dry to mesic forest/treed	Conifer

FUZZY ATTRIBUTE TABLE (ARULES)

SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	QWETI	Subxeric	5	4.50	4.50	4.50	0.00	4.51	0.01
2	formfile	QWETI	Submesic	1	5.00	5.00	5.00	4.50	5.50	0.50
3	formfile	QWETI	SubM2Mes	1	6.50	6.50	6.50	4.50	8.50	2.00
4	formfile	QWETI	Mesic	1	6.65	6.65	6.65	5.50	7.80	1.15
5	formfile	QWETI	Subhygric	1	8.90	8.90	8.90	7.80	10.00	1.10
6	formfile	QWETI	Hygric	4	10.00	10.00	10.00	9.00	26.00	1.00
7	formfile	PROF	Prof_cv	5	-20.00	-20.00	-20.00	-86.00	-19.00	1.00
8	formfile	PROF	Prof_st	1	1.75	1.75	1.75	-5.50	9.00	7.25
9	formfile	PROF	Prof_cx	4	30.00	30.00	30.00	29.00	86.00	1.00
10	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
11	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
12	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
13	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.50	0.50
14	formfile	SLOPE	SlopeGT30	4	31.00	31.00	31.00	30.00	100.00	1.00
15	formfile	SLOPE	SlopeLT50	5	50.00	50.00	50.00	0.00	50.50	0.50
16	formfile	SLOPE	SlopeGT50	4	51.00	51.00	51.00	50.00	100.00	1.00

Appendix 1j. Predictive Ecosystem Mapping Rules for ESSFwc3

Zone File 6000

FUZZY CLASS TABLE (CRULES)					
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	Predicting
FH6021	Dry	30	1	6021	02
FH6021	LnUp	30	1	6021	02
FH6021	shrub	30	1	6021	02
FH6011	Dry	30	2	6011	01
FH6011	LnMid	30	2	6011	01
FH6011	shrub	30	2	6011	01
FH6012	LnUp	30	3	6012	01
FH6012	Mesic	30	3	6012	01
FH6012	shrub	30	3	6012	01
FH6013	LnUp	30	4	6013	01
FH6013	Moist	30	4	6013	01
FH6013	shrub	30	4	6013	01
FH6031	Moist	30	5	6031	03
FH6031	LnMid	30	5	6031	03
FH6031	shrub	30	5	6031	03
FH6032	LnLow	30	6	6032	03
FH6032	SlopeLT30	30	6	6032	03
FH6032	shrub	30	6	6032	03
FH6014	Mesic	30	7	6014	01
FH6014	shrub	30	7	6014	01
FH6015	LnLow	30	8	6015	01
FH6015	SlopeGT30	30	8	6015	01
FH6015	shrub	30	8	6015	01
FH6033	LnLow	30	9	6033	03
FH6033	Moist	30	9	6033	03
FH6033	shrub	30	9	6033	03
FH6003	barren	80	10	6003	Barren
FH6004	water	80	11	6004	water
FH6022	Dry	30	12	6022	02
FH6022	LnUp	30	12	6022	02
FH6022	herb	30	12	6022	02
FH6016	Dry	30	13	6016	01
FH6016	LnMid	30	13	6016	01
FH6016	herb	30	13	6016	01
FH6017	LnUp	30	14	6017	01
FH6017	Mesic	30	14	6017	01
FH6017	herb	30	14	6017	01

FUZZY CLASS TABLE (CRULES)					
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	Predicting
FH6018	LnUp	30	15	6018	01
FH6018	Moist	30	15	6018	01
FH6018	herb	30	15	6018	01
FH6034	Moist	30	16	6034	03
FH6034	LnMid	30	16	6034	03
FH6034	herb	30	16	6034	03
FH6035	LnLow	30	17	6035	03
FH6035	SlopeLT30	30	17	6035	03
FH6035	herb	30	17	6035	03
FH6019	Mesic	30	18	6019	01
FH6014	herb	30	18	6014	01
FH6111	LnLow	30	19	6111	01
FH6111	SlopeGT30	30	19	6111	01
FH6111	herb	30	19	6111	01
FH6036	LnLow	30	20	6036	03
FH6036	Moist	30	20	6036	03
FH6036	herb	30	20	6036	03

FUZZY ATTRIBUTE TABLE (ARULES)										
SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	LNQAREA	LnUp	1	7.40	7.40	7.40	7.00	7.80	0.40
2	formfile	LNQAREA	LnMid	1	8.40	8.40	8.40	7.80	9.00	0.60
3	formfile	LNQAREA	LnLow	4	9.00	9.00	9.00	8.00	11.00	1.00
4	formfile	LNQAREA	LnCrest	5	7.00	7.00	7.00	0.00	7.10	0.10
5	formfile	QWETI	Dry	5	5.50	5.50	5.50	1.43	5.60	0.10
6	formfile	QWETI	Mesic	1	6.40	6.90	6.90	5.50	7.30	0.90
7	formfile	QWETI	Moist	1	9.65	10.15	10.15	7.30	12.00	2.35
8	formfile	SLOPE	SlopeGT70	4	70.00	70.00	70.00	69.00	100.00	1.00
9	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
10	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
11	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
12	geofile	Classify1	water	1	1.00	1.00	1.00	0.99	51.01	0.01
13	geofile	Classify1	herb	1	2.00	2.00	2.00	1.99	2.01	0.01
14	geofile	Classify1	shrub	1	3.00	3.00	3.00	2.99	3.01	0.01
15	geofile	Classify1	barren	1	4.00	4.00	4.00	3.99	4.01	0.01
16	formfile	SLOPE	SlopeLT40	5	40.00	40.00	40.00	0.00	40.01	0.01
17	formfile	SLOPE	SlopeLT80	5	80.00	80.00	80.00	0.00	80.01	0.01
18	formfile	SLOPE	SlopeLT20	5	20.00	20.00	20.00	0.00	20.01	0.01
19	formfile	SLOPE	SlopeGT20	4	20.00	20.00	20.00	19.00	100.00	1.00
20	formfile	SLOPE	SlopeGT40	4	40.00	40.00	40.00	39.00	100.00	1.00
21	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.01	0.01
22	formfile	SLOPE	SlopeGT30	4	30.00	30.00	30.00	29.00	100.00	1.00

Appendix 1k. Predictive Ecosystem Mapping Rules for ESSFwc3

Zone File 6500

FUZZY CLASS TABLE (CRULES)					
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	Predicting
FH6521	Dry	30	1	6521	02
FH6521	LnUp	30	1	6521	02
FH6521	conifer	30	1	6521	02
FH6511	Dry	30	2	6511	01
FH6511	LnMid	30	2	6511	01
FH6511	conifer	30	2	6511	01
FH6512	LnUp	30	3	6512	01
FH6512	Mesic	30	3	6512	01
FH6512	conifer	30	3	6512	01
FH6513	LnUp	30	4	6513	01
FH6513	Moist	30	4	6513	01
FH6513	conifer	30	4	6513	01
FH6531	Moist	30	5	6531	03
FH6531	LnMid	30	5	6531	03
FH6531	conifer	30	5	6531	03
FH6532	LnLow	30	6	6532	03
FH6532	SlopeLT30	30	6	6532	03
FH6532	conifer	30	6	6532	03
FH6514	Mesic	30	7	6514	01
FH6514	conifer	30	7	6514	01
FH6515	LnLow	30	8	6515	01
FH6515	SlopeGT30	30	8	6515	01
FH6515	conifer	30	8	6515	01
FH6533	LnLow	30	9	6533	03
FH6533	Moist	30	9	6533	03
FH6533	conifer	30	9	6533	03
FH6522	Dry	30	10	6522	02
FH6522	LnUp	30	10	6522	02
FH6522	deciduous	30	10	6522	02
FH6516	Dry	30	11	6516	01
FH6516	LnMid	30	11	6516	01
FH6516	deciduous	30	11	6516	01
FH6517	LnUp	30	12	6517	01
FH6517	Mesic	30	12	6517	01
FH6517	deciduous	30	12	6517	01
FH6518	LnUp	30	13	6518	01
FH6518	Moist	30	13	6518	01
FH6518	deciduous	30	13	6518	01

FUZZY CLASS TABLE (CRULES)					
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	Predicting
FH6534	Moist	30	14	6534	03
FH6534	LnMid	30	14	6534	03
FH6534	deciduous	30	14	6534	03
FH6535	LnLow	30	15	6535	03
FH6535	SlopeLT30	30	15	6535	03
FH6535	deciduous	30	15	6535	03
FH6519	Mesic	30	16	6519	01
FH6519	deciduous	30	16	6519	01
FH6591	LnLow	30	17	6591	01
FH6591	SlopeGT30	30	17	6591	01
FH6591	deciduous	30	17	6591	01
FH6536	LnLow	30	18	6536	03
FH6536	Moist	30	18	6536	03
FH6536	deciduous	30	18	6536	03

FUZZY ATTRIBUTE TABLE (ARULES)										
SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	LNQAREA	LnUp	1	7.40	7.40	7.40	7.00	7.80	0.40
2	formfile	LNQAREA	LnMid	1	8.40	8.40	8.40	7.80	9.00	0.60
3	formfile	LNQAREA	LnLow	4	9.00	9.00	9.00	8.00	11.00	1.00
4	formfile	LNQAREA	LnCrest	5	7.00	7.00	7.00	0.00	7.10	0.10
5	formfile	QWETI	Dry	5	5.50	5.50	5.50	1.43	5.60	0.10
6	formfile	QWETI	Mesic	1	6.40	6.90	6.90	5.50	7.30	0.90
7	formfile	QWETI	Moist	1	9.65	10.15	10.15	7.30	12.00	2.35
8	formfile	SLOPE	SlopeGT70	4	70.00	70.00	70.00	69.00	100.00	1.00
9	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
10	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
11	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
12	geofile	Classify1	conifer	1	5.00	5.00	5.00	4.99	5.01	0.01
13	geofile	Classify1	deciduous	1	7.00	7.00	7.00	6.99	7.01	0.01
14	formfile	SLOPE	SlopeLT40	5	40.00	40.00	40.00	0.00	40.01	0.01
15	formfile	SLOPE	SlopeLT80	5	80.00	80.00	80.00	0.00	80.01	0.01
16	formfile	SLOPE	SlopeLT20	5	20.00	20.00	20.00	0.00	20.01	0.01
17	formfile	SLOPE	SlopeGT20	4	20.00	20.00	20.00	19.00	100.00	1.00
18	formfile	SLOPE	SlopeGT40	4	40.00	40.00	40.00	39.00	100.00	1.00
19	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.01	0.01
20	formfile	SLOPE	SlopeGT30	4	30.00	30.00	30.00	29.00	100.00	1.00

Appendix 1l. Predictive Ecosystem Mapping Rules for ESSFwcp

Zone File 7000

FUZZY CLASS TABLE (CRULES)

F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING
FH7011	Mesic	20	1	7011	Mesic Conifer/shrub
FH7011	shrub	30	1	7011	Mesic Conifer/shrub
FH7012	Mesic	20	2	7012	Mesic herb
FH7012	herb	30	2	7012	Mesic herb
FH7021	Submesic	20	3	7021	Drier Conifer/shrub
FH7021	SlopeGT50	20	3	7021	Drier Conifer/shrub
FH7021	shrub	30	3	7021	Drier Conifer/shrub
FH7022	Submesic	20	4	7022	Drier herb
FH7022	SlopeGT50	20	4	7022	Drier herb
FH7022	herb	30	4	7022	Drier herb
FH7023	Subxeric	20	5	7023	Drier Conifer/shrub
FH7023	shrub	30	5	7023	Drier Conifer/shrub
FH7024	Subxeric	20	6	7024	Drier herb
FH7024	herb	30	6	7024	Drier herb
FH7051	Subhygric	20	7	7051	Wetter conifer / shrub
FH7051	shrub	30	7	7051	Wetter conifer / shrub
FH7052	Subhygric	20	8	7052	Wetter herb
FH7052	herb	30	8	7052	Wetter herb
FH7061	SlopeLT2	20	9	7061	Wetter conifer / shrub
FH7061	Hygric	20	9	7061	Wetter conifer / shrub
FH7061	shrub	30	9	7061	Wetter conifer / shrub
FH7062	SlopeLT2	20	10	7062	Wetter herb
FH7062	Hygric	20	10	7062	Wetter herb
FH7062	herb	30	10	7062	Wetter herb
FH7063	water	80	11	7063	water
FH7064	barren	80	12	7064	barren

FUZZY ATTRIBUTE TABLE (ARULES)

SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	LNQAREA	LnC2UM	5	7.50	7.50	7.50	0.00	7.60	0.10
2	formfile	LNQAREA	LnUM2L	1	8.60	8.60	8.60	7.50	9.70	1.10
3	formfile	LNQAREA	LnM2L	1	9.00	9.00	9.00	8.00	10.00	1.00
4	formfile	LNQAREA	LnML2T	1	9.75	9.75	9.75	9.00	10.50	0.75
5	formfile	LNQAREA	LnL2T	1	10.50	10.50	10.50	10.00	11.00	0.50
6	formfile	LNQAREA	LnV	4	11.00	11.00	11.00	10.00	16.79	1.00
7	formfile	LNQAREA	LnUM2T	1	9.45	9.45	9.45	7.50	11.40	1.95
8	formfile	QWETI	Subxeric	5	4.50	4.50	4.50	0.00	4.51	0.01
9	formfile	QWETI	Submesic	1	5.00	5.00	5.00	4.50	5.50	0.50
10	formfile	QWETI	SubM2Mes	1	6.50	6.50	6.50	4.50	8.50	2.00
11	formfile	QWETI	Mesic	1	6.65	6.65	6.65	5.50	7.80	1.15
12	formfile	QWETI	Subhygric	1	8.90	8.90	8.90	7.80	10.00	1.10
13	formfile	QWETI	Hygric	4	10.00	10.00	10.00	9.00	26.00	1.00
14	formfile	PROF	Prof_cv	5	-20.00	-20.00	-20.00	-86.00	-19.00	1.00
15	formfile	PROF	Prof_st	1	1.75	1.75	1.75	-5.50	9.00	7.25
16	formfile	PROF	Prof_cx	4	30.00	30.00	30.00	29.00	86.00	1.00
17	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
18	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
19	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
20	formfile	SLOPE	SlopeLT10	5	10.00	10.00	10.00	0.00	10.50	0.50
21	formfile	SLOPE	SlopeGT10	4	11.00	11.00	11.00	10.00	100.00	1.00
22	formfile	SLOPE	SlopeLT20	5	20.00	20.00	20.00	0.00	20.50	0.50
23	formfile	SLOPE	SlopeGT20	4	21.00	21.00	21.00	20.00	100.00	1.00
24	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.50	0.50
25	formfile	SLOPE	SlopeGT30	4	31.00	31.00	31.00	30.00	100.00	1.00
26	formfile	SLOPE	SlopeLT50	5	50.00	50.00	50.00	0.00	50.50	0.50
27	formfile	SLOPE	SlopeGT50	4	51.00	51.00	51.00	50.00	100.00	1.00
28	formfile	SLOPE	SlopeLT2	5	2.00	2.00	2.00	0.00	2.50	0.50
29	formfile	SLOPE	SlopeGT2	4	3.00	3.00	3.00	2.00	100.00	1.00
30	geofile	Classify1	water	1	1.00	1.00	1.00	0.99	1.01	0.01
31	geofile	Classify1	herb	1	2.00	2.00	2.00	1.99	2.01	0.01
32	geofile	Classify1	shrub	1	3.00	3.00	3.00	2.99	3.01	0.01
33	geofile	Classify1	barren	1	4.00	4.00	4.00	3.99	4.01	0.01

Appendix 1m. Predictive Ecosystem Mapping Rules for ESSFwcp

Zone File 7500

FUZZY CLASS TABLE (CRULES)					
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	PREDICTING
FH7511	Mesic	20	1	7511	Mesic forest/treed
FH7521	Submesic	20	2	7521	Drier forest/treed
FH7521	SlopeGT50	20	2	7521	Drier forest/treed
FH7523	Subxeric	20	3	7523	Drier forest/treed
FH7551	Subhygric	20	4	7551	Wetter forest/treed
FH7551	SlopeLT30	20	4	7551	Wetter forest/treed
FH7552	Subhygric	20	5	7552	Mesic forest/treed
FH7552	SlopeGT30	20	5	7552	Mesic forest/treed
FH7553	Hygric	20	6	7553	Wetter forest/treed
FH7554	Submesic	20	7	7554	Mesic forest/treed
FH7554	SlopeLT50	20	7	7554	Mesic forest/treed

FUZZY ATTRIBUTE TABLE (ARULES)										
SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	LNQAREA	LnC2UM	5	7.50	7.50	7.50	0.00	7.60	0.10
2	formfile	LNQAREA	LnUM2L	1	8.60	8.60	8.60	7.50	9.70	1.10
3	formfile	LNQAREA	LnM2L	1	9.00	9.00	9.00	8.00	10.00	1.00
4	formfile	LNQAREA	LnML2T	1	9.75	9.75	9.75	9.00	10.50	0.75
5	formfile	LNQAREA	LnL2T	1	10.50	10.50	10.50	10.00	11.00	0.50
6	formfile	LNQAREA	LnV	4	11.00	11.00	11.00	10.00	16.79	1.00
7	formfile	LNQAREA	LnUM2T	1	9.45	9.45	9.45	7.50	11.40	1.95
8	formfile	QWETI	Subxeric	5	4.50	4.50	4.50	0.00	4.51	0.01
9	formfile	QWETI	Submesic	1	5.00	5.00	5.00	4.50	5.50	0.50
10	formfile	QWETI	SubM2Mes	1	6.50	6.50	6.50	4.50	8.50	2.00
11	formfile	QWETI	Mesic	1	6.65	6.65	6.65	5.50	7.80	1.15
12	formfile	QWETI	Subhygric	1	8.90	8.90	8.90	7.80	10.00	1.10
13	formfile	QWETI	Hygric	4	10.00	10.00	10.00	9.00	26.00	1.00
14	formfile	PROF	Prof_cv	5	-20.00	-20.00	-20.00	-86.00	-19.00	1.00
15	formfile	PROF	Prof_st	1	1.75	1.75	1.75	-5.50	9.00	7.25
16	formfile	PROF	Prof_cx	4	30.00	30.00	30.00	29.00	86.00	1.00
17	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
18	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
19	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
20	formfile	SLOPE	SlopeLT10	5	10.00	10.00	10.00	0.00	10.50	0.50
21	formfile	SLOPE	SlopeGT10	4	11.00	11.00	11.00	10.00	100.00	1.00
22	formfile	SLOPE	SlopeLT20	5	20.00	20.00	20.00	0.00	20.50	0.50
23	formfile	SLOPE	SlopeGT20	4	21.00	21.00	21.00	20.00	100.00	1.00
24	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.50	0.50
25	formfile	SLOPE	SlopeGT30	4	31.00	31.00	31.00	30.00	100.00	1.00
26	formfile	SLOPE	SlopeLT50	5	50.00	50.00	50.00	0.00	50.50	0.50
27	formfile	SLOPE	SlopeGT50	4	51.00	51.00	51.00	50.00	100.00	1.00
28	formfile	SLOPE	SlopeLT2	5	2.00	2.00	2.00	0.00	2.50	0.50
29	formfile	SLOPE	SlopeGT2	4	3.00	3.00	3.00	2.00	100.00	1.00
30	geofile	Classify1	conifer	1	5.00	5.00	5.00	4.99	5.01	0.01
31	geofile	Classify1	deciduous	1	7.00	7.00	7.00	6.99	7.01	0.01

Appendix 1n. Predictive Ecosystem Mapping Rules for ESSFwk2

Zone File 8000

FUZZY CLASS TABLE (CRULES)					
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	Predicting
FH8021	Dry	30	1	8021	02
FH8021	shrub	30	1	8021	02
FH8022	Dry	30	2	8022	02 herb
FH8022	herb	30	2	8022	02 herb
FH8011	Mesic	30	3	8011	01/03
FH8011	shrub	30	3	8011	01/03
FH8012	Mesic	30	4	8012	01/03 herb
FH8012	herb	30	4	8012	01/03 herb
FH8041	Moist2Wet	30	5	8041	04
FH8041	shrub	30	5	8041	04
FH8041	SlopeLT40	20	5	8041	04
FH8041	SlopeGT30	20	5	8041	04
FH8042	Moist2Wet	30	6	8042	04 herb
FH8042	herb	30	6	8042	04 herb
FH8042	SlopeLT40	20	6	8042	04 herb
FH8042	SlopeGT30	20	6	8042	04 herb
FH8051	Moist2Wet	30	7	8051	05
FH8051	shrub	30	7	8051	05
FH8051	SlopeLT20	20	7	8051	05
FH8052	Moist2Wet	30	8	8052	05 herb
FH8052	herb	30	8	8052	05 herb
FH8052	SlopeLT20	20	8	8052	05 herb
FH8061	Wet	30	9	8061	06
FH8061	shrub	30	9	8061	06
FH8061	SlopeLT30	20	9	8061	06
FH8061	SlopeGT10	20	9	8061	06
FH8061	prof_cv	30	9	8061	06
FH8062	Wet	30	10	8062	06 herb
FH8062	herb	30	10	8062	06 herb
FH8062	SlopeLT30	20	10	8062	06 herb
FH8062	SlopeGT10	20	10	8062	06 herb
FH8062	prof_lev	20	10	8062	06 herb
FH8062	prof_cv	30	10	8062	06 herb
FH8062	plan_lev	20	10	8062	06 herb
FH8062	plan_cv	20	10	8062	06 herb
FH8053	Moist2Wet	30	11	8053	05
FH8053	shrub	30	11	8053	05

FUZZY CLASS TABLE (CRULES)					
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	Predicting
FH8053	prof_cv	20	11	8053	05
FH8054	Moist2Wet	30	12	8054	05 herb
FH8054	herb	30	12	8054	05 herb
FH8054	prof_cv	20	12	8054	05 herb
FH8013	Moist2Wet	30	13	8013	01/03
FH8013	shrub	30	13	8013	01/03
FH8013	SlopeGT40	20	13	8013	01/03
FH8014	Moist2Wet	30	14	8014	01/03 herb
FH8014	herb	30	14	8014	01/03 herb
FH8014	SlopeGT40	20	14	8014	01/03 herb
FH8001	barren	80	11	8001	Barren
FH8002	water	80	12	8002	water

FUZZY ATTRIBUTE TABLE (ARULES)										
SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	PROF	prof_cx	5	-16.00	-16.00	-16.00	-85.00	-16.10	0.10
2	formfile	PROF	prof_lev	1	4.50	4.50	4.50	-16.00	16.00	20.50
3	formfile	PROF	prof_cv	4	16.00	16.00	16.00	15.00	86.00	1.00
4	formfile	QWETI	Dry	5	4.20	4.20	4.20	1.43	4.10	0.10
5	formfile	QWETI	Mesic	1	5.60	5.60	5.60	4.20	7.00	1.40
6	formfile	QWETI	Moist2Wet	1	8.00	8.00	8.00	7.00	9.00	1.00
7	formfile	QWETI	Wet	4	9.00	9.00	9.00	8.00	26.00	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	Classify1	conifer	1	5.00	5.00	5.00	4.99	5.01	0.01
12	geofile	Classify1	deciduous	1	7.00	7.00	7.00	6.99	7.01	0.01
13	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.10	0.10
14	formfile	SLOPE	SlopeGT30	4	31.00	31.00	31.00	30.00	252.00	1.00
15	formfile	SLOPE	SlopeLT5	5	5.00	5.00	5.00	0.00	5.10	0.10
16	formfile	SLOPE	SlopeGT5	4	6.00	6.00	6.00	5.00	252.00	1.00
17	formfile	SLOPE	SlopeLT10	5	10.00	10.00	10.00	0.00	10.10	0.10
18	formfile	SLOPE	SlopeGT10	4	11.00	11.00	11.00	10.00	252.00	1.00
19	formfile	SLOPE	SlopeLT40	5	40.00	40.00	40.00	0.00	40.10	0.10
20	formfile	SLOPE	SlopeLT20	5	20.00	20.00	20.00	0.00	20.10	0.10
21	formfile	SLOPE	SlopeGT20	4	21.00	21.00	21.00	20.00	252.00	1.00
22	formfile	PLAN	plan_cx	5	-16.00	-16.00	-16.00	-85.00	-16.10	0.10
23	formfile	PLAN	plan_lev	1	4.50	4.50	4.50	-16.00	16.00	20.50
24	formfile	PLAN	plan_cv	4	16.00	16.00	16.00	15.00	86.00	1.00
25	formfile	SLOPE	SlopeGT40	4	41.00	41.00	41.00	40.00	252.00	1.00
26	geofile	Classify1	water	1	1.00	1.00	1.00	0.99	51.01	0.01
27	geofile	Classify1	herb	1	2.00	2.00	2.00	1.99	2.01	0.01
28	geofile	Classify1	shrub	1	3.00	3.00	3.00	2.99	3.01	0.01
29	geofile	Classify1	barren	1	4.00	4.00	4.00	3.99	4.01	0.01

Appendix 1o. Predictive Ecosystem Mapping Rules for ESSFwk2

Zone File 8500

FUZZY CLASS TABLE (CRULES)

BEC unit	F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	Predicting	Stand
ESSFwk2	FH8521	Dry	30	1	8521	02	Conifer
ESSFwk2	FH8521	conifer	30	1	8521	02	Conifer
ESSFwk2	FH8522	Dry	30	2	8522	02	Deciduous
ESSFwk2	FH8522	deciduous	30	2	8522	02	Deciduous
ESSFwk2	FH8511	Mesic	30	3	8511	01/03	Conifer
ESSFwk2	FH8511	conifer	30	3	8511	01/03	Conifer
ESSFwk2	FH8512	Mesic	30	4	8512	01/03	Deciduous
ESSFwk2	FH8512	deciduous	30	4	8512	01/03	Deciduous
ESSFwk2	FH8541	Moist2Wet	30	5	8541	04	Conifer
ESSFwk2	FH8541	conifer	30	5	8541	04	Conifer
ESSFwk2	FH8541	SlopeLT40	20	5	8541	04	Conifer
ESSFwk2	FH8541	SlopeGT30	20	5	8541	04	Conifer
ESSFwk2	FH8542	Moist2Wet	30	6	8542	04	Deciduous
ESSFwk2	FH8542	deciduous	30	6	8542	04	Deciduous
ESSFwk2	FH8542	SlopeLT40	20	6	8542	04	Deciduous
ESSFwk2	FH8542	SlopeGT30	20	6	8542	04	Deciduous
ESSFwk2	FH8551	Moist2Wet	30	7	8551	05	Conifer
ESSFwk2	FH8551	conifer	30	7	8551	05	Conifer
ESSFwk2	FH8551	SlopeLT20	20	7	8551	05	Conifer
ESSFwk2	FH8552	Moist2Wet	30	8	8552	05	Deciduous
ESSFwk2	FH8552	deciduous	30	8	8552	05	Deciduous
ESSFwk2	FH8552	SlopeLT20	20	8	8552	05	Deciduous
ESSFwk2	FH8561	Wet	30	9	8561	06	Conifer
ESSFwk2	FH8561	conifer	30	9	8561	06	Conifer
ESSFwk2	FH8561	SlopeLT30	20	9	8561	06	Conifer
ESSFwk2	FH8561	SlopeGT10	20	9	8561	06	Conifer
ESSFwk2	FH8561	prof_cv	30	9	8561	06	Conifer
ESSFwk2	FH8562	Wet	30	10	8562	06	Deciduous
ESSFwk2	FH8562	deciduous	30	10	8562	06	Deciduous
ESSFwk2	FH8562	SlopeLT30	20	10	8562	06	Deciduous
ESSFwk2	FH8562	SlopeGT10	20	10	8562	06	Deciduous
ESSFwk2	FH8562	prof_lev	20	10	8562	06	Deciduous
ESSFwk2	FH8562	prof_cv	30	10	8562	06	Deciduous
ESSFwk2	FH8562	plan_lev	20	10	8562	06	Deciduous
ESSFwk2	FH8562	plan_cv	20	10	8562	06	Deciduous
ESSFwk2	FH8553	Moist2Wet	30	11	8553	05	Conifer
ESSFwk2	FH8553	conifer	30	11	8553	05	Conifer
ESSFwk2	FH8553	prof_cv	20	11	8553	05	Conifer
ESSFwk2	FH8554	Moist2Wet	30	12	8554	05	Deciduous
ESSFwk2	FH8554	deciduous	30	12	8554	05	Deciduous
ESSFwk2	FH8554	prof_cv	20	12	8554	05	Deciduous
ESSFwk2	FH8513	Moist2Wet	30	13	8513	01/03	Conifer
ESSFwk2	FH8513	conifer	30	13	8513	01/03	Conifer
ESSFwk2	FH8513	SlopeGT40	20	13	8513	01/03	Conifer
ESSFwk2	FH8514	Moist2Wet	30	14	8514	01/03	Deciduous
ESSFwk2	FH8514	deciduous	30	14	8514	01/03	Deciduous
ESSFwk2	FH8514	SlopeGT40	20	14	8514	01/03	Deciduous

FUZZY ATTRIBUTE TABLE (ARULES)

SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	PROF	prof_cx	5	-16.00	-16.00	-16.00	-85.00	-16.10	0.10
2	formfile	PROF	prof_lev	1	4.50	4.50	4.50	-16.00	16.00	20.50
3	formfile	PROF	prof_cv	4	16.00	16.00	16.00	15.00	86.00	1.00
4	formfile	QWETI	Dry	5	4.20	4.20	4.20	1.43	4.10	0.10
5	formfile	QWETI	Mesic	1	5.60	5.60	5.60	4.20	7.00	1.40
6	formfile	QWETI	Moist2Wet	1	8.00	8.00	8.00	7.00	9.00	1.00
7	formfile	QWETI	Wet	4	9.00	9.00	9.00	8.00	26.00	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	Classify1	conifer	1	5.00	5.00	5.00	4.99	5.01	0.01
12	geofile	Classify1	deciduous	1	7.00	7.00	7.00	6.99	7.01	0.01
13	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.10	0.10
14	formfile	SLOPE	SlopeGT30	4	31.00	31.00	31.00	30.00	252.00	1.00
15	formfile	SLOPE	SlopeLT5	5	5.00	5.00	5.00	0.00	5.10	0.10
16	formfile	SLOPE	SlopeGT5	4	6.00	6.00	6.00	5.00	252.00	1.00
17	formfile	SLOPE	SlopeLT10	5	10.00	10.00	10.00	0.00	10.10	0.10
18	formfile	SLOPE	SlopeGT10	4	11.00	11.00	11.00	10.00	252.00	1.00
19	formfile	SLOPE	SlopeLT40	5	40.00	40.00	40.00	0.00	40.10	0.10
20	formfile	SLOPE	SlopeLT20	5	20.00	20.00	20.00	0.00	20.10	0.10
21	formfile	SLOPE	SlopeGT20	4	21.00	21.00	21.00	20.00	252.00	1.00
22	formfile	PLAN	plan_cx	5	-16.00	-16.00	-16.00	-85.00	-16.10	0.10
23	formfile	PLAN	plan_lev	1	4.50	4.50	4.50	-16.00	16.00	20.50
24	formfile	PLAN	plan_cv	4	16.00	16.00	16.00	15.00	86.00	1.00
25	formfile	SLOPE	SlopeGT40	4	41.00	41.00	41.00	40.00	252.00	1.00

Appendix 1p. Predictive Ecosystem Mapping Rules for SBSwk2

Zone File 9000

FUZZY CLASS TABLE (CRULES)					
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	Predicting
FH9001	shrub	30	1	9001	Wetland Shrub/Herb
FH9001	SlopeLT5	40	1	9001	Wetland Shrub/Herb
FH9001	flat	40	1	9001	Wetland Shrub/Herb
FH9002	herb	30	2	9002	Wetland herb
FH9002	SlopeLT5	40	2	9002	Wetland herb
FH9002	flat	40	2	9002	Wetland herb
FH9003	barren	80	3	9003	Barren
FH9004	water	80	4	9004	water
FH9021	Dry	40	5	9021	02 shrub
FH9021	shrub	30	5	9021	02 shrub
FH9022	Dry	40	6	9022	02 herb
FH9022	herb	30	6	9022	02 herb
FH9011	Mesic	30	7	9011	01 shrub
FH9011	shrub	30	7	9011	01 shrub
FH9011	SlopeGT5	20	7	9011	01 shrub
FH9012	Mesic	30	8	9012	01 herb
FH9012	herb	30	8	9012	01 herb
FH9012	SlopeGT5	20	8	9012	01 herb
FH9031	submesic	30	9	9031	03 shrub
FH9031	shrub	30	9	9031	03 shrub
FH9031	SlopeLT75	20	9	9031	03 shrub
FH9032	submesic	30	10	9032	03 herb
FH9032	herb	30	10	9032	03 herb
FH9032	SlopeLT75	20	10	9032	03 herb
FH9041	Mesic	30	11	9041	04 shrub
FH9041	shrub	30	11	9041	04 shrub
FH9041	SlopeLT30	20	11	9041	04 shrub
FH9041	NE_Aspect	20	11	9041	04 shrub
FH9042	Mesic	30	12	9042	04 herb
FH9042	herb	30	12	9042	04 herb
FH9042	SlopeLT5	20	12	9042	04 herb
FH9043	Mesic	30	13	9043	04 shrub
FH9043	shrub	30	13	9043	04 shrub
FH9043	SlopeLT5	20	13	9043	04 shrub
FH9044	Mesic	30	14	9044	04 herb
FH9044	herb	30	14	9044	04 herb
FH9044	SlopeLT30	20	14	9044	04 herb
FH9044	NE_Aspect	20	14	9044	04 herb

FUZZY CLASS TABLE (CRULES)					
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	Predicting
FH9051	subhygric	30	15	9051	05 shrub
FH9051	shrub	30	15	9051	05 shrub
FH9051	SlopeGT5	20	15	9051	05 shrub
FH9051	SlopeLT35	20	15	9051	05 shrub
FH9052	subhygric	30	16	9052	05 herb
FH9052	herb	30	16	9052	05 herb
FH9052	SlopeGT5	20	16	9052	05 herb
FH9052	SlopeLT35	20	16	9052	05 herb
FH9005	Organic	50	17	9005	Organic wetland (fen)
FH9005	shrub	30	17	9005	Organic wetland (fen)
FH9006	Organic	50	18	9006	Organic wetland (fen)
FH9006	herb	30	18	9006	Organic wetland (fen)

FUZZY ATTRIBUTE TABLE (ARULES)										
SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	QWETI	Dry	5	4.40	4.40	4.40	1.43	4.50	0.10
2	formfile	QWETI	submesic	1	5.20	5.20	5.20	4.40	6.00	0.80
3	formfile	QWETI	Mesic	1	7.00	7.00	7.00	6.00	8.00	1.00
4	formfile	QWETI	subhygric	1	10.50	10.50	10.50	8.00	13.00	2.50
5	formfile	QWETI	wet	4	13.00	13.00	13.00	12.00	26.00	1.00
6	formfile	SLOPE	SlopeLT15	5	15.00	15.00	15.00	0.00	15.10	0.10
7	formfile	SLOPE	SlopeGT5	4	5.00	5.00	5.00	4.00	100.00	1.00
8	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.10	0.10
9	formfile	SLOPE	SlopeLT35	5	35.00	35.00	35.00	0.00	35.10	0.10
10	formfile	SLOPE	SlopeLT75	5	75.00	75.00	75.00	0.00	75.10	0.10
11	formfile	SLOPE	SlopeLT10	5	10.00	10.00	10.00	0.00	10.10	0.10
12	formfile	SLOPE	SlopeLT5	5	5.00	5.00	5.00	0.00	5.10	0.10
13	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
14	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
15	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
16	geofile	Classify1	water	1	1.00	1.00	1.00	0.99	1.01	0.01
17	geofile	Classify1	herb	1	2.00	2.00	2.00	1.99	2.01	0.01
18	geofile	Classify1	shrub	1	3.00	3.00	3.00	2.99	3.01	0.01
19	geofile	Classify1	barren	1	4.00	4.00	4.00	3.99	4.01	0.01
20	relzfile	Z2PIT	puddle	5	1.50	1.50	1.50	0.00	1.51	0.10
21	relzfile	Z2PIT	flat	1	2.50	2.50	2.50	1.50	3.50	1.00
22	geofile	Terrain	Bedrock	1	1.00	1.00	1.00	0.99	1.01	0.01
23	geofile	Terrain	Colluv	1	2.00	2.00	2.00	1.99	2.01	0.01
24	geofile	Terrain	Fluvial	1	3.00	3.00	3.00	2.99	3.01	0.01
25	geofile	Terrain	FG	1	4.00	4.00	4.00	3.99	4.01	0.01
26	geofile	Terrain	Lacust	1	5.00	5.00	5.00	4.99	5.01	0.01
27	geofile	Terrain	GlacLac	1	6.00	6.00	6.00	5.99	6.01	0.01
28	geofile	Terrain	Organic	1	7.00	7.00	7.00	6.99	7.01	0.01
29	geofile	Terrain	Moraine	1	8.00	8.00	8.00	7.99	8.01	0.01
30	geofile	Terrain	Other	1	9.00	9.00	9.00	8.99	9.01	0.01

Appendix 1q. Predictive Ecosystem Mapping Rules for SBSwk2

Zone File 9500

FUZZY CLASS TABLE (CRULES)						
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	Predicting	Stand
FH9521	Dry	40	1	9521	02	Conifer
FH9521	conifer	30	1	9521	02	Conifer
FH9522	Dry	40	2	9522	02	Deciduous
FH9522	deciduous	30	2	9522	02	Deciduous
FH9511	Mesic	30	3	9511	01	Conifer
FH9511	conifer	30	3	9511	01	Conifer
FH9511	SlopeGT5	20	3	9511	01	Conifer
FH9512	Mesic	30	4	9512	01	Deciduous
FH9512	deciduous	30	4	9512	01	Deciduous
FH9512	SlopeGT5	20	4	9512	01	Deciduous
FH9531	submesic	30	5	9531	03	Conifer
FH9531	conifer	30	5	9531	03	Conifer
FH9531	SlopeLT75	20	5	9531	03	Conifer
FH9532	submesic	30	6	9532	03	Deciduous
FH9532	deciduous	30	6	9532	03	Deciduous
FH9532	SlopeLT75	20	6	9532	03	Deciduous
FH9541	Mesic	30	7	9541	04	Conifer
FH9541	conifer	30	7	9541	04	Conifer
FH9541	SlopeLT30	20	7	9541	04	Conifer
FH9541	NE_Aspect	20	7	9541	04	Conifer
FH9542	Mesic	30	8	9542	04	Conifer
FH9542	deciduous	30	8	9542	04	Conifer
FH9542	SlopeLT5	20	8	9542	04	Conifer
FH9543	Mesic	30	9	9543	04	Deciduous
FH9543	conifer	30	9	9543	04	Deciduous
FH9543	SlopeLT5	20	9	9543	04	Deciduous
FH9544	Mesic	30	10	9544	04	Deciduous
FH9544	deciduous	30	10	9544	04	Deciduous
FH9544	SlopeLT30	20	10	9544	04	Deciduous
FH9544	NE_Aspect	20	10	9544	04	Deciduous
FH9551	subhygric	30	11	9551	05	Conifer
FH9551	conifer	30	11	9551	05	Conifer
FH9551	SlopeGT5	20	11	9551	05	Conifer
FH9551	SlopeLT35	20	11	9551	05	Conifer

FUZZY CLASS TABLE (CRULES)						
F_NAME	FUZATTR	ATTRWT	FACET_NO	F_CODE	Predicting	Stand
FH9552	subhygric	30	12	9552	05	Deciduous
FH9552	deciduous	30	12	9552	05	Deciduous
FH9552	SlopeGT5	20	12	9552	05	Deciduous
FH9552	SlopeLT35	20	12	9552	05	Deciduous
FH9561	wet	30	13	9561	06 (Ws07)	Not used
FH9561	SlopeLT10	20	13	9561	06 (Ws07)	Not used
FH9561	flat	50	13	9561	06 (Ws07)	Not used
FH9571	wet	30	14	9571	07 (Wb06)	Not used
FH9571	SlopeLT10	20	14	9571	07 (Wb06)	Not used
FH9571	puddle	50	14	9571	07 (Wb06)	Not used
FH9600	Organic	60	15	9600	07 (Wb06)	Not used

FUZZY ATTRIBUTE TABLE (ARULES)										
SORTORDER	FILE_IN	ATTR_IN	CLASS_OUT	MODEL_NO	B	B_LOW	B_HI	B1	B2	D
1	formfile	QWETI	Dry	5	4.20	4.20	4.20	1.43	4.30	0.10
2	formfile	QWETI	submesic	1	5.20	5.20	5.20	4.40	6.00	0.80
3	formfile	QWETI	Mesic	1	7.00	7.00	7.00	6.00	8.00	1.00
4	formfile	QWETI	subhygric	1	10.50	10.50	10.50	8.00	13.00	2.50
5	formfile	QWETI	wet	4	13.00	13.00	13.00	12.00	26.00	1.00
6	formfile	SLOPE	SlopeLT15	5	15.00	15.00	15.00	0.00	15.10	0.10
7	formfile	SLOPE	SlopeGT5	4	5.00	5.00	5.00	4.00	100.00	1.00
8	formfile	SLOPE	SlopeLT30	5	30.00	30.00	30.00	0.00	30.10	0.10
9	formfile	SLOPE	SlopeLT35	5	35.00	35.00	35.00	0.00	35.10	0.10
10	formfile	SLOPE	SlopeLT75	5	75.00	75.00	75.00	0.00	75.10	0.10
11	formfile	SLOPE	SlopeLT10	5	10.00	10.00	10.00	0.00	10.10	0.10
12	formfile	SLOPE	SlopeLT5	5	5.00	5.00	5.00	0.00	5.10	0.10
13	formfile	SLOPE	Steep	4	40.00	40.00	40.00	35.00	100.00	5.00
14	formfile	NEW_ASP	NE_Aspect	1	90.00	90.00	90.00	0.00	180.00	45.00
15	formfile	NEW_ASP	SW_Aspect	1	270.00	270.00	270.00	180.00	360.00	45.00
16	geofile	Classify1	conifer	1	5.00	5.00	5.00	4.99	5.01	0.01
17	geofile	Classify1	deciduous	1	7.00	7.00	7.00	6.99	7.01	0.01
18	relzfile	Z2PIT	puddle	5	1.50	1.50	1.50	0.00	1.51	0.10
19	relzfile	Z2PIT	flat	1	2.50	2.50	2.50	1.50	3.50	1.00
20	geofile	Terrain	Bedrock	1	1.00	1.00	1.00	0.99	1.01	0.01
21	geofile	Terrain	Colluv	1	2.00	2.00	2.00	1.99	2.01	0.01
22	geofile	Terrain	Fluvial	1	3.00	3.00	3.00	2.99	3.01	0.01
23	geofile	Terrain	FG	1	4.00	4.00	4.00	3.99	4.01	0.01
24	geofile	Terrain	Lacust	1	5.00	5.00	5.00	4.99	5.01	0.01
25	geofile	Terrain	GlacLac	1	6.00	6.00	6.00	5.99	6.01	0.01
26	geofile	Terrain	Organic	1	7.00	7.00	7.00	6.99	7.01	0.01
27	geofile	Terrain	Moraine	1	8.00	8.00	8.00	7.99	8.01	0.01
28	geofile	Terrain	Other	1	9.00	9.00	9.00	8.99	9.01	0.01

Appendix 2

British Columbia Conservation Data Centre Listed Ecosystems in the Peace Forest District

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Appendix 2. British Columbia Conservation Data Centre Listed Ecosystems in the Peace Forest District

English Name	Scientific Name	Global Status	Prov Status	BC List	Ecosystem Group	Endemic	Murray River BEC/Site Series
(balsam poplar, black cottonwood) - spruces / red-osier	*Populus balsamifera* (ssp. *balsamifera* , ssp. *trichocarpa*) - *Picea* spp. / *Cornus stolonifera*	GNR	S2?	Red	Riparian, Forest		Fm02; BWBSmw/112
arctic rush - Nuttall's alkaligrass - seablite	*Juncus arcticus - Puccinellia nuttalliana - Suaeda calceoliformis*	G3?	S1	Red	Herbaceous, Wetland		BWBSmw/00
black spruce / common horsetail / peat-mosses	*Picea mariana / Equisetum arvense / Sphagnum spp.*	GNR	S3S4	Blue	Forest, Wetland		Wb09
black spruce / lingonberry / peat-mosses	*Picea mariana / Vaccinium vitis-idaea / Sphagnum spp.*	GNR	S3	Blue	Wetland, Forest		Wb03
common cattail Marsh	*Typha latifolia* Marsh	G5	S3	Blue	Wetland, Herbaceous		Wm05
lodgepole pine / black huckleberry / reindeer lichens	*Pinus contorta / Vaccinium membranaceum / Cladina* spp.	G3	S3	Blue	Woodland, Forest	Y	SBSwk2/02
lodgepole pine / few-flowered sedge / peat-mosses	*Pinus contorta / Carex pauciflora / Sphagnum spp.*	G2G3	S2S3	Blue	Wetland, Forest, Woodland	Y	Wb10
mat muhly - arctic rush - Nevada bluegrass	*Muhlenbergia richardsonis - Juncus arcticus - Poa secunda* ssp. *juncifolia*	GNR	S1	Red	Herbaceous, Wetland, Grassland		BWBSmw/00
narrow-leaf willow Shrubland	*Salix exigua* Shrubland	G5	S2	Red	Wetland, Riparian, Shrub	N	none
narrow-leaved cotton-grass - shore sedge	*Eriophorum angustifolium - Carex limosa*	G3	S3	Blue	Wetland, Herbaceous	Y	Wf13
Pacific willow / red-osier dogwood / horsetails	*Salix lucida ssp. lasiandra / Cornus stolonifera / Equisetum spp.*	G2	S2	Red	Riparian, Shrub, Herbaceous	Y	none
scrub birch / water sedge	*Betula nana / Carex aquatilis*	G4	S3	Blue	Wetland, Shrub	Y	Wf02
shore sedge - buckbean / hook-mosses	*Carex limosa - Menyanthes trifoliata / Drepanocladus* spp.	G3	S3	Blue	Wetland, Herbaceous	Y	Wf08
slender sedge / common hook-moss	*Carex lasiocarpa / Drepanocladus aduncus*	G3	S3	Blue	Wetland, Herbaceous	Y	Wf05
subalpine fir / alders / horsetails	*Abies lasiocarpa / Alnus* spp. / *Equisetum* spp.	GNR	S3	Blue	Forest		ESSFmv2/06
swamp horsetail - beaked sedge	*Equisetum fluviatile - Carex utriculata*	G4	S3	Blue	Wetland, Herbaceous		Wm02
tamarack / buckbean - shore sedge	*Larix laricina / Menyanthes trifoliata - Carex limosa*	GNR	S3?	Blue	Forest, Wetland		Wf18
tamarack / water sedge / golden fuzzy fen moss	*Larix laricina / Carex aquatilis / Tomentypnum nitens*	GNR	S3	Blue	Wetland, Forest		Wb06
tufted clubrush / golden star-moss	*Trichophorum cespitosum / Campylium stellatum*	G2G3	S2S3	Blue	Wetland, Herbaceous	Y	Wf11
white spruce - black spruce / labrador tea / glow moss	*Picea glauca - Picea mariana / Ledum groenlandicum / Aulacomnium palustre*	GNR	S3	Blue	Forest, Wetland		Ws15
white spruce - lodgepole pine / soopolallie / showy aster	*Picea glauca - Pinus contorta / Shepherdia canadensis / Aster conspicuus*	GNR	S3	Blue	Forest		BWBSwk1/103
white spruce / oak fern - wild sarsaparilla	*Picea glauca / Gymnocarpium dryopteris - Aralia nudicaulis*	G3	S3	Blue	Forest, Riparian		BWBSmw/110
white spruce / red swamp currant / horsetails	*Picea glauca / Ribes triste / Equisetum* spp.	G4	S2S3	Blue	Forest, Riparian		BWBSmw/111;BWBSwk1/110
white spruce / red swamp currant / tall bluebells	*Picea glauca / Ribes triste / Mertensia paniculata*	G3	S3	Blue	Forest, Riparian		none

Appendix 3

British Columbia Conservation Data Centre Listed Plants in the Peace Forest District

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Appendix 3. British Columbia Conservation Data Centre Listed Plants in the Peace Forest District

Scientific Name	English Name	RISC Code	GlobalStatus	ProvStatus	BCList	SARA Listed	NationalGS	Category	Habitat Type
Amblyodon dealbatus		AMBLDEA	G3G5	S2S3	Blue	No		Nonvascular Plant	
Amblystegium tenax		HYGRTEN	G5	S2S3	Blue	No		Nonvascular Plant	
Anemone canadensis	Canada anemone	ANEMCAN	G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	PALUSTRINE;TERRESTRIAL
Arnica chamissonis ssp. incana	meadow arnica	ARNICHA3	G5T3T5	S2S3	Blue	No		Vascular Plant	PALUSTRINE;TERRESTRIAL
Astragalus vexilliflexus var. vexilliflexus	bent-flowered milk-vetch	ASTRVEX1	G4T4	S2S3	Blue	No		Vascular Plant	TERRESTRIAL
Botrychium crenulatum	dainty moonwort	BOTRCRE	G3	S2S3	Blue	No	3 - Sensitive (2010)	Vascular Plant	PALUSTRINE;RIVERINE;TERRESTRIAL
Botrychium simplex	least moonwort	BOTRSIM	G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	PALUSTRINE;RIVERINE;TERRESTRIAL
Brachythecium groenlandicum		BRACGRO	G3G5	S2S3	Blue	No		Nonvascular Plant	
Bryobrittonia longipes		BRYOLON	G3	S2S3	Blue	No		Nonvascular Plant	
Bryum stenotrichum		BRYUAMB	GNR	S2S3	Blue	No		Nonvascular Plant	
Calamagrostis montanensis	plains reedgrass	CALAMON	G5	S3	Blue	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Calliergon richardsonii		CALLRIC	G4	S2S3	Blue	No		Nonvascular Plant	
Carex bicolor	two-coloured sedge	CAREBIC	G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	LACUSTRINE;PALUSTRINE;TERRESTRIAL
Carex fuliginosa ssp. misandra	short-leaved sedge		G5	S2S3	Blue	No		Vascular Plant	TERRESTRIAL
Carex lenticularis var. dolia	Enander's sedge	CARELEN1	G5T3	S2S3	Blue	No		Vascular Plant	LACUSTRINE;PALUSTRINE;RIVERINE;TERRESTRIAL
Carex scoparia	pointed broom sedge	CARESCO	G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	LACUSTRINE;PALUSTRINE;TERRESTRIAL
Carex tenera	tender sedge	CARETEE	G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	LACUSTRINE;PALUSTRINE;TERRESTRIAL
Carex torreyi	Torrey's sedge	CARETOR	G4	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Chrysosplenium iowense	Iowa golden-saxifrage	CHRYIOW	G3?	S2S3	Blue	No	3 - Sensitive (2010)	Vascular Plant	PALUSTRINE
Cicuta virosa	European water-hemlock	CICUVIR	G4G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	LACUSTRINE;PALUSTRINE;TERRESTRIAL
Didymodon subandreaeoides		DIDYSUB	GU	S2S3	Blue	No		Nonvascular Plant	
Draba alpina	alpine draba	DRABALP	G4G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Draba fladnizensis	Austrian draba	DRABFLA	G4	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Draba glabella var. glabella	smooth draba	DRABGLA1	G4G5T4	S2S3	Blue	No		Vascular Plant	PALUSTRINE;TERRESTRIAL
Draba lactea	milky draba	DRABLAC	G4	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	RIVERINE;TERRESTRIAL
Draba porsildii	Porsild's draba	DRABPOR	G3G4	S2S3	Blue	No	3 - Sensitive (2010)	Vascular Plant	TERRESTRIAL
Drepanocladus capillifolius		DREPLON	GU	S2S3	Blue	No		Nonvascular Plant	
Epilobium hornemannii ssp. behringianum	Hornemann's willowherb	EPILHOR1	G5T4	S2S3	Blue	No		Vascular Plant	PALUSTRINE;RIVERINE;TERRESTRIAL
Epilobium leptocarpum	small-fruited willowherb	EPILLEP	G5	S2S3	Blue	No	3 - Sensitive (2010)	Vascular Plant	PALUSTRINE;RIVERINE;TERRESTRIAL
Galium labradoricum	northern bog bedstraw	GALILAB	G5	S3	Blue	No	4 - Secure (2010)	Vascular Plant	PALUSTRINE
Glyceria pulchella	slender mannagrass	GLYCPUL	G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	LACUSTRINE;PALUSTRINE
Helictotrichon hookeri	spike-oat	HELIHOO	G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Hypnum plicatulum		HYPNPLI	G5	S2S3	Blue	No		Nonvascular Plant	
Hypnum procerrimum		HYPNPRO	G3G4	S2S3	Blue	No		Nonvascular Plant	
Juncus arcticus ssp. alaskanus	arctic rush	JUNCARC1	G5T4T5	S2S3	Blue	No		Vascular Plant	LACUSTRINE;PALUSTRINE;RIVERINE;TERRESTRIAL
Lomatogonium rotatum	marsh felwort	LOMAROT	G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	PALUSTRINE;TERRESTRIAL
Luzula confusa	northern wood-rush	LUZUCON	G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Luzula nivalis	arctic wood-rush	LUZUNIV	G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	PALUSTRINE;TERRESTRIAL
Luzula rufescens	rusty wood-rush	LUZURUF	G5	S2S3	Blue	No	3 - Sensitive (2010)	Vascular Plant	PALUSTRINE;TERRESTRIAL
Meesia longiseta		MEESLON	G4?	S2S3	Blue	No		Nonvascular Plant	
Minuartia austromontana	Rocky Mountain sandwort	MINUAUS	G4	S2S3	Blue	No	3 - Sensitive (2010)	Vascular Plant	TERRESTRIAL
Minuartia elegans	northern sandwort	MINUELE	G4G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Orthotrichum alpestre		ORTHALP	G4G5	S2S3	Blue	No		Nonvascular Plant	
Orthotrichum speciosum var. elegans		ORTHSPE1	G5T5	S2S3	Blue	No		Nonvascular Plant	
Oxytropis campestris var. davisii	Davis' locoweed	OXYTJOR1	G5T3	S3	Blue	No		Vascular Plant	PALUSTRINE;TERRESTRIAL
Oxytropis nigrescens var. uniflora	one-flower oxytrope	OXYTNIG2	G5TNR	S2S3	Blue	No		Vascular Plant	TERRESTRIAL
Packera plattensis	plains butterweed	PACKPLA	G5	S2S3	Blue	No	3 - Sensitive (2010)	Vascular Plant	PALUSTRINE;TERRESTRIAL
Pedicularis parviflora ssp. parviflora	small-flowered lousewort	PEDIPAR1	G4T4	S3	Blue	No		Vascular Plant	PALUSTRINE;RIVERINE;TERRESTRIAL
Pinguicula villosa	hairy butterwort	PINGVIL	G4	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	PALUSTRINE;RIVERINE;TERRESTRIAL

Appendix 3. British Columbia Conservation Data Centre Listed Plants in the Peace Forest District

Scientific Name	English Name	RISC Code	GlobalStatus	ProvStatus	BCList	SARA Listed	NationalGS	Category	Habitat Type
Pohlia vexans		POHLVEX	G3G5	S2S3	Blue	No		Nonvascular Plant	
Polemonium boreale	northern Jacob's-ladder	POLEBOR	G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Polemonium occidentale ssp. occidentale	western Jacob's-ladder	POLEOCC1	G5?T5?	S2S3	Blue	No		Vascular Plant	PALUSTRINE;TERRESTRIAL
Pyrola elliptica	white wintergreen	PYROELL	G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	PALUSTRINE;TERRESTRIAL
Ranunculus pedatifidus ssp. affinis	birdfoot buttercup	RANUPED1	G5T5	S2S3	Blue	No		Vascular Plant	PALUSTRINE;TERRESTRIAL
Rosa arkansana var. arkansana	Arkansas rose	ROSAARK1	G5T4T5	S2S3	Blue	No		Vascular Plant	PALUSTRINE;RIVERINE;TERRESTRIAL
Rumex arcticus	arctic dock	RUMEARC	G5	S3	Blue	No	4 - Secure (2010)	Vascular Plant	LACUSTRINE;PALUSTRINE;TERRESTRIAL
Salix petiolaris	meadow willow	SALIPET	G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	PALUSTRINE
Salix serissima	autumn willow	SALISER	G4	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	PALUSTRINE
Sarracenia purpurea ssp. gibbosa	common pitcher-plant	SARRPUR2	G5T5	S2S3	Blue	No		Vascular Plant	PALUSTRINE
Scorpidium turgescens		PSEUTUR	G3G5	S2S3	Blue	No		Nonvascular Plant	
Senecio sheldonensis	Mount Sheldon butterweed	SENESHE	G2G3	S2S3	Blue	No	3 - Sensitive (2010)	Vascular Plant	PALUSTRINE;RIVERINE;TERRESTRIAL
Silene involucrata ssp. involucrata	arctic campion	SILEINV1	G5T5	S2S3	Blue	No		Vascular Plant	TERRESTRIAL
Sphagnum wulfianum		SPHAWUL	G5	S2S3	Blue	No		Nonvascular Plant	
Sphenopholis intermedia	slender wedgegrass	SPHEINT	G5	S3	Blue	No	4 - Secure (2010)	Vascular Plant	LACUSTRINE;PALUSTRINE;RIVERINE;TERRESTRIAL
Stuckenia vaginata	sheathing pondweed	STUCVAG	G5	S2S3	Blue	No	4 - Secure (2010)	Vascular Plant	LACUSTRINE;RIVERINE
Symphyotrichum puniceum var. puniceum	purple-stemmed aster	ASTEPUN1	G5T5	S2S3	Blue	No		Vascular Plant	PALUSTRINE;TERRESTRIAL
Tetraplodon angustatus		TETRANG	G4	S2S3	Blue	No		Nonvascular Plant	
Tomentypnum falcifolium		TOMEFAL	G3G5	S2S3	Blue	No		Nonvascular Plant	
Utricularia ochroleuca	ochroleucous bladderwort	UTRIOCH	G4?	S2S3	Blue	No	3 - Sensitive (2010)	Vascular Plant	LACUSTRINE
Alopecurus alpinus	alpine meadow-foxtail	ALOPALP	G5	S1S3	Red	No	4 - Secure (2010)	Vascular Plant	PALUSTRINE;TERRESTRIAL
Anemone virginiana var. cylindroidea	riverbank anemone	ANEMVIR3	G5T4T5	S1	Red	No		Vascular Plant	PALUSTRINE;TERRESTRIAL
Arabis sparsiflora	sickle-pod rockcress	ARABSPA	G5	S1	Red	No	2 - May be at risk (2010)	Vascular Plant	TERRESTRIAL
Artemisia longifolia	long-leaved mugwort	ARTELON	G5	S2	Red	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Atriplex gardneri var. gardneri	Gardner's sagebrush	ATRIGAR1	G5T5	S1	Red	No		Vascular Plant	TERRESTRIAL
Botrychium ascendens	upswept moonwort	BOTRASC	G2G3	S2	Red	No	2 - May be at risk (2010)	Vascular Plant	PALUSTRINE;TERRESTRIAL
Botrychium spathulatum	spoon-shaped moonwort	BOTRSPA	G3	S1	Red	No	3 - Sensitive (2010)	Vascular Plant	PALUSTRINE;TERRESTRIAL
Bryum uliginosum		BRYUULI	G3G5	S1S3	Red	No		Nonvascular Plant	
Carex xerantica	dry-land sedge	CAREXER	G5	S2	Red	No	3 - Sensitive (2010)	Vascular Plant	TERRESTRIAL
Chenopodium hians	gaping goosefoot	CHENHIA	G5	S2	Red	No	2 - May be at risk (2010)	Vascular Plant	TERRESTRIAL
Cirsium drummondii	Drummond's thistle	CIRSDRU	G5	S1	Red	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Erigeron trifidus	three-lobed daisy	ERIGTRI	G2G3Q	S2	Red	No	3 - Sensitive (2010)	Vascular Plant	TERRESTRIAL
Helianthus nuttallii ssp. rydbergii	Nuttall's sunflower	HELINUT	G5T5	S1	Red	No		Vascular Plant	PALUSTRINE;TERRESTRIAL
Hesperostipa spartea	porcupinegrass	HESPSPA	G5	S2	Red	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Lomatium foeniculaceum var. foeniculaceum	fennel-leaved desert-parsley	LOMAFOE2	G5T5	S1	Red	No		Vascular Plant	TERRESTRIAL
Penstemon gracilis	slender penstemon	PENSGRA	G5	S2	Red	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Polygala senega	Seneca-snakeroot	POLYSEN	G4G5	SH	Red	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Polypodium sibiricum	Siberian polypody	POLYSIB	G5?	SH	Red	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Prenanthes racemosa	purple rattlesnake-root	PRENRAC1	G5	SH	Red	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Ranunculus cardiophyllus	heart-leaved buttercup	RANUCAR	G4G5	S1	Red	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Ranunculus rhomboideus	prairie buttercup	RANURHO	G5	S1	Red	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Rhizomnium punctatum		RHIZPUN	G5	S1S3	Red	No		Nonvascular Plant	
Schistidium pulchrum		SCHIPUL	GNR	S1S3	Red	No		Nonvascular Plant	
Selaginella rupestris	rock selaginella	SELARUP	G5	S1	Red	No	4 - Secure (2010)	Vascular Plant	TERRESTRIAL
Sphagnum nitidum		SPHANIT	GNR	S1S3	Red	No		Nonvascular Plant	
Sphagnum platyphyllum		SPHAPLA	G5	S1S3	Red	No		Nonvascular Plant	
Splachnum rubrum		SPLARUB	G3	S1S3	Red	No		Nonvascular Plant	
Tephroseris palustris	marsh fleabane	SENECON	G5	S1S3	Red	No	4 - Secure (2010)	Vascular Plant	LACUSTRINE;PALUSTRINE

Appendix 4

Ecological Characteristics of Map Units within the Regional Study Area

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Appendix 4. Ecological Characteristics of Map Units within the Regional Study Area

BEC Unit	Site Series	Map Code	Ecosystem Unit	Name	Description	General Ecosystem Type	Typical SMR
BAFAun	00	BA	BA	Barren	Land devoid of vegetation due to extreme climatic or edaphic conditions	Barren	N/A
BAFAun	00	FM	FM	Wetter herb	High elev herb meadow. Forb species dominate, e.g. Veratrum viride, Senecio triangularis, and Valeriana sitchensis. Some mapped areas may have dwarf shrubs, e.g. Cassiope mertensia & Empetrum nigrum. Or graminoid dominated but could not map separate.	Moist to Wet Herb	Subhygric to hygric
BAFAun	00	HE	HE	Herb	High elev herb, most commonly forb dominated but could include mountain heather species (Cassiope sp.). Subxeric to mesic (mesic) moist relative moisture range.	Dry to Mesic Herb	Submesic to mesic
BAFAun	00	KR	KR	Subalpine fir Krummholtz	Krummholtz subalpine fir (Abies lasiocarpa), with stunted, and often deformed growth and clumped distribution. Between the clumps of trees, white mountain-heather (Cassiope mertensia) and crowberry (Empetrum nigrum) dominate.	Dry to Mesic Forest	Subxeric to submesic
BAFAun	00	LA	LA	TRIM Lake/Reservoir	TRIM-identified - A natural or artifical static body of water, greater than 2 m deep in some portion. The boundary for the lake is the natural high water mark or a human-made structure.	Water	N/A
BAFAun	00	WE	WE	TRIM Wetland	TRIM wetland that is herb dominated.	Wetland	subhygric to hydric
BWBSmw	00	BA	BA	Barren	Land devoid of vegetation due to extreme climatic or edaphic conditions	Barren	N/A
BWBSmw	00	LA	LA	TRIM Lake/Reservoir	TRIM-identified - A natural or artifical static body of water, greater than 2 m deep in some portion. The boundary for the lake is the natural high water mark or a human-made structure.	Water	N/A
BWBSmw	00	MA	MA	TRIM Marsh	TRIM marsh; semi-permanently to seasonally flooded mineral wetland dominated by emergent vegetation	Wetland	subhygric to hydric
BWBSmw	00	RI	RI	TRIM River	TRIM River	Water	N/A
BWBSmw	00	SA	SA	TRIM Swamp	TRIM swamp (generic); likely mineral soil	Wetland	subhygric to hydric
BWBSmw	00	WA	WA	Water	Water from image classification	Water	N/A
BWBSmw	00	WB	WB	Wetland Bog	wetland that is organic soil and dominated by shrub or tree species	Wetland	subhygric to hydric
BWBSmw	00	WE	WE	TRIM Wetland	TRIM wetland that is shrub or herb dominated.	Wetland	subhygric to hydric
BWBSmw	00	WF	WF	Wetland Fen	wetland that is organic soil and herb dominated	Wetland	subhygric to hydric
BWBSmw	00	WH	WH	Wetland Herb	Herb dominated wetland; unknown if mineral or organic soil type	Wetland	subhygric to hydric
BWBSmw	101	XA	101	Sw - Trailing raspberry - Step moss	occur on gentle to moderate slopes (< 20%); mid to level positions, but also upper and lower; soil texture variable; range of parent materials; coarse fragment content is generally less than 20%; canopy dominated by white spruce.	Mesic Forest	(sub)mesic-(subhygric)
BWBSmw	101$	XG	101$	At - Rose - Creamy peavine	generally occur on gentle to moderate slopes (< 20%) in level to upper slope positions; soils often fine to medium textured, derived from various parent materials; coarse fragment content generally less than 20%; canopy dominated by trembling aspen.	Mesic Forest	submesic-subhygric
BWBSmw	102	XB	102	Pl - Kinnikinnick - Lingonberry	occur along the top or face of coarse-textured (glacio) fluvial terraces but can occur in other situations where compensating factors result in a xeric to subxeric moisture regime; lodgepole pine canopy.	Moderately Dry Forest	xeric-subxeric
BWBSmw	102$	XH	102$	At - Soopolallie - Kinnikinnick	generally occur on coarse-textured (glacio) fluvial material, typically veneer over another parent material or deeper blanket;occur on the steep sides of fluvial terraces; canopy dominated by trembling aspen.	Moderately Dry Forest	xeric-subxeric
BWBSmw	103	XC	103	SwPl - Soopolallie - Wildrye	often occur on warm slopes but slope gradient and slope position range widely; soils variable but most commonly from (glacio) fluvial parent material; soil textures generally medium to coarse; white spruce and lodgepole pine canopy.	Moderately Dry Forest	submesic
BWBSmw	103$	XI	103$	At - Rose - Fuzzy-spiked wildrye	gentle to level slopes or on steeper warm aspects; soil texture moderately fine to medium in texture from lacustrine or morainal parent materials, but coarser texture where derived from (glacio) fluvial parent material; canopy dominated by trembling aspen	Moderately Dry Forest	submesic
BWBSmw	103$/102$	XI/XH	103$/102$	At - Rose - Fuzzy-spiked wildrye/At - Soopolallie -	could be either 103$ or 102$ site series (see respective descriptions), but more likely to be 103$	Moderately Dry Forest	xeric-submesic
BWBSmw	103/102	XC/XB	103/102	SwPl - Soopolallie - Wildrye/Pl - Kinnikinnick - Lingonberry	could be either 103 or 102 site series (see respective descriptions), but more likely to be 103	Moderately Dry Forest	xeric-submesic
BWBSmw	104	XD	104	Sb - Lingonberry - Step moss	generally on gentle slopes (< 10%) but may occur on steep cool slopes; soils from a range of parent materials, but generally medium to fine textured; rooting often restricted to < 30 cm; canopy dominated by lodgepole pine and/or black spruce.	Slightly Dry to Moist Forest	submesic-hygric
BWBSmw	104$	XJ	104$	At - Labrador tea - Lingonberry	primarily level to gently sloping with little relief. Soils are fine to medium in texture and are derived from a range of parent materials; canopy dominated by trembling aspen.	Slightly Dry to Moist Forest	submesic-subhygric

Appendix 4. Ecological Characteristics of Map Units within the Regional Study Area

BEC Unit	Site Series	Map Code	Ecosystem Unit	Name	Description	General Ecosystem Type	Typical SMR
BWBSmw	110	XE	110	Sw - Oak fern - Sarsaparilla	generally occur on gentle lower slopes or steeper cool aspects; soil texture variable; range of parent materials; white spruce dominated canopy.	Moist Forest	mesic-subhygric
BWBSmw	110$	XK	110$	At - Highbush-cranberry - Oak fern	occur in a range of positions on gentle slopes or steeper cool aspects; soils medium to fine textured and generally derived from morainal or fluvial parent materials; canopy dominated by trembling aspen.	Moist Forest	mesic-subhygric
BWBSmw	111	XF	111	Sw - Currant - Horsetail	restricted to wet sites; occur on the floodplains of smaller watercourses, on gentle lower slopes or steeper cool aspects. Soils are variable in texture but are generally derived from fluvial or lacustrine parent materials; white spruce dominated canopy.	Moist Forest	subhygric-hygric
BWBSmw	111$	XL	111$	At - Cow-parsnip - Meadowrue	occur along smaller watercourses, and level to lower slopes, or mid-slope on steeper cool aspects; soils from med. to fine texture on M and L; coarser on F parent material; canopy dominated by balsam poplar and/or trembling aspen.	Moist Forest	subhygric-hygric
BWBSmw	111$/112	XL/XM	111$/112	At - Cow-parsnip - Meadowrue/AcbSw - Mountain alder - Dogwood	111$ or 112; see 111$ description for more info; 112:restricted to the middlebench floodplains along major watercourses. They occur on level sites with coarse to medium-textured fl uvial soils. Mixed balsam poplar and white spruce canopy.	Moist Forest/Mid Bench Floodplain	subhygric-hygric
BWBSwk1	00	BA	BA	Barren	Land devoid of vegetation due to extreme climatic or edaphic conditions	Barren	N/A
BWBSwk1	00	LA	LA	TRIM Lake/Reservoir	TRIM-identified - A natural or artifical static body of water, greater than 2 m deep in some portion. The boundary for the lake is the natural high water mark or a human-made structure.	Water	N/A
BWBSwk1	00	MA	MA	TRIM Marsh	TRIM marsh; semi-permanently to seasonally flooded mineral wetland dominated by emergent vegetation	Wetland	subhygric to hydric
BWBSwk1	00	RI	RI	TRIM River	TRIM River	Water	N/A
BWBSwk1	00	SA	SA	TRIM Swamp	TRIM swamp (generic); likely mineral soil	Wetland	subhygric to hydric
BWBSwk1	00	WA	WA	Water	Water from image classification	Water	N/A
BWBSwk1	00	WB	WB	Wetland Bog	wetland that is organic soil and dominated by shrub or tree species	Wetland	subhygric to hydric
BWBSwk1	00	WE	WE	TRIM Wetland	TRIM wetland that is shrub or herb dominated.	Wetland	subhygric to hydric
BWBSwk1	00	WS	WS	Wetland Swamp	Wetland Swamp, mineral soil, shrub or tree species dominated	Wetland	subhygric to hydric
BWBSwk1	101	YA	101	SwBl - Huckleberry - Feathermoss	mid to upper slope positions, occasionally on level sites. Soils are generally medium to fine textured, primarily from morainal and glaciofluvial parent materials; dominated by lodgepole pine	Mesic Forest	(submesic)-mesic
BWBSwk1	101$	YG	101$	At - Birch-leaved spiraea - Huckleberry	areas with recent (< 100 years) disturbance history; occur on gentle to moderate slopes (< 30%); upper to mid-slope positions or on level sites; Soils range in texture; morainal or glaciofluvial parent materials; trembling aspen canopy dominated.	Mesic Forest	(submesic)-mesic
BWBSwk1	102	YB	102	Pl - Lingonberry - Reindeer lichen	generally along moderately coarse- to medium-textured (glacio) fluvial ridges or terraces, or on thin soils over bedrock. Lodgepole pine forms a sparse to open canopy; black spruce occasionally present.	Moderately Dry Forest	xeric-subxeric
BWBSwk1	102$	YH	102$	At - Kinnikinnick - Fuzzy-spiked wildrye	based on limited data, occurs on moderately coarse- to coarse-textured warm slopes, but could also occur in other situations where soils are coarse and/or shallow. Limited data indicate that trembling aspen forms a sparse canopy.	Moderately Dry Forest	xeric-subxeric
BWBSwk1	103	YC	103	SwPl - Soopolallie - Showy aster	warm aspects; mid to upper slope positions; moderately coarse- to coarse-textured soils from morainal or glaciofluvial parent materials. Canopy is dominated by lodgepole pine.	Moderately Dry Forest	submesic
BWBSwk1	103$	YI	103$	At - Rose - Fuzzy-spiked wildrye	generally associated with warm slopes; soils are derived from a range of parent materials but are coarse to medium textured. Dominated by trembling aspen.	Moderately Dry Forest	submesic
BWBSwk1	104	YD	104	Sb - Huckleberry - Lingonberry	generally level or gently sloping (< 10%) terrain; restricted to cool aspects in steeper terrain. Soils medium to coarse textured;occasionally finer; typically morainal or glaciofluvial parent materials; Canopy dominated by lodgepole pine or black spruce.	Slightly Dry to Moist Forest	submesic-subhygric
BWBSwk1	104$	YJ	104$	At - Labrador tea - Lingonberry	generally associated with gentle slopes (< 10% slope) on cool aspects; soils derived from a range of parent materials and texture is variable. Canopy dominated by trembling aspen.	Slightly Dry to Moist Forest	submesic-subhygric
BWBSwk1	110$	YK	110$	AcbAt - Cow-parsnip/At - Highbush-cranberry - Oak fern	M or F parent materials; 6.B1: along small watercourses or on gentle low to toe slopes; soils mod. coarse to med. textured; Act dominated. 6.B2: on gentle, mid to lower slopes or steeper cool aspects; soils med. to fine textured; At dominated.	Moist Forest	mesic-hygric
BWBSwk1	110/111	YE/YF	110/111	Sw - Currant - Horsetail/Sb - Lingonberry - Horsetail	110: floodplains of smaller watercourses, gentle lower slopes, or steeper cool aspects; morainal; Sw canopy OR 111: cool lower slopes or level with imperfect to poor soil drainage; organic, morainal, or thick humified organic over fluvial. Sb dominant.	Moist Forest	mes-hygr/subhyg-hygric

Appendix 4. Ecological Characteristics of Map Units within the Regional Study Area

BEC Unit	Site Series	Map Code	Ecosystem Unit	Name	Description	General Ecosystem Type	Typical SMR
ESSFmv2	00	BA	BA	Barren	Land devoid of vegetation due to extreme climatic or edaphic conditions	Barren	N/A
ESSFmv2	00	LA	LA	TRIM Lake/Reservoir	TRIM-identified - A natural or artifical static body of water, greater than 2 m deep in some portion. The boundary for the lake is the natural high water mark or a human-made structure.	Water	N/A
ESSFmv2	00	MA	MA	TRIM Marsh	TRIM marsh; semi-permanently to seasonally flooded mineral wetland dominated by emergent vegetation	Wetland	subhygric to hydric
ESSFmv2	00	RI	RI	TRIM River	TRIM River	Water	N/A
ESSFmv2	00	SA	SA	TRIM Swamp	TRIM swamp (generic); likely mineral soil	Wetland	subhygric to hydric
ESSFmv2	00	WB	WB	Wetland Bog	wetland that is organic soil and dominated by shrub or tree species	Wetland	subhygric to hydric
ESSFmv2	00	WE	WE	TRIM Wetland	TRIM wetland that is shrub or herb dominated.	Wetland	subhygric to hydric
ESSFmv2	00	WH	WH	Wetland Herb	Herb dominated wetland	Wetland	subhygric to hydric
ESSFmv2	00	WS	WS	Wetland Swamp	Wetland Swamp, mineral soil, shrub or tree species dominated	Wetland	subhygric to hydric
ESSFmv2	01	FR	01	Bl - Rhododendron - Feathermoss	gentle slope, deep medium - textured soils	Mesic Forest	submesic - mesic
ESSFmv2	01/03/04	FR (BT/FO)	01/03/04	Bl - Rhododendron - Feathermoss (BlSb - Labrador tea/Bl - Oak fern - Knight's plume)	gentle slope, deep medium - textured soils but may also be the conditions of 03 or 04 site series; could not differentiate well	Slightly Dry to Moist Forest	submesic - subhygric
ESSFmv2	02	FL	02	Bl - Lingonberry	gentle slope to level site; deep coarse-textured soils	Moderately Dry Forest	subxeric - submesic
ESSFmv2	03	BT	03	BlSb - Labrador tea	gently sloping to depressional sites with deep fine-textured soils	Slightly Dry to Moist Forest	submesic - hygric
ESSFmv2	04	FO	04	Bl - Oak fern - Knight's plume	gentle slope, moisture receiving sites, deep, medium- textured soils	Mesic Forest	mesic - subhygric
ESSFmv2	05	FD	05	Bl - Devil's club - Rhododendron	gentle slope, moisture receiving sites, deep, medium- textured soils	Moist Forest	subhygric
ESSFmv2	06	FH	06	Bl - Alder - Horsetail (Ws08 - Bl - Sitka valerian - Common horsetail)	level or depressional sites with deep coarse - textured soils	Wet Forest	subhygric - hygric
ESSFmvp	00	BA	BA	Barren	Land devoid of vegetation due to extreme climatic or edaphic conditions	Barren	N/A
ESSFmvp	00	BC	BC	Bl - crowberry	pen to clumped conifer, Abies lasiocarpa dominant (Picea engelmanni). Trees interspersed with open meadow of heathers, crowberry, or forbs (where seepage btwn C or M veneers. Shrub layer typically Abies lasiocarpa. Typ herb is Empetrum nigrum	Dry to Mesic Forest	Subxeric to submesic (mesic)
ESSFmvp	00	BC	BC	Bl - crowberry	pen to clumped conifer, Abies lasiocarpa dominant (Picea engelmanni). Trees interspersed with open meadow of heathers, crowberry, or forbs (where seepage btwn C or M veneers. Shrub layer typically Abies lasiocarpa. Typ herb is Empetrum nigrum	Dry to Mesic Shrub	Subxeric to submesic (mesic)
ESSFmvp	00	BV	BV	Bl - Sitka Valerian	Open-clumped conifer, Abies lasiocarpa dominant. Typical shrub is Abies lasiocarpa, with some deciduous sp. Forbs typical, e.g. Veratrum viridis, Lupinus arcticus, Valeriana sitchensis. Typically moisture receiving; many with subsurface seepage.	Moist to Wet Shrub	Subhygric to hygric
ESSFmvp	00	BV	BV	Bl - Sitka Valerian	Open-clumped conifer, Abies lasiocarpa dominant. Typical shrub is Abies lasiocarpa, with some deciduous sp. Forbs typical, e.g. Veratrum viridis, Lupinus arcticus, Valeriana sitchensis. Typically moisture receiving; many with subsurface seepage.	Wet Forest	Subhygric
ESSFmvp	00	FM	FM	Wetter herb	High elev herb meadow. Forb species dominate, e.g. Veratrum viride, Senecio triangularis, and Valeriana sitchensis. Some mapped areas may have dwarf shrubs, e.g. Cassiope mertensia & Empetrum nigrum. Or graminoid dominated but could not map separate.	Moist to Wet Herb	Subhygric to hygric
ESSFmvp	00	HE	HE	Herb	High elev herb, most commonly forb dominated but could include mountain heather species (Cassiope sp.). Subxeric to mesic (mesic) moist relative moisture range.	Dry to Mesic Herb	Submesic (mesic)
ESSFmvp	00	LA	LA	TRIM Lake/Reservoir	TRIM-identified - A natural or artifical static body of water, greater than 2 m deep in some portion. The boundary for the lake is the natural high water mark or a human-made structure.	Water	N/A
ESSFmvp	00	MA	MA	TRIM Marsh	TRIM marsh; semi-permanently to seasonally flooded mineral wetland dominated by emergent vegetation	Wetland	subhygric to hydric
ESSFmvp	00	SA	SA	TRIM Swamp	TRIM swamp (generic); likely mineral soil	Wetland	subhygric to hydric
ESSFmvp	00	WA	WA	Water	Water from image classification	Water	N/A
ESSFmvp	00	WE	WE	TRIM Wetland	TRIM wetland that is shrub or herb dominated.	Wetland	subhygric to hydric
ESSFwc3	00	BA	BA	Barren	Land devoid of vegetation due to extreme climatic or edaphic conditions	Barren	N/A
ESSFwc3	00	LA	LA	TRIM Lake/Reservoir	TRIM-identified - A natural or artifical static body of water, greater than 2 m deep in some portion. The boundary for the lake is the natural high water mark or a human-made structure.	Water	N/A

Appendix 4. Ecological Characteristics of Map Units within the Regional Study Area

BEC Unit	Site Series	Map Code	Ecosystem Unit	Name	Description	General Ecosystem Type	Typical SMR
ESSFwc3	00	WE	WE	TRIM Wetland	TRIM wetland that is shrub or herb dominated.	Wetland	subhygric to hydric
ESSFwc3	01	FR	01	Bl - Rhododendron - Oak fern	gentle slope; deep, medium-textured soil	Mesic Forest	mesic
ESSFwc3	02	FQ	02	Bl - Rhododendron - Queen's cup	gentle slope; shallow soil; crest position	Moderately Dry Forest	xeric-subxeric
ESSFwc3	03	FG	03	Bl - Globeflower - Horsetail (Ws08 - Bl - Sitka valerian - Common horsetail)	moisture receiving lower slope position;gentle slope; deep, medium-textured soil gentle slope; deep, medium-textured soil	Moist Forest	hygric - subhygric
ESSFwc3	03	FG	03	Bl - Globeflower - Horsetail (Ws08 - Bl - Sitka valerian - Common horsetail)	moisture receiving lower slope position;gentle slope; deep, medium-textured soil gentle slope; deep, medium-textured soil	Moist Forest	hygric-subhygric
ESSFwc3	03	FG	03	Bl - Globeflower - Horsetail (Ws08 - Bl - Sitka valerian - Common horsetail)	moisture receiving lower slope position;gentle slope; deep, medium-textured soil gentle slope; deep, medium-textured soilentle slope; deep, medium-textured soil gentle slope; deep, medium-textured soil	Moist Forest	hygric - subhygric
ESSFwcp	00	BA	BA	Barren	Land devoid of vegetation due to extreme climatic or edaphic conditions	Barren	N/A
ESSFwcp	00	BC	BC	Bl - crowberry	pen to clumped conifer, Abies lasiocarpa dominant (Picea engelmanni). Trees interspersed with open meadow of heathers, crowberry, or forbs (where seepage btwn C or M veneers. Shrub layer typically Abies lasiocarpa. Typ herb is Empetrum nigrum	Dry to Mesic Forest	Subxeric to submesic (mesic)
ESSFwcp	00	BC	BC	Bl - crowberry	pen to clumped conifer, Abies lasiocarpa dominant (Picea engelmanni). Trees interspersed with open meadow of heathers, crowberry, or forbs (where seepage btwn C or M veneers. Shrub layer typically Abies lasiocarpa. Typ herb is Empetrum nigrum	Dry to Mesic Shrub	Subxeric to submesic (mesic)
ESSFwcp	00	BV	BV	Bl - Sitka Valerian	Open-clumped conifer, Abies lasiocarpa dominant. Typical shrub is Abies lasiocarpa, with some deciduous sp. Forbs typical, e.g. Veratrum viridis, Lupinus arcticus, Valeriana sitchensis. Typically moisture receiving; many with subsurface seepage.	Moist to Wet Shrub	Subhygric to hygric
ESSFwcp	00	BV	BV	Bl - Sitka Valerian	Open-clumped conifer, Abies lasiocarpa dominant. Typical shrub is Abies lasiocarpa, with some deciduous sp. Forbs typical, e.g. Veratrum viridis, Lupinus arcticus, Valeriana sitchensis. Typically moisture receiving; many with subsurface seepage.	Wet Forest	Subhygric
ESSFwcp	00	FM	FM	Wetter herb	High elev herb meadow. Forb species dominate, e.g. Veratrum viride, Senecio triangularis, and Valeriana sitchensis. Some mapped areas may have dwarf shrubs, e.g. Cassiope mertensia & Empetrum nigrum. Or graminoid dominated but could not map separate.	Moist to Wet Herb	Subhygric to hygric
ESSFwcp	00	HE	HE	Herb	High elev herb, most commonly forb dominated but could include mountain heather species (Cassiope sp.). Subxeric to mesic (mesic) moist relative moisture range.	Dry to Mesic Herb	Submesic (mesic)
ESSFwcp	00	LA	LA	TRIM Lake/Reservoir	TRIM-identified - A natural or artifical static body of water, greater than 2 m deep in some portion. The boundary for the lake is the natural high water mark or a human-made structure.	Water	N/A
ESSFwcp	00	WE	WE	TRIM Wetland	TRIM wetland that is shrub or herb dominated.	Wetland	subhygric to hydric
ESSFwk2	00	BA	BA	Barren	Land devoid of vegetation due to extreme climatic or edaphic conditions	Barren	N/A
ESSFwk2	00	LA	LA	TRIM Lake/Reservoir	TRIM-identified - A natural or artifical static body of water, greater than 2 m deep in some portion. The boundary for the lake is the natural high water mark or a human-made structure.	Water	N/A
ESSFwk2	00	WE	WE	TRIM Wetland	TRIM wetland that is shrub or herb dominated.	Wetland	subhygric to hydric
ESSFwk2	01/03	FO/FB	01/03	Bl - Oak fern - Knight's plume/Bl - Oak fern - Bluebells	gentle slope, deep medium - textured soils; morainal soil; gentle slope; deep medium - textured soils; moist sites	Mesic Forest	mesic (to subhygric)
ESSFwk2	02	FS	02	Bl - Oak fern - Sarsaparilla	gentle slopes; deep, coarse - textured soils	Moderately Dry Forest	subxeric - submesic
ESSFwk2	04	FD	04	Bl - Devil's club - Rhododendron	gentle lower slope positions, deep medium - textured soils	Moist Forest	subhygric
ESSFwk2	05	FR	05	Bl - Rhododendron - Lady fern	gentle lower slope; deep medium - textured soils, seepage common	Moist Forest	subhygric
ESSFwk2	06	FH	06	Bl - Horsetail - Sphagnum	level to toe slope; deep, fine - textured soils; poorly drained	Wet Forest	hygric
SBSwk2	00	BA	BA	Barren	Land devoid of vegetation due to extreme climatic or edaphic conditions	Barren	N/A
SBSwk2	00	LA	LA	TRIM Lake/Reservoir	TRIM-identified - A natural or artifical static body of water, greater than 2 m deep in some portion. The boundary for the lake is the natural high water mark or a human-made structure.	Water	N/A
SBSwk2	00	MA	MA	TRIM Marsh	TRIM marsh; semi-permanently to seasonally flooded mineral wetland dominated by emergent vegetation	Wetland	subhygric to hydric
SBSwk2	00	RI	RI	TRIM River	TRIM River	Water	N/A
SBSwk2	00	SA	SA	TRIM Swamp	TRIM swamp (generic); likely mineral soil	Wetland	subhygric to hydric
SBSwk2	00	WA	WA	Water	Water from image classification	Water	N/A

Appendix 4. Ecological Characteristics of Map Units within the Regional Study Area

BEC Unit	Site Series	Map Code	Ecosystem Unit	Name	Description	General Ecosystem Type	Typical SMR
SBSwk2	00	WE	WE	TRIM Wetland	TRIM wetland that is shrub or herb dominated.	Wetland	subhygric to hydric
SBSwk2	00	WH	WH	Wetland Herb	Herb dominated wetland	Wetland	subhygric to hydric
SBSwk2	00	WS	WS	Wetland Swamp	Wetland Swamp, mineral soil, shrub or tree species dominated	Wetland	subhygric to hydric
SBSwk2	01	SO	01	Sxw - Oak fern	gentle slope, deep medium - textured soil	Mesic Forest	mesic
SBSwk2	02	LH	02	Pl - Huckleberry - Cladina	gentle slope to level site; deep coarse-textured soils	Moderately Dry Forest	subxeric
SBSwk2	03	SC	03	Sxw - Huckleberry - Highbush-cranberry	significant slope, warm aspects; deep, coarse-textured soil	Moderately Dry Forest	submesic
SBSwk2	04	BF	04	SbPl - Feathermoss	gentle slope, cool site, deep, coarse - textured soils; poor nutrient regime	Slightly Dry to Moist Forest	submesic - mesic
SBSwk2	05	SD	05	Sxw - Devil's club	gentle slope, moisture receiving sites; deep, medium - textured soil	Moist Forest	subhygric
SBSwk2	06	Ws07	06	Sxw - Horsetail (Ws07 - Common horsetail - Leafy moss)	poorly-drained; lower to toe slopes and wetland margins; deep coarse- textured soils; medium to rich soil nutrient regime.	Wetland	subhygric-hygric
SBSwk2	07	Wb06	07	Lt - Water sedge - Fen Moss (Wb06 - Lt - Water sedge - Fen Moss)	bog / poor soil nutrients regime; gentle slopes and depressions with poor drainage; typically dominated by black spruce; occurs on deep, peaty Sphagnum soils, typically with very poor to poor soil nutrient regime	Wetland	subhydric

Appendix 5

Ecological Characteristics of Map Units within the Local Study Area

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Appendix 5. Ecological Characteristics of Map Units within the Local Study Area

Unit	Site Series	Map Code	Site Series Name	Assumed Situation	Site Modifier a	Site Modifier b	Site Modifier c	Typical SMR	StructuralStage
BWBSmw	101		Sw - Trailing raspberry - Step moss	occur on gentle to moderate slopes (< 20%); mid to level positions, but also upper and lower; soil texture variable; range of parent materials; coarse fragment content is generally less than 20%; canopy dominated by white spruce.					2,3,4,5,6,7
BWBSmw	101$		At - Rose - Creamy peavine	generally occur on gentle to moderate slopes (< 20%) in level to upper slope positions; soils often fine to medium textured, derived from various parent materials; coarse fragment content generally less than 20%; canopy dominated by trembling aspen.					2,3,4,5,6,7
BWBSmw	102		Pl - Kinnikinnick - Lingonberry	occur along the top or face of coarse-textured (glacio) fluvial terraces but can occur in other situations where compensating factors result in a xeric to subxeric moisture regime; lodgepole pine canopy.					2,3,4,5,6,7
BWBSmw	103		SwPl - Soopolallie - Wildrye	often occur on warm slopes but slope gradient and slope position range widely; soils variable but most commonly from (glacio) fluvial parent material; soil textures generally medium to coarse; white spruce and lodgepole pine canopy.					2,3,4,5,6,7
BWBSmw	103$		At - Rose - Fuzzy-spiked wildrye	gentle to level slopes or on steeper warm aspects; soil texture moderately fine to medium in texture from lacustrine or morainal parent materials, but coarser texture where derived from (glacio) fluvial parent material; canopy dominated by trembling aspen					2,3,4,5,6,7
BWBSmw	104		Sb - Lingonberry - Step moss	generally on gentle slopes (< 10%) but may occur on steep cool slopes; soils from a range of parent materials, but generally medium to fine textured; rooting often restricted to < 30 cm; canopy dominated by lodgepole pine and/or black spruce.					2,3,4,5,6,7
BWBSmw	104$		At - Labrador tea - Lingonberry	primarily level to gently sloping with little relief. Soils are fine to medium in texture and are derived from a range of parent materials; canopy dominated by trembling aspen.					2,3,4,5,6,7
BWBSmw	110		Sw - Oak fern - Sarsaparilla	generally occur on gentle lower slopes or steeper cool aspects; soil texture variable; range of parent materials; white spruce dominated canopy.					2,3,4,5,6,7
BWBSmw	110$		At - Highbush-cranberry - Oak fern	occur in a range of positions on gentle slopes or steeper cool aspects; soils medium to fine textured and generally derived from morainal or fluvial parent materials; canopy dominated by trembling aspen.					2,3,4,5,6,7
BWBSmw	111		Sw - Currant - Horsetail	restricted to wet sites; occur on the floodplains of smaller watercourses, on gentle lower slopes or steeper cool aspects. Soils are variable in texture but are generally derived from fluvial or lacustrine parent materials; white spruce dominated canopy.					2,3,4,5,6,7
BWBSmw	111$		At - Cow-parsnip - Meadowrue	occur along smaller watercourses, and level to lower slopes, or mid-slope on steeper cool aspects; soils from med. to fine texture on M and L; coarser on F parent material; canopy dominated by balsam poplar and/or trembling aspen.					2,3,4,5,6,7
BWBSmw	112		AcbSw - Mountain alder - Dogwood	restricted to the middlebench floodplains along major watercourses. They occur on level sites with coarse to medium-textured fluvial soils. Mixed balsam poplar and white spruce canopy.					2,3,4,5,6,7
BWBSmw	Fl05								
BWBSmw	Wb05								
BWBSmw	Wb06								
BWBSmw	Wb08								
BWBSmw	Wb09								
BWBSmw	Wm01								
BWBSmw	Ws04								
BWBSmw	Ws07								
BWBSwk1	101		SwBl - Huckleberry - Feathermoss	mid to upper slope positions, occasionally on level sites. Soils are generally medium to fine textured, primarily from morainal and glaciofluvial parent materials; dominated by lodgepole pine					2,3,4,5,6,7
BWBSwk1	101$		At - Birch-leaved spiraea - Huckleberry	areas with recent (< 100 years) disturbance history; occur on gentle to moderate slopes (< 30%); upper to mid-slope positions or on level sites; Soils range in texture; morainal or glaciofluvial parent materials; trembling aspen canopy dominated.					2,3,4,5,6,7
BWBSwk1	102		Pl - Lingonberry - Reindeer lichen	generally along moderately coarse- to medium-textured (glacio) fluvial ridges or terraces, or on thin soils over bedrock. Lodgepole pine forms a sparse to open canopy; black spruce occasionally present.					2,3,4,5,6,7
BWBSwk1	102$		At - Kinnikinnick - Fuzzy-spiked wildrye	based on limited data, occurs on moderately coarse- to coarse-textured warm slopes, but could also occur in other situations where soils are coarse and/or shallow. Limited data indicate that trembling aspen forms a sparse canopy.					2,3,4,5,6,7
BWBSwk1	103		SwPl - Soopolallie - Showy aster	warm aspects; mid to upper slope positions; moderately coarse- to coarse-textured soils from morainal or glaciofluvial parent materials. Canopy is dominated by lodgepole pine.					2,3,4,5,6,7
BWBSwk1	103$		At - Rose - Fuzzy-spiked wildrye	generally associated with warm slopes; soils are derived from a range of parent materials but are coarse to medium textured. Dominated by trembling aspen.					2,3,4,5,6,7
BWBSwk1	104		Sb - Huckleberry - Lingonberry	generally level or gently sloping (< 10%) terrain; restricted to cool aspects in steeper terrain. Soils medium to coarse textured;occasionally finer; typically morainal or glaciofluvial parent materials; Canopy dominated by lodgepole pine or black spruce.					2,3,4,5,6,7
BWBSwk1	104$		At - Labrador tea - Lingonberry	generally associated with gentle slopes (< 10% slope) on cool aspects; soils derived from a range of parent materials and texture is variable. Canopy dominated by trembling aspen.					2,3,4,5,6,7
BWBSwk1	110		Sw - Currant - Horsetail	110: floodplains of smaller watercourses, gentle lower slopes, or steeper cool aspects; morainal; Sw canopy					2,3,4,5,6,7
BWBSwk1	110$		AcbAt - Cow-parsnip/At - Highbush-cranberry - Oak fern	M or F parent materials; 6.B1: along small watercourses or on gentle low to toe slopes; soils mod. coarse to med. textured; Act dominated. 6.B2: on gentle, mid to lower slopes or steeper cool aspects; soils med. to fine textured; At dominated.					2,3,4,5,6,7
BWBSwk1	111		/Sb - Lingonberry - Horsetail	OR 111: cool lower slopes or level with imperfect to poor soil drainage; organic, morainal, or thick humified organic over fluvial. Sb dominant.					2,3,4,5,6,7
BWBSwk1	Wb07								
BWBSwk1	Wf04								
BWBSwk1	Ws04								

Appendix 5. Ecological Characteristics of Map Units within the Local Study Area

Unit	Site Series	Map Code	Site Series Name	Assumed Situation	Site Modifier a	Site Modifier b	Site Modifier c	Typical SMR	StructuralStage
ESSFmv2	03	BT	BlSb - Labrador tea	gently sloping to depressional sites with deep fine-textured soils	d	f	j	submesic - hygric	2,3,4,5,6,7
ESSFmv2	05	FD	Bl - Devil's club - Rhododendron	gentle slope, moisture receiving sites, deep, medium- textured soils	d	j	m	subhygric	2,3,4,5,6,7
ESSFmv2	06	FH	Bl - Alder - Horsetail (Ws08 - Bl - Sitka valerian - Common horsetail)	level or depressional sites with deep coarse - textured soils	c	d	j	subhygric - hygric	2,3,4,5,6,7
ESSFmv2	02	FL	Bl - Lingonberry	gentle slope to level site; deep coarse-textured soils	c	d	j	subxeric - submesic	2,3,4,5,6,7
ESSFmv2	04	FO	Bl - Oak fern - Knight's plume	gentle slope, moisture receiving sites, deep, medium- textured soils	d	j	m	mesic - subhygric	2,3,4,5,6,7
ESSFmv2	01	FR	Bl - Rhododendron - Feathermoss	gentle slope, deep medium - textured soils	d	j	m	submesic - mesic	2,3,4,5,6,7
ESSFmv2	Wb06								
ESSFmv2	Wm01								
ESSFmv2	Ws04								
ESSFmv2	Ws07								
ESSFmv2	07								
SBSwk2	04	BF	SbPl - Feathermoss	gentle slope, cool site, deep, coarse - textured soils; poor nutrient regime	c	d	j	submesic - mesic	2,3,4,5,6,7
SBSwk2	02	LH	Pl - Huckleberry - Cladina	gentle slope to level site; deep coarse-textured soils	c	d	j	subxeric	2,3,4,5,6,7
SBSwk2	03	SC	Sxw - Huckleberry - Highbush-cranberry	significant slope, warm aspects; deep, coarse-textured soil	c	d	w	submesic	2,3,4,5,6,7
SBSwk2	05	SD	Sxw - Devil's club	gentle slope, moisture receiving sites; deep, medium - textured soil	d	j	m	subhygric	2,3,4,5,6,7
SBSwk2	06	SH	Sxw - Horsetail (Ws07 - Common horsetail - Leafy moss)	flat to depression; coarse - textured soil	c	j		hygric	2,3,4,5,6,7
SBSwk2	01	SO	Sxw - Oak fern	gentle slope, deep medium - textured soil	d	j	m	mesic	2,3,4,5,6,7

Code	Restricted Unit Name	Common Modifiers	Structural Stage	Definition	Old Code
CL	Cliff	q, z	1	A steep, vertical or overhanging rock face.3	
ES	Exposed Soil	k, r, w	1	Any area of exposed soil that is not included in any of the other definitions. It includes areas of recent disturbance, such as mud slides, debris torrents, avalanches, and human-made disturbances (e.g., pipeline rights-of-way) where vegetation cover is l	
GP	Gravel Pit				
LA	Lake	not applicable	not applicable	A naturally occurring static body of water, greater than 2 m deep in some portion. The boundary for the lake is the natural high water mark.2	
MI	Mine	not applicable	1	An unvegetated area used for the extrac-tion of mineral ore and other materials.1	
MZ	Rubbly Mine Spoils	not applicable	1	Discarded overburden or waste rock moved so that ore can be extracted in a mining operation.2	MS
OW	Shallow Open Water	not applicable	not applicable	A wetland composed of permanent shallow open water and lacking extensive emergent plant cover. The water is less than 2 m deep. (If vegetated, these units should developed into site series groups for interpretation.)	
PD	Pond	not applicable	not applicable	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).	
RI	River	not applicable	not applicable	A watercourse formed when water flows between continuous, definable banks. The flow may be intermittent or perennial. An area that has an ephemeral flow and no channel with definable banks is not considered a river.2	
RN	Railway Surface	not applicable	not applicable	A roadbed with fixed rails for possibly single or multiple rail lines.2	
RU	Rubble	k, r, w	1	Rubble is common on the ground surface in and adjacent to alpine areas, on ridgetops, gentle slopes and flat areas due to the effects of frost heaving.2, 4	
RY	Reclaimed Mine	k, r, w	1, 2, 3	A mined area that has plant communities composed of a mixture of agronomic or native grasses, forbs, and shrubs.	RM
RZ	Road Surface	not applicable	not applicable	An area cleared and compacted for the purpose of transporting goods and services by vehicles.2	RP
TA	Talus	k, r, w	1	Angular rock fragments of any size accumulated at the foot of steep rock slopes as a result of successive rock falls. It is a type of colluvium.2, 4	
TZ	Mine Tailings	not applicable	1	Solid waste materials directly produced in the mining and milling of ore.2	TS
UR	Urban/ Suburban	not applicable	not applicable	An area in which residences and other human developments form an almost continuous covering of the landscape. These areas include cities and towns, subdivisions, commercial and industrial parks, and similar developments both inside and outside city limits	

Note: Map codes were used within the RSA and LSA.

Appendix 6
Terrestrial Ecosystem Map

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Terrestrial Ecosystem Map of the Local Study Area

- Ecosystems Plot
- Potential Mine Surface Development Area
- Local Study Area

General Ecosystem

- Exposed Soil / Barren
- Anthropogenically Modified
- Mesic Forest
- Moderately Dry Forest
- Moist Forest
- Slightly Dry to Moist Forest
- Wet Forest
- Low Bench Floodplain
- Mid Bench Floodplain
- Water
- Wetland Bog
- Wetland Fen
- Wetland Marsh
- Wetland Swamp

1:16,000

0 1,000 2,000

Metres

Date: March 26, 2013
GIS no.: MUR-20-026; VERSION # T0.10
Projection: UTM10, NAD83
Imagery: Bing Maps aerial imagery,
(c) 2010 Microsoft Corporation
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MURRAY RIVER PROJECT

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Appendix 6

N

619000 620000 621000 622000 623000 624000 625000 626000 627000 628000 629000 630000 631000 632000 633000

6105000 6104000 6103000 6102000 6101000 6100000 6099000 6098000 6097000 6096000 6095000 6094000 6093000 6092000

Appendix 7

Ecosystem Mapping Field Survey Data

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Appendix 7. Ecosystem Mapping Field Survey Data

Plot Number	Region	Zone	Sub Zone	Site Series	Status	UTM Zone	UTM Northing	UTM Easting	Date	Site Surveyor	Photo Number	Moisture Regime	Nutrient Regime	Structural Stage	Elevation
001	PG	BWBS	mw	101		10	6095378	628790	7/1/2010	NB, TG	493-495	5	D	6	976
002	PG	BWBS	mw	103		10	6095063	628764	7/1/2010	NB, TG	496-498	4	D	6/tm	992
003	PG	BWBS	mw	101$		10	6095268	628548	7/1/2010	NB, TG	503-506	4	E	5/b	998
004	PG	BWBS	wk1	RY		10	6093774	627564	7/2/2010	NG, TG, RD	514-519	3	C	2a	1031
005	PG	BWBS	wk1	RY		10	6093991	627581	7/2/2010	NB, TG, RD	519-522	3	C	2a	1034
006	PG	BWBS	wk1	102		10	6093836	627847	7/2/2010	NB, TG, RD	523-527	2	B	5/c	1050
007	PG	BWBS	wk1	101		10	6093093	627184	7/2/2010	NB, TG, RD	535-538	4	B	4/c	1095
008	PG	BWBS	wk1	Ws00	Wetland Sensitive	10	6092954	627094	7/2/2010	NB, TG, RD	539-542	6	D	3b	1082
009	PG	BWBS	mw	101		10	6095378	628790	7/3/2010	NB, TG, RD	543-551	5	C	3a	976
010	PG	BWBS	mw	101		10	6097872	627098	7/3/2010	NB, TG, RD	552-555	4	C	3a	805
011	PG	BWBS	mw	101$		10	6098031	627046	7/3/2010	NB, TG, RD	556-558	4	D	6/tb	791
012	PG	BWBS	mw	104		10	6097639	626443	7/3/2010	NB, TG, RD	559-563	4	B	4/c	776
013	PG	BWBS	mw	102		10	6097638	625904	7/3/2010	NB, TG, RD	566-570	2	B	4/c	798
014	PG	BWBS	mw	Ws07	Wetland Sensitive	10	6097465	625746	7/3/2010	NB, TG, RD	491-502	VM	D	7/c	765
015	PG	BWBS	mw	101		10	6099716	626367	7/4/2010	NB, TG, RD	572-578	5	E	7/tc	759
016	PG	BWBS	mw	110	Blue Listed	10	6099652	626090	7/4/2010	NB, TG, RD	582-586	4	D	7/tc	804
017	PG	BWBS	mw	101		10	6099342	625617	7/4/2010	NB, TG, RD	587-590	4	B	5/c	866
018	PG	BWBS	mw	101		10	6098711	625811	7/4/2010	NB, TG, DJ	591	4	B	7/tc	866
019	PG	BWBS	mw	103		10	6098681	626218	7/4/2010	NB, TG, RD	595-597	3	C	6/tc	796
020	PG	BWBS	mw	101		10	6098556	626617	7/5/2010	NB, TG, RD	598-602	5	C	7/mm	763
021	PG	BWBS	mw	104		10	6098557	626340	7/5/2010	NB, TG, RD	603-604	4	B	5/sm	767
022	PG	BWBS	mw	103$		10	6098278	626037	7/5/2010	NB, TG, RD	605-608	4	C	4/tc	801
023	PG	BWBS	mw	101		10	6098220	626282	7/5/2010	NB, TG, RD	609-611	5	C	7/tm	782
024	PG	BWBS	mw	WT		10	6098002	626268	7/5/2010	NB, TG, RD	612-619	not described	not described	3b	768
025	PG	BWBS	mw	101		10	6098059	626213	7/5/2010	NB, TG, RD	620-622	4	D	7/tc	782
026	PG	BWBS	mw	110$		10	6098876	625043	7/6/2010	NB, TG, RD	630-635	4	D	6/tb	908
027	PG	BWBS	mw	102		10	6098807	625201	7/6/2010	NB, TG, RD	636-643	3	B	4/sm	944
028	PG	BWBS	mw	103		10	6098667	625075	7/6/2010	NB, TG, RD	644-648	4	C	7/mb	914
029	PG	BWBS	mw	102		10	6099181	625015	7/6/2010	NB, TG, RD	657661	3	B	5/tc	884
030	PG	BWBS	mw	101		10	6098610	624522	7/6/2010	NB, TG, RD	664-668	5	C	6/tm	884
031	PG	BWBS	mw	101		10	6098090	625115	7/7/2010	NB, TG, RD	669-674	4	C	6/tm	845
032	PG	BWBS	mw	102		10	6097894	625655	7/7/2010	NB, TG, RD	675-680	3	B	5/tc	831
033	PG	BWBS	mw	103		10	6097655	625453	7/7/2010	NB, TG, RD	685-689	3	C	6/mc	799
034	PG	BWBS	wk1	110$		10	6097016	625339	7/7/2010	NB, TG, RD	698-704	5	D	6/sm	774
038	PG	BWBS	mw	102		10	6097079	625668	7/8/2010	NB, TG, RD	767-775	2	B	4/sc	820
039	PG	BWBS	mw	101		10	6097230	625749	7/8/2010	NB, TG, RD	786-791	4	C	4/sc	821
040	PG	BWBS	mw	110	Blue Listed	10	6097185	625948	7/8/2010	NB, TG, RD	792-797	5	E	6/c	769
041	PG	BWBS	mw	102		10	6096612	625051	7/8/2010	NB, TG, RD	798-803	3	B	5/tc	790
042	PG	BWBS	mw	101		10	6096410	626131	7/9/2010	NB, TG	813-818	4	C	5/c	816
044	PG	BWBS	mw	AN		10	6096091	626048	7/9/2010	NB, TG	846-857	n/a	n/a	3b	770
046	PG	BWBS	mw	111	Blue Listed	10	6095399	625121	7/10/2010	NB, TG, RD	899-906	5	D	6/sc	768
047	PG	BWBS	mw	102		10	6095427	624905	7/10/2010	NB, TG, RD	910-917	3	B	6/mc	794
048	PG	BWBS	mw	101$		10	6095645	624751	7/10/2010	NB, TG, RD	918-923	5	C	5/sb	805
049	PG	BWBS	mw	101		10	6097441	624867	7/10/2010	NB, TG, RD	945-961	3	D	6/tm	811
050	PG	BWBS	mw	110	Blue Listed	10	6097663	624680	7/10/2010	NB, TG, RD	968-972	5	D	5/tm	
051	PG	BWBS	mw	103		10	6097790	624761	7/10/2010	NB, TG, RD	989-995	4	C	5/tm	847
052	PG	BWBS	mw	103		10	6097694	625019	7/11/2010	NB, TG, RD	1011-1016	3	B	5/tm	830
055	PG	BWBS	wk1	101		10	6098851	624211	7/11/2010	NB, TG, RD	1044-1050	4	B	4/sc	918
056	PG	BWBS	wk1	101		10	6098972	624222	7/11/2010	NB, TG, RD	1052-1062	4	B	4/c	904
057	PG	BWBS	mw	102		10	6099164	624123	7/11/2010	NB, TG, RD	1063-1068	2	B	5/tc	935
058	PG	BWBS	wk1	101		10	6098620	623637	7/12/2010	NB, TG, RD	1073-1083	4	C	6/mm	964
059	PG	BWBS	wk1	101		10	6099484	623230	7/12/2010	NB, TG, RD	1085-1091	5	C	5/tc	1016
060	PG	BWBS	wk1	104		10	6099516	622574	7/12/2010	NB, TG, RD	1100-1105	4	B	4/sc	1073
061	PG	BWBS	wk1	WS	Wetland Sensitive	10	6099281	622626	7/12/2010	NB, TG, RD	1108-1120	7	D	5/c	1067
062	PG	BWBS	mw	103		10	6099475	621489	7/12/2010	NB, TG, RD	1123-1128	5	B	5/mc	1095
063	PG	ESSF	mv2	06	Blue Listed	10	6099256	620625	7/13/2010	NB, TG, RD	135, 1141-115	6	D	6/mc	1169
063B	PG	ESSF	mv2	06	Blue Listed	10	6099286	620575	7/13/2010	NB, TG, RD	1130-1134	6	D	6/mc	1190
064	PG	BWBS	mw	GP		10	6096302	625258	7/13/2010	NB, TG, RD	1154-1160	n/a	n/a	1	770
065	PG	BWBS	mw	103$		10	6096543	625402	7/13/2010	NB, TG, RD	1161-1170	3	B	5/mb	775
066	PG	BWBS	wk1	101		10	6101078	623676	8/24/2010	RD, TG, DG	5-9	4	D	5/sm	1198
067	PG	BWBS	wk1	101$		10	6100840	623103	8/24/2010	RD, TG, DG	13-18	5	0	5/tb	1093
068	PG	BWBS	wk1	101		10	6100965	622650	8/24/2010	RD, TG, DG	23-27	4	D	5/im	1113
069	PG	BWBS	wk1	110	Blue Listed	10	6100526	622605	8/24/2010	RD, TG, DG	35-41	6	D	6/im	1072
070	PG	BWBS	wk1	101		10	6100191	622294	8/24/2010	RD, TG, DG	43-47	4	C	6/tm	1065
071	PG	BWBS	wk1	103	Blue Listed	10	6099884	622046	8/24/2010	RD, TG, DG	49-53	3	C	5/im	1046
072	PG	ESSF	mv2	01		10	6101869	621996	8/25/2010	RD, TG, DG	69-72	4	C	5/sc	1256
073	PG	ESSF	mv2	SA		10	6101444	621626	8/25/2010	RD, TG, DG	81-85	3	C	3b	1239
074	PG	ESSF	mv2	03		10	6101126	621479	8/25/2010	RD, TG, DG	93-99	4	B	5/sc	1205
075	PG	BWBS	wk1	110	Blue Listed	10	6100599	621258	8/25/2010	RD, TG, DG	100-105	5	D	6/im	1073
076	PG	BWBS	wk1	103	Blue Listed	10	6100401	621214	8/25/2010	RD,TG, DG	109-113	4	B	5/sc	1098
077	PG	BWBS	wk1	WS	Wetland Sensitive	10	6100057	621229	8/25/2010	RD, TG, DG	115-120	6	E	5/ic	1065
078	PG	BWBS	wk1	101		10	6099703	621053	8/25/2010	RD, TG, DG	124-128	4	C	5/im	1099
089	PG	ESSF	mv2	01		10	6102265	619939	8/27/2010	RD, TG, DG	307-311	4	C	5/im	1152
079	PG	ESSF	mv2	01		10	6101290	620990	8/26/2010	RD, TG, DG	185-189	4	C	5/tm	1143
080	PG	ESSF	mv2	Wb06	Blue Listed	10	6101652	621116	8/26/2010	RD, TG, DG	191-196	7	C	5/ic	1143
081	PG	ESSF	mv2	Ws04	Wetland Sensitive	10	6101809	620984	8/26/2010	RD, TG, DG	206-210	8	C	3a	1129
082	PG	ESSF	mv2	01		10	6101582	620818	8/26/2010	RD, TG, DG	218-222	4	C	5/tc	1147
083	PG	ESSF	mv2	Ws04	Wetland Sensitive	10	6101536	620448	8/26/2010	RD, TG, DG	229-235	7	D	5/ic	1098
084	PG	ESSF	mv2	Fm00	Floodplain Sensitive	10	6101478	620260	8/26/2010	RD, TG, DG	241-246	5	D	5/ic	1088
085	PG	ESSF	mv2	03		10	6101406	620218	8/26/2010	RD, TG, DG	251-254	4	B	5/sb	1111
086	PG	SBS	wk2	06		10	6102859	620389	8/27/2010	RD, TG, DG	278-281	5	C	6/ib	1102
087	PG	SBS	wk2	Ws04	Wetland Sensitive	10	6102803	620348	8/27/2010	RD, TG, DG	294-299	8	D	2b	1094
088	PG	ESSF	mv2	02		10	6102770	620224	8/27/2010	RD, TG, DG	301-305	3	B	4/c	1124
090	PG	SBS	wk2	Wb06	Blue Listed	10	6102371	620180	8/27/2010	RD, TG, DG	312-318	7	B	3b	1104
091	PG	ESSF	mv2	Wb06	Blue Listed	10	6102029	620247	8/27/2010	RD, TG, DG	320-323	7	B	3/b	1103
092	PG	ESSF	mv2	Wb00	Wetland Sensitive	10	6101918	620380	8/27/2010	RD, TG, DG	325-328	7	B	3b	1107
093	PG	ESSF	mv2	02		10	6101941	620170	8/27/2010	RD, TG, DG	330-334	3	B	5/sc	1117
094	PG	ESSF	mv2	02		10	6100718	619880	8/28/2010	RD, TG, DG	335-339	3	B	5/sc	1195
095	PG	ESSF	mv2	06	Blue Listed	10	6100547	620007	8/28/2010	RD, TG, DG	341-344	5	C	5/im	1175
096	PG	ESSF	mv2	Ws04	Wetland Sensitive	10	6100452	620022	8/28/2010	RD, TG, DG	351-354	7	D	3b	1163
097	PG	ESSF	mv2	04		10	6100309	620213	8/28/2010	RD, TG, DG	356-359	5	B	3a	1165
098	PG	ESSF	mv2	06	Blue Listed	10	6100544	620243	8/28/2010	RD, TG, DG	361-364	5	D	6/ic	1151
099	PG	ESSF	mv2	04		10	6100681	620254	8/28/2010	RD, TG, DG	366-370	5	C	5/sc	1164
100	PG	ESSF	mv2	04		10	6100903	620120	8/28/2010	RD, TG, DG	372-375	4	C	5/sc	1164
101	PG	ESSF	mv2	01		10	6100927	619901	8/28/2010	RD, TG, DG	377-381	3	B	4/c	1180
105	PG	BWBS	mw	103		10	6099222	627074	8/30/2010	RD, TG, DG	525-529	4	C	5/tc	776
106	PG	BWBS	mw	111	Blue Listed	10	6099413	627229	8/30/2010	RD, TG, DG	537-542	6	D	6/ic	774
107	PG	BWBS	mw	101		10	6098676	627446	8/30/2010	RD, TG, DG	560-564	5	D	5/ic	793
102	PG	SBS	wk2	Wm02	Blue Listed	10	6093419	623733	8/27/2010	RD, TG, DG	388-396	8	D	2b	770

Appendix 7. Ecosystem Mapping Field Survey Data

Plot Number	Region	Zone	Sub Zone	Site Series	Status	UTM Zone	UTM Northing	UTM Easting	Date	Site Surveyor	Photo Number	Moisture Regime	Nutrient Regime	Structural Stage	Elevation
103	PG	BWBS	mw	HW	Wetland Sensitive	10	6104371	628619	8/30/2010	RD, TG, DG	501-508	8	C	2b	885
104	PG	BWBS	mw	Wb09	Blue Listed	10	6099200	627189	8/30/2010	RD, TG, DG	517-520	7	B	5/ic	775
035	PG	BWBS	mw	Wb00	Wetland Sensitive	10	6097285	625513		NB, TG, RD	785-719	6	B	4/sc	776
036	PG	BWBS	mw	Wm01	Wetland Sensitive	10	6097534	625395	7/8/2010	NB, TG, RD	724-736	7	C	3	775
037	PG	BWBS	mw	Wm01	Wetland Sensitive	10	6097377	625638	7/8/2010	NB, TG, RD	737-754	7	C	2c	769
043	PG	BWBS	mw	Wm01	Wetland Sensitive	10	6096402	626022	7/9/2010	NB, TG	819-838	W	D	2b	765
045	PG	BWBS	mw	Ws00	Wetland Sensitive	10	6095612	625731	7/9/2010	NB, TG	045 (1-6)	7	E	6/c	766
053	PG	BWBS	mw	Wb09	Blue Listed	10	6098123	624641	7/11/2010	NB, TG, RD	1017-1036		B	4/c	867
054	PG	BWBS	mw	111	Blue Listed	10	6097980	624696	7/11/2010	NB, TG	1038-1043	6	D	6/mm	863
200v	PG	BWBS	mw	110	Blue Listed	10	6103712	627291	8/15/2011	NB, TG				5/tm	787
201v	PG	BWBS	mw	111	Blue Listed	10	6103700	627247	8/15/2011	NB, TG				5/tm	794
202v	PG	BWBS	mw	111	Blue Listed	10	6103700	627232	8/15/2011	NB, TG				5/tm	785
285	PG	BWBS	mw	104		10	6103521	627791	8/15/2011	DM, NB		4	C	5/tc	851
204v	PG	BWBS	mw	101$		10	6103724	627381	8/15/2011	NB, TG				4/b	785
205v	PG	BWBS	mw	101		10	6103740	627504	8/15/2011	NB, TG				5/tm	825
206v	PG	BWBS	mw	110	Blue Listed	10	6096929	624179	8/15/2011	NB, TG		5	D	6/tm	920
207v	PG	BWBS	mw	110	Blue Listed	10	6096805	624113	8/16/2011	NB, TG				6/hm	908
208v	PG	BWBS	mw	101		10	6096323	624089	8/16/2011	NB, TG					944
209v	PG	BWBS	wk1	101$		10	6096213	624039	8/16/2011	NB, TG		4	C	5/sb	987
210v	PG	BWBS	wk1	104		10	6096068	624010	8/16/2011	NB, TG		3	B	5/sc	1009
211v	PG	BWBS	mw	101		10	6095829	623952	8/16/2011	NB, TG		3	B	5/tc	958
212v	PG	BWBS	mw	TP		10	6095606	623924	8/16/2011	NB, TG				6/tc	879
213v	PG	BWBS	mw	110	Blue Listed	10	6095353	623857	8/16/2011	NB, TG					876
214v	PG	BWBS	mw	101		10	6095154	623815	8/16/2011	NB, TG		4	B	5/tc	871
215v	PG	BWBS	mw	TP		10	6095043	623777	8/16/2011	NB, TG				6/mc	
216v	PG	BWBS	mw	Ws07	Wetland Sensitive	10	6095011	623878	8/16/2011	NB, TG		7	D	6/mc	850
219v	PG	BWBS	mw	101		10	6094613	624212	8/16/2011	NB, TG					777
220v	PG	BWBS	mw	Wb09	Blue Listed	10	6102692	628509	8/17/2011	NB, TG		6	B		873
221v	PG	BWBS	mw	101		10	6106204	628364	8/17/2011	NB, TG				3a	875
222v	PG	BWBS	mw	103		10	6102413	628133	8/17/2011	NB, TG				3a	874
223v	PG	BWBS	mw	101		10	6102504	627888	8/17/2011	NB, TG				3a	869
224v	PG	BWBS	mw	103		10	6102419	627721	8/17/2011	NB, TG				5/mm	828
225v	PG	BWBS	mw	101		10	6102313	627632	8/17/2011	NB, TG				5/mm	779
226V	PG	BWBS	mw	CD		10	6102245	627685	8/17/2011	NB, TG				5/tb	803
227v	PG	BWBS	mw	101		10	6102177	627752	8/17/2011	NB, TG				5/mc	817
228v	PG	BWBS	mw	NN		10	6102094	627807	8/17/2011	NB, TG			D		820
229v	PG	BWBS	mw	111$		10	6101988	627827	8/17/2011	NB, TG				5/sb	824
230v	PG	BWBS	mw	NN		10	6100630	627688	8/19/2011	NB, TG				4/sb	802
231v	PG	BWBS	mw	111	Blue Listed	10	6100531	627651	8/19/2011	NB, TG		6	B	4/sc	810
232v	PG	BWBS	mw	101		10	6100637	627442	8/19/2011	NB, TG		4	C	5/tc	788
233v	PG	BWBS	mw	103		10	6100654	627541	8/19/2011	NB, TG		4		5/c	781
234v	PG	BWBS	mw	NN		10	6100849	627845	8/19/2011	NB, TG				4	810
235v	PG	BWBS	mw	NN		10	6100116	628337	8/19/2011	NB, TG				3a	847
236v	PG	BWBS	mw	Ws07	Wetland Sensitive	10	6099997	629184	8/19/2011	NB, TG		7	B	6/sc	881
237v	PG	BWBS	mw	103		10	6099268	629608	8/19/2011	NB, TG				4/sc	892
238	PG	BWBS	mw	103		10	6099150	629628	8/19/2011	NB, TG		3	B	5/sc	900
239v	PG	BWBS	mw	NN		10	6096946	624793	8/20/2011	NB, TG					814
240v	PG	BWBS	mw	NN		10	6097037	624462	8/20/2011	NB, TG					849
241v	PG	BWBS	mw	101$		10	6097173	624283	8/20/2011	NB, TG					876
242v	PG	BWBS	mw	101		10	6097248	624049	8/20/2011	NB, TG		3	B	6/tc	906
245v	PG	BWBS	mw	111$		10	6097262	624131	8/20/2011	NB, TG				3b	901
246v	PG	BWBS	mw	WS	Wetland Sensitive	10	6097288	624171	8/20/2011	NB, TG					895
247v	PG	BWBS	mw	101$		10	6097241	624232	8/20/2011	NB, TG				6/sb	895
248v	PG	BWBS	mw	103		10	6096489	625369	8/20/2011	NB, TG				6/tc	770
249v	PG	BWBS	mw	Ws07	Wetland Sensitive	10	6096502	625485	8/20/2011	NB, TG				3b	760
250v	PG	BWBS	mw	Ws00	Wetland Sensitive	10	6096483	625513	8/20/2011	NB, TG				6/ic	764
251v	PG	BWBS	mw	112$	Red Listed	10	6096436	625617	8/20/2011	NB, TG		6	E	6/ic	758
252v	PG	BWBS	mw	NN		10	6096877	625170	8/20/2011	NB, TG					774
253v	PG	BWBS	mw	111	Blue Listed	10	6096625	625571	8/20/2011	NB, TG				6/tm	766
271v	PG	BWBS	wk1	101$		10	6101846	625566	8/21/2011	NB, TG				5/sb	1010
272v	PG	BWBS	wk1	101$		10	6101871	625693	8/21/2011	NB, TG				5/sb	983
274v	PG	BWBS	mw	103$		10	6101989	625934	8/21/2011	NB, TG				6/tb	920
275v	PG	BWBS	mw	103$		10	6102025	625982	8/21/2011	NB, TG				6/tb	903
276v	PG	BWBS	mw	101$		10	6102049	626067	8/21/2011	NB, TG				6/tb	858
277v	PG	BWBS	mw	111	Blue Listed	10	6102116	626118	8/21/2011	NB, TG		6	D	6/tc	828
278v	PG	BWBS	mw	101		10	6102146	626239	8/21/2011	NB, TG		3		4/sc	813
286	PG	BWBS	mw	103		10	6103825	627449	8/15/2011	NB, TG, DM, RD				5/sb	819
287	PG	BWBS	mw	111	Blue Listed	10	6103740	627200	8/15/2011	NB, TG, DM		6	D	5/sb	778
S21	PG	BWBS	mw	103		10	6100764	627974	8/19/2011	NB, TG, DM		3	C	5/tc	833
S32	PG	BWBS	mw	103		10	6099269	629607	8/19/2011	NB, TG		3	B	5/sc	893
S33	PG	BWBS	mw	101		10	6100100	629157	8/19/2011	NB, TG, RD		4	C	2a	881
S42	PG	BWBS	mw	110	Blue Listed	10	6096637	624212	8/16/2011	NB, TG, RD		5	D	6/tc	894
S43	PG	BWBS	mw	101$		10	6095923	623970	8/16/2011	NB, TG, RD		4	B	5/tb	975
S44	PG	BWBS	mw	Ws00	Wetland Sensitive	10	6095007	623918	8/16/2011	NB, TG, RD		7	D	6	847
S19	PG	BWBS	mw	101$		10	6102962	627948	8/17/2011	NB, TG, RD		4	C	5/sb	850
S22	PG	BWBS	mw	Ws07	Wetland Sensitive	10	6100554	627493	8/19/2011	TG, NB, RD		7	D	5/sc	790
243	PG	BWBS	wk1	110	Blue Listed	10	6097275	623308	8/17/2011	NB, TG		4	B	6/mc	1053
244	PG	BWBS	mw	110	Blue Listed	10	6097405	623384	8/20/2011	NB, TG, RD		4	C	6/tc	999
254	PG	BWBS	mw	112	Red Listed	10	6096512	625716	8/20/2011	NB, RD, DM, WE		5	D	5/tb	758
270	PG	BWBS	mw	101$		10	6101869	625504	8/21/2011	NB, TG, RD		4	C	6/tb	1031
273	PG	BWBS	mw	101$		10	6101975	625891	8/21/2011	NB, TG, RD		3	C	6/tb	925
279	PG	BWBS	mw	101		10	6102161	626289	8/21/2011	NB, TG, RD		3	B	5/tc	799
280	PG	BWBS	mw	112	Red Listed	10	6102288	626492	8/21/2011	NB, TG		5	D		760
281	PG	BWBS	mw	MI		10	6093476	625028	8/21/2011	NB, TG, RD		n/a	n/a		851
282	PG	BWBS	mw	101		10	6093744	624620	8/21/2011	NB, TG, RD		4	C	6/tm	776
S17	PG	BWBS	mw	101		10	6102299	627629	8/17/2011	NB, TG		4	C	5/tm	792
S18	PG	BWBS	mw	101		10	6102561	627840	8/17/2011	NB, TG, DM		4	C	5/mm	860
P-26	PG	BWBS	mw	Wb03	Blue Listed	10	6099800	627073	8/18/2011	TG,RD,NB		7	B		764
S-25	PG	BWBS	mw	Ws02	Wetland Sensitive	10	6099656	626791	8/18/2011	TG,RD		7	C		756
S-24	PG	BWBS	mw	111	Blue Listed	10	6099655	626549	8/18/2011			5	C	6	767
S-17	PG	BWBS	mw	101		10	6102306	627643	8/17/2011	TG,RD		4	B	5	786
S-14	PG	BWBS	mw	FP	Floodplain Sensitive	10	6103720	627198	8/17/2011	TG,RD					795
DM001	PG	SBS	wk2	03		10	6081270	612901	8/16/2011	DM		4	C	3b	829
DM002	PG	SBS	wk2	01		10	6082268	612901	8/16/2011	DM				5/tc	827
DM003	PG	SBS	wk2	02	Blue Listed	10	6084538	613962	8/16/2011	DM				5/m	770
DM004	PG	SBS	wk2	Ws00	Wetland Sensitive	10	6084698	613552	8/16/2011	DM				3/b	770
DM005	PG	SBS	wk2	06		10	6085368	613837	8/16/2011	DM	3926-3928			6/tc	776
DM006	PG	SBS	wk2	03		10	6085931	613870	8/16/2011	DM				5/c	788

Appendix 7. Ecosystem Mapping Field Survey Data

Plot Number	Region	Zone	Sub Zone	Site Series	Status	UTM Zone	UTM Northing	UTM Easting	Date	Site Surveyor	Photo Number	Moisture Regime	Nutrient Regime	Structural Stage	Elevation
DM009	PG	SBS	wk2	NN		10	6087648	612495	8/16/2011	DM					987
DM010	PG	ESSF	mv2	NN		10	6088711	611368	8/16/2011	DM					1055
DM011	PG	SBS	wk2	01		10	6087665	614278	8/16/2011	DM	3939			5/b	780
DM012	PG	SBS	wk2	01		10	6089706	615684	8/16/2011	DM				6/t	790
DM013	PG	SBS	wk2	NN		10	6090589	615882	8/16/2011	DM					790
DM014	PG	SBS	wk2	NN		10	6090934	618425	8/16/2011	DM	3941-43				792
DM015	PG	BWBS	wk1	104		10	6113460	631665	8/16/2011	DM	3944-46			5/mc	937
DM016	PG	BWBS	wk1	Wb00	Wetland Sensitive	10	6112390	631981	8/16/2011	DM				4/c	960
DM018	PG	BWBS	wk1	101		10	6108688	633848	8/16/2011	DM				5/tc	1063
WP328	PG	BAFA	un	AM	Alpine Sensitive	10	6084925	609129	8/18/2011	DM				2a	1736
WP329	PG	BAFA	un	KH	Alpine Sensitive	10	6084921	609049	8/18/2011	DM				3a	1759
WP330	PG	BAFA	un	AT	Alpine Sensitive	10	6084810	609037	8/18/2011	DM				2d	1787
WP331	PG	BAFA	un	AM	Alpine Sensitive	10	6084843	608810	8/18/2011	DM				2a	1854
WP332	PG	BAFA	un	AM	Alpine Sensitive	10	6084909	608820	8/18/2011	DM				2b	1827
WP333	PG	BAFA	un	KW	Alpine Sensitive	10	6084774	609116	8/18/2011	DM				3a	1758
WP334	PG	BAFA	un	AM	Alpine Sensitive	10	6085009	609088	8/18/2011	DM				2a	1738
WP336	PG	BAFA	un	AF		10	6084892	605791	8/18/2011	DM				2d	1785
WP337	PG	BAFA	un	AT	Alpine Sensitive	10	6084824	603811	8/18/2011	DM				2d	1757
WP338	PG	ESSF	mvp	WM		10	6085203	605947	8/18/2011	DM				2a	1654
WP339	PG	ESSF	mvp	KH		10	6085306	605976	8/18/2011	DM				3	1606
WP340	PG	ESSF	mv2	WM		10	6085411	605998	8/18/2011	DM				2	1569
WP341	PG	ESSF	mv2	NN		10	6085524	606106	8/18/2011	DM				3b	1551
WP344	PG	ESSF	wc3	WM			6085386	602580	8/18/2011	DM				2b	1333
WP352	PG	ESSF	mv2	NN		10	6093325	596293	8/18/2011	DM					1683
WP353	PG	ESSF	mv2	CC		10	6093570	597146	8/18/2011	DM				3	1667
WP354	PG	ESSF	mv2	Wf01	Wetland Sensitive		6096180	598415	8/18/2011					2	1591
WP355	PG	ESSF	mv2	NN		10	6096992	599398	8/18/2011					3b	1635
WP356	PG	ESSF	mv2	NN		10	6097479	599048	8/18/2011	DM				3b	1669
WP357	PG	BAFA	un	NN		10	6098684	598341	8/18/2011					2a	1831
WP358	PG	BAFA	un	NN		10	6099058	597667	8/18/2011	DM				2a	1902
WP359	PG	BAFA	un	AT	Alpine Sensitive	10	6099615	597543	8/18/2011	DM				2d	1917
WP360	PG	BAFA	un	RO		10	6099842	597752	8/18/2011	DM				1	1961
WP361	PG	BAFA	un	NN		10	6100094	598017	8/18/2011					2d	2000
WP362	PG	BAFA	un	NN		10	6101549	599313	8/18/2011	DM				2a	2087
WP363	PG	BAFA	un	NN		10	6102501	600445	8/18/2011	DM				3b	2065
WP364	PG	ESSF	mvp	WM		10	6103090	600950	8/18/2011	DM				2a	2040
WP365	PG	ESSF	mvp	NN		10	6103504	601242	8/18/2011	DM				3b	2021
WP366	PG	ESSF	mvp	WM		10	6103480	602346	8/18/2011	DM					1971
WP367	PG	ESSF	mvp	NN		10	6102580	603901	8/18/2011	DM				4	1955
WP368	PG	ESSF	mv2	CB		10	6102168	604802	8/18/2011	DM					1925
WP369	PG	ESSF	mv2	NN		10	6102552	605605	8/18/2011	DM				4/c	1902
WP370	PG	ESSF	mvp	NN		10	6103595	605858	8/18/2011					5/c	1855
WP371	PG	ESSF	mv2	NN		10	6104134	609216	8/18/2011	DM				5/c	1756
WP372	PG	ESSF	mv2	01		10	6103436	609966	8/18/2011	DM				4/c	1718
WP373	PG	ESSF	mv2	01		10	6103120	610312	8/18/2011	DM				3b	1712
WP374	PG	ESSF	mv2	01		10	6102210	613547	8/18/2011	DM				4/c	1670
WP376	PG	BWBS	wk1	NN		10	6108465	613009	8/18/2011	DM				3a	1631
WP378	PG	ESSF	mv2	NN		10	6105471	619520	8/18/2011	DM				4/c	1549
WP379	PG	ESSF	mv2	NN		10	6104411	621605	8/18/2011	DM				4/c	1538
WP380	PG	ESSF	mv2	NN		10	6104183	622282	8/18/2011	DM				6/tc	1528
WP381	PG	ESSF	mv2	NN		10	6103614	623630	8/18/2011	DM				6/tc	1505
WP382	PG	BWBS	mw	NN		10	6103454	627191	8/18/2011	DM				5/tm	1278
WP383	PG	BWBS	mw	CC		10	6103903	628409	8/18/2011	DM				3	1211
WP384	PG	BWBS	mw	Wb00	Wetland Sensitive	10	6104712	629032	8/18/2011	DM					1152
WP385	PG	BWBS	mw	NN		10	6103856	629061	8/18/2011	DM				4/c	1112
WP386	PG	BWBS	mw	CC		10	6102646	630091	8/18/2011	DM				3a	1140
WP389	PG	BWBS	wk1	NN		10	6084268	649577	8/19/2011	DM		5	C		1101
WP390	PG	BWBS	wk1	Ws07	Wetland Sensitive	10	6084212	649609	8/19/2011	DM		6	D	3b	1099
WP391	PG	BWBS	wk1	Wm01	Wetland Sensitive	10	6085072	649195	8/19/2011	DM				2b	1088
WP392	PG	BWBS	wk1	SLW	Wetland Sensitive	10	6085737	648833	8/19/2011	DM				4/c	1096
WP393	PG	BWBS	wk1	101		10	6087359	647478	8/19/2011	DM				5/tc	1112
WP394	PG	BWBS	wk1	Wm01	Wetland Sensitive	10	6087180	647409	8/19/2011	DM				2b	1090
WP395	PG	BWBS	wk1	101		10	6087019	647227	8/19/2011	DM				6/tc	1090
WP396	PG	BWBS	wk1	110	Blue Listed	10	6088503	646101	8/19/2011	DM		6	D	6/tc	1078
WP397	PG	BWBS	mw	111	Blue Listed	10	6088760	644318	8/19/2011	DM		5	C	5/c	963
WP398	PG	BWBS	mw	Wm01	Wetland Sensitive	10	6088506	644167	8/19/2011	DM				2b	960
WP399	PG	BWBS	mw	101		10	6088669	644203	8/19/2011	DM				6/tc	960
WP400	PG	BWBS	wk1	110	Blue Listed	10	6090769	642226	8/19/2011	DM		5	D	6/tc	1047
WP401	PG	BWBS	wk1	103	Blue Listed		6102383	645149	8/19/2011	DM				4/c	1106
WP402	PG	BWBS	wk1	103	Blue Listed	10	6102079	644501	8/19/2011	DM				4/c	1123
WP403	PG	BWBS	wk1	Wm01	Wetland Sensitive		6101273	643189	8/19/2011	DM				2	1141
WP404	PG	BWBS	wk1	103	Blue Listed	10	6101810	642972	8/19/2011	DM				4/c	1157
WP405	PG	BWBS	wk1	CC		10	6102420	642569	8/19/2011	DM				3b	1133
WP406	PG	BWBS	wk1	103	Blue Listed	10	6103012	641989	8/19/2011	DM				4/c	1088
WP407	PG	BWBS	wk1	101		10	6103906	640587	8/19/2011	DM				3b	1056
WP408	PG	BWBS	wk1	101		10	6104633	640389	8/19/2011	DM		5	C	5/tc	1019
WP409	PG	BWBS	mw	Wm01	Wetland Sensitive	10	6104901	640311	8/19/2011	DM				2b	987
WP410	PG	BWBS	wk1	101		10	6104870	639206	8/19/2011	DM		5	C	6/tc	1044
WP411	PG	BWBS	wk1	110	Blue Listed	10	6105463	638482	8/19/2011	DM				6/tc	1072
WP412	PG	BWBS	wk1	101		10	6106664	637377	8/19/2011	DM				3b	1119
WP413	PG	BWBS	wk1	110	Blue Listed	10	6107817	635406	8/19/2011	DM				3b	1117
12-401	PG	BWBS	mw	Wb06	Blue Listed	10	6099606	628337	9/13/2012	TG, WB		6	B	3a	955
12-402	PG	BWBS	mw	104		10	6099553	628113	9/13/2012	TG, WB		5+	C	5/sC	949
12-403	PG	BWBS	mw	Wb06	Blue Listed	10	6099348	628268	9/13/2012	TG, WB		4	B+	5	974
12-404	PG	BWBS	mw	103 (101)		10	6099347	628542	9/13/2012	TG, WB		7	A	3b	1002
12-405	PG	BWBS	mw	111	Blue Listed	10	6099253	628458	9/14/2012	TG, WB		3	C+	6	854
12-406	PG	BWBS	mw	111	Blue Listed	10	6099175	628178	9/14/2012	TG, WB		6	D	6	825
12-407	PG	BWBS	mw	Wb09	Blue Listed	10	6099108	627980	9/14/2012	TG, WB		7	A	4	819
12-408	PG	BWBS	mw	101		10	6098831	627938	9/14/2012	TG, WB		4	C	6	813
12-409	PG	BWBS	mw	101		10	6098645	627985	9/14/2012	TG, WB		4	C		818
12-410	PG	BWBS	mw	101$		10	6099239	627805	9/15/2012	TG, WB		4	C	3a	818
12-411	PG	BWBS	mw	104 (111)		10	6099181	627590	9/15/2012	TG, WB		5	C+	5	806
12-412	PG	BWBS	mw	101 (104)		10	6098920	627566	9/15/2012	TG, WB		4	D	6	804
12-413	PG	BWBS	mw	111	Blue Listed	10	6098375	627430	9/15/2012	TG, WB		6	D		802

Appendix 7. Ecosystem Mapping Field Survey Data

Plot Number	Slope Gradient	Aspect	Meso Slope Position	Strata Cover Herb	Strata Cover Moss	Strata Cover Shrub	Strata Cover Tree	Terrain Surficial	Terrain Underlying	Terrain Process
001	3	334	MD	60	3	15	45	sFGu		
002	4	328	MD	15	3	15	65	kFGv	Mj	
003	8	356	MD	60	T	75	20	zsFGv	Mj	
004	6	105	MD	55	0	0	0	gkAj		
005	27	358	UP	55	0	0	0	gkAh		
006	6	242	UP	2	3	20	10	kxMr		
007	22	55	MD	65	10	15	40	kMa		
008	0	999	DP	60	65	65	T	uOv	cF	U
009	3	334	MD	20	0.001	15		sFGj		
010	12	264	MD	9	.001	15		bMj		
011	9	310	TO	30	85	35	15	rMj		
012	11	320	MD	5	60	80	18	gFk		
013	21	170	MD	5	3	8	30	xMk		
014	0	999	DP	70	45	10	25	uOb		
015	5	270	MD	85	5	20	40	hOv	scFj	
016	12	80E	LW	70	45	45	20	zcsFGj		
017	22	38	UP	60	60	45	25	czsMj		
018	9	110	MD	75	40	40	30	zsFGj	Mj	
019	56	84	MD	40	0.001	55	18	zsFGa		
020	0	999	LV	85	8	50	18	szcFp		
021	2	54	LV	35	80	20	30	csgFp		
022	64	130	MD	50	.001	30	18	sgkFGc		
023	0	999	LV	55	15	40	40	szcFp		U
024	4	140	TO	10	0	45	0	sgkF		
025	0	999	LV	65	5	45	15	szcFd		
026	52	320	MD	95	6	35	30	zgsCk		
027	4	40	UP	65	40	30	25	zsgMj		
028	31	180	UP	50	.001	30	25	sckMm		
029	2	185	LV	30	90	25	20	zsgFGp		
030	2	40	LV	35	8	35	45	ckgFGp		
031	0	999	LV	45	15	35	40	zsFGr	M	
032	0	999	LV	45	70	60	35	zsFGp	M	
033	50	140	UP	25		35	18	zsFGk		F
034	0	999		85	0.001	65	20	szcFp		
038	9	210	UP	30	15	5	40	czrMh		
039	85	350	MD	4	95	7	51	rzsCs		FR
040	0	999	LV	55		55	30	sczFj		U
041	2	230	LV	50	70	40	15	zskFGp		
042	50	260	MD	9	20	15	65	zgsFGk		F
044	0	999	LV	45	5	60		zskA		
046	0	999	CR	75		60	15	zsF		U
047	12	310	UP	30	75	25	30	gksFGj		
048	22	160	MD	70	20	45	40	zsFGj		F
049	10	170	LW	75		55	30	gksFGj		
050	90	30	LW	50	45	45	20	zsgCs		RFV
051	12	190		65	<5	40	45	czsMj		
052	15	160		45	10	60	30	zgsFGv	Mr	
055	8	30	MD	5	50	10	55	zcrMv	Ru	
056	55	280	LW	8	95+	12	50	zcrMm	R	F
057	5	40	CR	15	80	45	40	zsrMh	R	
058	15	50	UP	40	70	55	49	zrMh		
059	11	90	MD	55	80	20	60	zcMu		
060	0	999	LV	20	75	5	60	rMu		
061	0	999	LV	50	60	45	15	Omb		U
062	12	355	MD	40	70	45	30	zcM		
063	11	30	MD	55	40	20	40	zCv	Mu	U
063B	15	30	UP					szcMu		
064	2		MD	15	0	30	0	kgFp		
065	3	90E	UP	70	10	35		zsgFk		
066	20	200	LW	40	0.1	65	15	czsMbjm		
067	5	160	LV	50	0.1	60	25	czsMbpj		
068	5	100	MD	40	0.1	75	15	czsMwj		
069	10	110	MD	65	0.1	75	10	ehOv	zcMjv	L
070	12	130	MD	45	15	50	25	czMj		
071	25	160	MD	60	10	60	15	czMva		
072	6	180	DP	40	90	65	20	czMwmj		
073	16	160	UP	45	0.1	80	0	zcgMbmj		
074	0	999	CR	10	50	50	10	gzcMwmj		
075	27	200	LW	80	0.1	35	15	zcMtwj		
076	3	140	LV	50	50	80	10	zcMbp		
077	6	120	LV	80	15	50	3	hOv	cMj	
078	0	999	CR	5	0.1	80	2	zcgMwuj		
089	30	50	LW	35	0.1	80	10	zkgCwa		VF
079	42	230	MD	40	0.1	65	10	zcgMba		
080	0	999	DP	50	80	60	5	uObp		
081	0	999	DP	60	10	15	0	hObd		
082	10		MD	50	40	50	15	czgMwj		
083	0	999	LV	65	35	70	5	hOr	szcFlp	U
084	0	999	LV	50	0.1	75	5	sgFAp		
085	0	999	LV	35	75	65	7	sgFlp		
086	8	250	TO	50	5	50	10	gcMv		S
087	0	999	DP	80	0.1	5	0	hObd		
088	25	310	UP	35	80	50	10	zcgFGaum		
090	0	999	LV	45	90	60	0	uObph		
091	0	999	DP	40	90	50	0	uOph		
092	0	999	LV	40	90	60	0	uOph		
093	3	270	LV	30	80	75	7	zsgFGtj		
094	8	210	UP	25	40	50	15	zcgMbam		
095	10	110	LW	50	25	70	20	zgcMvj		
096	1	999	LV	40	30	80	0	hObj		
097	13	20	MD	5	15	30	0	zcMbj		
098	8	45	MD	70	20	65	10	zcMbj		L
099	10	70	MD	80	20	65	10	zcMvju		
100	70	50	MD	70	40	65	40	zcgMva		
101	52	270	MD	30	80	40	10	zcgMk		
105	0	999	LW	50	75	40	15	zcMvj		
106	3	260	LW	60	35	60	5	uOvh	cLj	L
107	20	280	LW	35	80	20	5	sFGv	cMj	
102	0	999	LV					cLv	gsFp	

Appendix 7. Ecosystem Mapping Field Survey Data

Plot Number	Slope Gradient	Aspect	Meso Slope Position	Strata Cover Herb	Strata Cover Moss	Strata Cover Shrub	Strata Cover Tree	Terrain Surficial	Terrain Underlying	Terrain Process
103	0	999	DP					eObp		
104	5	250	LW					eOv	cFGp	
035	0	999	DP					uhOb	czFp	
036	0	999	LV	45	15	55	15	eOx	sFG	U
037	0	999	DP	90		10		uOb		
043	0	999	DP	20	0	10	0	zcL		U
045	0	999	LV	85	4	35	10	cL		U
053	2	999	LV	60	85	20	15	uOb	Mu	
054	3	150	LV	60	10	40	25	euOv	cMu	
200v										
201v										
202v										
285	6	260	MD	20	80	30	40	szgFGbj		FR
204v										
205v										
206v										
207v										
208v										
209v										
210v			CR							
211v										
212v										
213v										
214v										
215v										
216v										
219v										
220v										
221v										
222v										
223v										
224v										
225v										
226V										
227v										
228v								M		RA
229v										
230v										
231v										
232v								M		
233v								FGv	M	
234v										
235v										
236v										
237v										
238			MD				30	zsFGx	zcMu	
239v										
240v										
241v										
242v			CR							
245v										
246v								O		
247v										
248v										
249v										
250v										
251v										
252v										
253v										
271v										
272v										
274v										
275v										
276v										
277v								M		
278v										
286	70	310	MD	35	1	52	35			
287	5	999		45	5	15	45			
S21			MD	20	15	35	12	zsFGb		
S32	10	170	MD	9	45	35	30	zsFGx	Mu	
S33	4	220						FG	M	
S42	37	70	TO	50	15	60	20	zcsFGbu		V
S43			UP	55	5	30	20	zcMb	u	
S44	1	999	LV	75	40	40	45	uzcOb	M	
S19	25	278	MD	12	4	15	35	zsCv	cMu	F
S22	0	999	LV	70	80	8	20	uhOb	gcMj	
243	20	038		55	8	15	40			
244			MD	55	4	55	40	zscCx	Ma	
254			LV	8	75	18	30	szFAp		
270	12	150	UP	35	0.001	35	25	gzcMv	Rj	
273	40	130	MD	25	6	45	20	zgcMv	Ra	
279	20	110	MD	3	4	15	60	gzcMv	Ra	
280			LV	45	0.001	55	25			
281										
282	8	330	LW	60	0.001	30	40	gzcF		
S17				30	5	35	25			
S18	20	270	MD	45	5	30	20	kgsFGv	kgcMx	
P-26	0	999	LV					euOv	zcLp	
S-25										
S-24	1	999	LV					zcsFp		
S-17	35	270	MD					gzcCx	zcMb	F
S-14								gsFp		
DM001										
DM002										
DM003										
DM004										
DM005										
DM006								FG		

Appendix 7. Ecosystem Mapping Field Survey Data

Plot Number	Slope Gradient	Aspect	Meso Slope Position	Strata Cover Herb	Strata Cover Moss	Strata Cover Shrub	Strata Cover Tree	Terrain Surficial	Terrain Underlying	Terrain Process
DM009										
DM010										
DM011										
DM012										
DM013										
DM014										
DM015										
DM016										
DM018								Mb		
WP328										
WP329										
WP330										
WP331										
WP332										
WP333										
WP334										
WP336										
WP337										
WP338										
WP339										
WP340										
WP341										
WP344										
WP352										
WP353										
WP354										
WP355										
WP356										
WP357										
WP358										
WP359										
WP360										
WP361										
WP362										
WP363										
WP364										
WP365										
WP366										
WP367										
WP368								C		
WP369										
WP370										
WP371										
WP372										
WP373										
WP374										
WP376										
WP378										
WP379										
WP380										
WP381										
WP382										
WP383										
WP384										
WP385										
WP386										
WP389								LG		
WP390				80		80				
WP391										
WP392								Ov	LG	
WP393				50						
WP394								Ov	LG	
WP395								Mb		
WP396								Ov		
WP397								F		
WP398										
WP399										
WP400										
WP401								M		
WP402										
WP403										
WP404								Mb		
WP405										
WP406	8	NW						Mb		
WP407										
WP408								Mb		
WP409										
WP410										
WP411										
WP412										
WP413										
12-401	6	292	MD	2	0	0	0	uObj		
12-402	6	245	LWR	13	38	14	37	hOv	zsFGv/Mu	L
12-403	10	262	MD	45	55	6	37	sFGv	gszMj	L
12-404	3	242	LVL	46	45	10	0	uObp		
12-405	2		UP	8	0	0	28	sFGv	gszMu	
12-406	3	344	LVL	33	5	29	20	gzsFx	gzcMks	V
12-407	0		LVL	45	41	20	8	uObp		
12-408	3	296	MD	15	10	33	25	zsFGv	gzcMj	
12-409	6	230	MD	51	1	25	35	zsFGv	gscMu	
12-410	6	260	MD	35	0.1	19	0	gzcMuj		
12-411	2	276	LWR	12	41	16	31	gscMbj		
12-412	5	262	MD	27	6	18	19	zsMbj		
12-413	8	340	LWR	21	25	23	28	zFv	cMbuj	L

Appendix 7. Ecosystem Mapping Field Survey Data

Plot Number	Humus Form	Root Restricting Depth	Root Restricting Type	Soil Drainage	Crown Closure	EC1 Percent Cover	EC2 Percent Cover	EC3 Percent Cover	EC1 Site Series	EC2 Site Series
001	D	30	C	i	45					
002	D	60	L	w	65					
003	D			w	20					
004	L	18	c	r		100			RY	
005	L	18	L	w						
006	L			w	10	100			02	
007	L			w	40	90			01	
008	P	20	P	v						
009	L	55		i		60	30	10	06	Mine
010	L			m						
011	L	60	C	m	15					
012	L	30		w	18	100			04	
013	R			w	30	100			02	
014	D	18								
015	P			w	40	100			06	
016	L			m	20	40	60		05	01
017	L			w	25					
018	L			r						
019	L			r	18					
020	L			m	18					
021	L			w	30					
022	L			w	18		90	10		WS
023	L			m	40					
024	N	80	W	r		50	40	10	WT	low FP
025	L			w	10	100			06	
026	D			w	30	50	30	20	01	05
027	L			w	25	100			02	
028	L			w	25					
029	L			w	20					
030	D	30	P	p	45	90	10		01	06
031	L			w	40	90	10		01	07
032	L			r	35	60	40		02	01
033	L			w	18					
034	D			w	20					
038	L			w	40	100			02	
039	L			w	51	100			01	
040	D			w						
041	L			w	15	100			02	
042	L			w	65	80	20		01	RY
044	N	17	K	w		40	40	20	Wmo1	Wmo1
046	N			w	15	100			111	
047	L			r	30					
048	L			m	40					
049	N			w	30	50	30	20	00	01
050	L			w						
051	L			w	45					
052	L	55	K	w	30					
055	L	60	L	w	55	100			01	
056	L			w	50	80	20		01	05
057	L			w	40					
058	L			w	49					
059	D			m	60	70	30		01	05
060	L			w	60	80	20		03	06
061	P			v	15					
062	L	25	C	m	30					
063	D	60	c	i	40					
063B	L			m	40					
064	N			x	0	70	30		GP	GP
065	L			r	20					
066	D			w	15					
067	D	18	K	i	25	80	20		05	05
068	L			w	15	80	20			
069	D	56	K	p	10	60	40		06	05
070	L	40	K	m	20	100			01	
071	L			w	15					
072	L			w	20					
073	L			w						
074	L	25	K	m	10	50	50		01	03
075	L			i	15					
076	L	30	P	m	10					
077	P	35	P	p	3					
078	L			w	2	90	10		01	01
089	L			w	10					
079	D			w						
080	P	25	W	v	5					
081	P			v			70	30	Ws	Wm
082	L			w	15					
083	P			p	5	50	50		Ws04	Wb06
084	N			r						
085	L			w	7					
086	D	30	K	i	10					
087	P			v		30	30	40	Ws	OW
088	L			w	10	50	50		02	03
090	P			v						
091	P			v	0					
092	P			v	0					
093	L			w	7					
094	L			w	15					
095	D			m	20	50	50		06	04
096	P			p	0					
097	L	40	P	i	0					
098	D	30	C	m						
099	L			i	10					
100	L			w						
101	L			w	10					
105	L			w	15	40	60		03	06/07
106	P			p	5	10	90		6iC	3a
107	L			m	5	10	90		5iC	3a
102	N	60		v						

Appendix 7. Ecosystem Mapping Field Survey Data

Plot Number	Humus Form	Root Restricting Depth	Root Restricting Type	Soil Drainage	Crown Closure	EC1 Percent Cover	EC2 Percent Cover	EC3 Percent Cover	EC1 Site Series	EC2 Site Series
103	P	55		v						
104	P			v						
035	P	40		v	55					
036	P			v		70	30		OW	Wm
037	P			v						
043	N			v		80	20		OW	Wm
045	R	50	P							
053	P			v						
054	P			v	25					
200v										
201v										
202v										
285				w						
204v										
205v										
206v										
207v										
208v										
209v										
210v										
211v										
212v										
213v										
214v										
215v										
216v										
219v										
220v										
221v										
222v										
223v										
224v										
225v										
226V										
227v										
228v										
229v										
230v										
231v										
232v										
233v										
234v										
235v										
236v										
237v										
238	L			w	35					
239v										
240v										
241v										
242v										
245v										
246v										
247v										
248v										
249v										
250v										
251v										
252v										
253v										
271v										
272v										
274v										
275v										
276v										
277v										
278v										
286					30					
287					45				111	112
S21	L			r	12					
S32	L		C	w	30					
S33										
S42	L			m	25					
S43					25					
S44				v	45					
S19				w	30					
S22		40	W	v						
243	L				45					
244	L			w	45					
254	R				35	40	10	50	112$	112$
270		30	K		25					
273		35	L	r	25					
279	L			w	60					
280					25					
281										
282				w	30				101	
S17										
S18	HR			w						
P-26										
S-25				p						
S-24	LR			w						
S-17										
S-14		48	W	i						
DM001										
DM002										
DM003										
DM004									00	
DM005										
DM006										

Appendix 7. Ecosystem Mapping Field Survey Data

Plot Number	Humus Form	Root Restricting Depth	Root Restricting Type	Soil Drainage	Crown Closure	EC1 Percent Cover	EC2 Percent Cover	EC3 Percent Cover	EC1 Site Series	EC2 Site Series
DM009										
DM010										
DM011										
DM012										
DM013										
DM014										
DM015										
DM016										
DM018										
WP328										
WP329										
WP330										
WP331										
WP332										
WP333										
WP334										
WP336										
WP337										
WP338										
WP339										
WP340										
WP341										
WP344										
WP352										
WP353										
WP354										
WP355										
WP356										
WP357										
WP358										
WP359									00	
WP360										
WP361										
WP362										
WP363										
WP364										
WP365										
WP366										
WP367										
WP368										
WP369										
WP370										
WP371										
WP372									103	
WP373									103	
WP374									103	
WP376										
WP378										
WP379										
WP380										
WP381										
WP382										
WP383										
WP384										
WP385										
WP386									CC	
WP389										
WP390										
WP391										
WP392										
WP393									101	
WP394										
WP395									01	
WP396										
WP397										
WP398										
WP399										
WP400										
WP401									103	
WP402									103	
WP403										
WP404		40								
WP405										
WP406										
WP407										
WP408										
WP409										
WP410										
WP411										
WP412										
WP413										
12-401	P	-	-	vp						
12-402	P	-	-	i						
12-403	R	-	-	w						
12-404	P	-	-	vp						
12-405	R	-	-	w						
12-406	L	50	W	i						
12-407	P	-	-	vp						Wb03.2
12-408	R	-	-	w		70	30		101	104
12-409	R	-	-	w						
12-410	R	-	-	m						
12-411	R	-	-	m						
12-412	R	-	-	w						
12-413	L	50	P	p						

Appendix 7. Ecosystem Mapping Field Survey Data

Plot Number	EC3 Site Series	EC1 Site Modifier	EC2 Site Modifier	EC3 Site Modifier	EC1 Structural Stage	EC2 Structural Stage	EC3 Structural Stage
001							
002							
003							
004					2		
005							
006					5c		
007					4C		
008							
009	06				3a	NA	6M
010							
011							
012					4C		
013					4C		
014							
015					7tC		
016					7tC	6M	
017							
018							
019							
020							
021							
022	02					4tC	3C
023							
024	Mu				3b	4B	NA
025					7tC		
026	05				6tM	6tB	7tC
027					4sM		
028							
029							
030					6	6tM	
031					6tM	6tM	
032					5tC	5tC	
033							
034							
038					4sC		
039					4sC		
040							
041					5tC		
042					5c	NA	
044	00				3b	NA	4B
046					6sC		
047							
048							
049	06	TB			6tM	6tM	6tM
050							
051							
052							
055					4SC		
056					4sC	6tC	
057							
058							
059					5C	5C	
060					4C	5C	
061							
062							
063							
063B							
064					NA	3	
065							
066							
067		5tB	5tM				
068		5iM	6iM				
069		6iM	6iM				
070		6tM					
071							
072							
073							
074		5sC	5sC				
075							
076							
077							
078		1/3a	5iM				
089							
079							
080							
081	OW/PD				6iC	3a	n/a
082							
083		5iC	5iC				
084							
085							
086							
087	Ws	3b	2c	2b			
088		4C	5iC				
090							
091							
092							
093							
094							
095		5iM	5iM				
096							
097							
098							
099							
100							
101							
105							
106		07	07				
107							
102							

Appendix 7. Ecosystem Mapping Field Survey Data

Plot Number	EC3 Site Series	EC1 Site Modifier	EC2 Site Modifier	EC3 Site Modifier	EC1 Structural Stage	EC2 Structural Stage	EC3 Structural Stage
103							
104							
035							
036					n/a	3b	
037							
043					N/A	2	
045							
053							
054							
200v							
201v							
202v							
285							
204v							
205v							
206v							
207v							
208v							
209v							
210v							
211v							
212v							
213v							
214v							
215v							
216v							
219v							
220v							
221v							
222v							
223v							
224v							
225v							
226V							
227v							
228v							
229v							
230v							
231v							
232v							
233v							
234v							
235v							
236v							
237v							
238							
239v							
240v							
241v							
242v							
245v							
246v							
247v							
248v							
249v							
250v							
251v							
252v							
253v							
271v							
272v							
274v							
275v							
276v							
277v							
278v							
286							
287			Fm02		5sB	5sB	
S21							
S32							
S33							
S42		111	110	101			
S43							
S44							
S19							
S22							
243							
244							
254	FT				5tB	6tB	3b
270							
273							
279							
280							
281							
282					6tM		
S17							
S18							
P-26							
S-25							
S-24							
S-17							
S-14							
DM001							
DM002							
DM003							
DM004		ws			3b		
DM005							
DM006							

Appendix 7. Ecosystem Mapping Field Survey Data

Plot Number	EC3 Site Series	EC1 Site Modifier	EC2 Site Modifier	EC3 Site Modifier	EC1 Structural Stage	EC2 Structural Stage	EC3 Structural Stage
DM009		n/a					
DM010		n/a					
DM011							
DM012							
DM013		103$	101$	110$	5mM	5B	6B
DM014		n/a					
DM015							
DM016							
DM018							
WP328							
WP329							
WP330							
WP331							
WP332							
WP333							
WP334							
WP336							
WP337							
WP338							
WP339							
WP340							
WP341					2a	3b	
WP344							
WP352		burn					
WP353		CC					
WP354		Wf01			2		
WP355		burn	burn		3b	4c	
WP356		burn	burn		3b	4c	
WP357					2a		
WP358					2a		
WP359			KH		2d		
WP360		RO			1		
WP361					2d		
WP362					2a		
WP363					3b		
WP364					2a		
WP365					3b	4c	
WP366							
WP367					4a		
WP368							
WP369							
WP370							
WP371					5c	4c	
WP372					4c		
WP373					3b		
WP374					4c		
WP376					3a		
WP378					4c		
WP379							
WP380					6tC		
WP381					6tC		
WP382							
WP383		CC					
WP384		Wb					
WP385					4c		
WP386					3a/3b		
WP389							
WP390		Ws07	wb		3b	3b	
WP391		Wm01	Ws04		2b	3a	
WP392					4c		
WP393					5tc		
WP394		Wm01	grass		2b	2b	
WP395							
WP396							
WP397					6C		
WP398		Wm01	Ws04		2b	3a	
WP399							
WP400							
WP401							
WP402					4C		
WP403		Wm01					
WP404							
WP405							
WP406							
WP407							
WP408							
WP409		Wm01	Ws		2b	3b	
WP410							
WP411							
WP412							
WP413							
12-401							
12-402							
12-403							
12-404							
12-405							
12-406							
12-407							
12-408							
12-409							
12-410							
12-411							
12-412							
12-413							

Appendix 8

Plant Species Identified during Field Surveys

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Appendix 8. Plant Species Identified during Field Surveys

Common Name	Scientific Name	Synonyms	Notes
Alfalfa	*Medicago Sativa*		
Alpine Club-Moss	*Diphasiastrum Alpinum*		
Alpine Yarrow	*Achillea Sibirica*	A. Alpina	
American Speadwell	*Veronica Americana*		
American Vetch	*Vicia Americana*		
Arctic Bluegrass	*Poa Arctica*		
Arctic Lupine	*Lupinus Arcticus (?)*		
Arctic Willow	*Salix Arctica*		
Arnica	*Arnica sp.*		
Arrow-leaved Coltsfoot	*Petasites Sagittatus*		
Arrow-leaved groundsel	*Senecio Triangularis*		
Aslike Clover	*Trifolium Hybridum*		Axotic
Aven	*Geum sp.*		
Awned Sedge	*Carex Atherodes*		
Balsam Poplar	*Populus Balsamifera ssp. Balsamifera*		
Baltic Rush	*Juncus Balticus*		
Baneberry	*Actaea Rubra*		
Barclay's Willow	*Salix Barclayi*		
Barratt's Willow	*Salix Barrattiana*		
Beaked Sedge	*Carex Utriculata*		
Bebb's Willow	*Salix Bebbiana*		
Bedstraw	*Galium sp.*		
Birch-leaved Spirea	*Spiraea Betulifolia*		
Black Cottonwood	*Populus Balsamifera ssp. Trichocarpa*		
Black Gooseberry	*Ribes Lacustre*		
Black Huckleberry	*Vaccinium Membranaceum*		
Black Medic	*Medicago Lupulina*		Exotic
Black Spruce	*Picea Mariana*		
Black Twinberry	*Lonicera Involucrata*		
Blue Clematis	*Clematis Occidentalis*		
Blue Wildrye	*Elymus Glaucus*		
Blueberry, Huckleberry	*Vaccinium sp.*		
Bluegrass	*Poa sp.*		
Bluejoint Reedgrass	*Calamagrostis Canadensis*		
Blunt-leaved Sandwort	*Moehringia Lateriflora*	Arenaria Lateriflora	
Bog Adder's-mouth Orchid	*Malaxis Paludosa*		
Bog Cranberry	*Oxycoccus Oxycoccos*		
Bog Willowherb	*Epilobium Leptophyllum*		
Bog-rosemary	*Andromeda Polifolia*		
Bracted Lousewort	*Pedicularis Bracteosa*		
Bristle-stalked Sedge	*Carex Leptalea ssp. Leptalea*		
Broad-leaved Willowherb	*Epilobium Latifolium*		
Broom-moss	*Dicranum Scoparium*		
Bull Thistle	*Cirsium Vulgare*		
Bunchberry	*Cornus Canadensis*		
Canada Goldenrod	*Solidago Canadensis*		
Canada Milk-vetch	*Astragalus Canadensis*		
Canada thistle	*Cirsium Arvense*	Exotic	
Canada Violet	*Viola Canadensis*		
Clad Lichens	*Cladonia sp.*		
Clasping Twistedstalk	*Streptopus Amplexifolius*		
Claw-moss	*Hypnum sp.*		
Cloudberry	*Rubus Chamaemorus*		
Clover	*Trifolium sp.*		
Clubmoss	*Lycopodium sp.*		
Coltsfoot	*Petasites sp.*		
Common Brown Peat-moss	*Sphagnum Fuscum*		
Common Cattail	*Typha Latifolia*		
Common Dandelion	*Taraxacum Officinale*		
Common Duckweed	*Lemna Minor*		

Appendix 8. Plant Species Identified during Field Surveys

Common Name	Scientific Name	Synonyms	Notes
common green peat-moss	*Sphagnum Girgensohnii*		
Common Horsetail	*Equisetum Arvense*		
Common Juniper	*Juniperus Canadensis*		
Common Juniper	*Juniperus Communis*		
Common Leafy Moss	*Plagiomnium Medium*		
Common Mare's-tail	*Hippuris Vulgaris*		
Common Mitrewort	*Mitella Nuda*		
Common Moonwort	*Botrychium Lunaria*		
Common Plantain	*Plantago Major*		Exotic
Common Red Peat-moss	*Sphagnum Capillifolium*		
Common Snowberry	*Symphoricarpos Albus*		
Common Tansy	*Tanacetum Vulgare*		
Coralroot	*Corallorhiza sp.*		
Cotton-grass	*Eriophorum sp.*		
Cow-parsnip	*Heracleum Maximum*		
Cream-flowered Peavine	*Lathyrus Ochroleucus*		
Creeping Bentgrass	*Agrostis Stolonifera*		
Creeping Juniper	*Juniperus Horizontalis*		
Creeping Snowberry	*Gaultheria Hispidula*		
Crowberry	*Empetrum Nigrum*		
Curled Dock	*RumexCcrispus*		
Curly Heron's-bill Moss	*Dicranum Fuscescens*		
Currant or Gooseberry	*Ribes sp.*		
Cut-leaved Anemone	*Anemone Multifida*		
Dainty Moonwort	*Botrychium Crenulatum*		Blue Listed Species
Deciduous Pelt	*Peltigera Britannica*		
Devil's Club	*Oplopanax Horridus*		
Diverse-leaved Cinquefoil	*Potentilla Diversifolia*		
Dog Pelt	*Peltigera Canina*		
Douglas' Water-hemlock	*Cicuta Douglasii*		
Drummond's Willow	*Salix Drummondiana*		
Dwarf Blueberry	*Vaccinium Caespitosum*		
Dwarf Nagoonberry	*Rubus Arcticus*		
Dwarf Rattlesnake Orchid	*Goodyera Repens*		
Dwarf Red Raspberry	*Rubus Pubescens*		
Dwarf Scouring-rush	*Equisetum Scirpoides*		
Early Blue Violet	*Viola Adunca var. Adunca*		
Enchanter's-nightshade	*Circaea Alpina*		
Eurasian Watermilfoil	*Myriophyllum Spicatum*		
Eyed Foam	*Stereocaulon Tomentosum*		
False Solomon's-seal	*Maianthemum Racemosum*		
False Solomon's-seal	*Smilacina Racemosa*		
False Toadflax	*Geocaulon Lividum*		
Fescue	*Festuca sp.*		
Field Chickweed	*Cerastium Arvense*		
Field Locoweed	*Oxytropis Campestris*		
Fireweed	*Epilobium Angustifolium*		
Five-leaved Bramble	*Rubus Pedatus*		
Five-stamened Mitrewort	*Mitella Pentandra*		
Fleabane	*Erigeron sp.*		
Foam Lichens	*Stereocaulon sp.*		
Fowl Bluegrass	*Poa Palustris*		
Fragrant White Rein Orchid	*Platanthera Dilatata*		
Freckle Pelt	*Peltigera Aphthosa*		
Fuzzy-spiked Wildrye	*Elymus Innovatus*		
Fuzzy-spiked Wildrye	*Leymus Innovatus*		
Gentian	*Gentiana sp.*		
Glow Moss	*Aulacomnium Palustre*		
Goatsbeard	*Aruncus Dioicus*		
Golden Carpet	*Chrysosplenium Tetrandrum*		

Appendix 8. Plant Species Identified during Field Surveys

Common Name	Scientific Name	Synonyms	Notes
Golden Ragged-moss	*Brachythecium Salebrosum*		
Golden Sedge	*Carex Aurea*		
Graceful Mountain Sedge	*Carex Podocarpa*		
Great Northern Aster	*Canadanthus Modestus*		
Green Alder	*Alnus Virdis ssp. Crispa*		
Green Wintergreen	*Pyrola Chlorantha*		
Grey Reindeer	*Cladina Rangiferina*		
Grey-leaved Willow	*Salix Glauca*		
Ground-cedar	*Diphasiastrum Complanatum*	Lycopodium Complanatum	
Ground-pine	*Lycopodium Dendroideum*	L. Obscurum	
Haircap Moss	*Polytrichum sp.*		
Hawkweed	*Hieracium sp.*		
Heart-leaved Arnica	*Arnica Cordifolia*		
Heart-leaved Twayblade	*Listera Cordata*		
Heron's-bill Moss	*Dicranum sp.*		
Highbush Cranberry	*Viburnum Edule*		
Honeysuckle	*Lonicera sp.*		
Hooker's Fairybells	*Disporum Hookeri*		
Horsetail	*Equisetum sp.*		
Hybird White Spruce	*Picea Engelmannii X Glauca*		
Indian Hellebore	*Veratrum Viride*		
Ivy-leaved Duckweed	*Lemna Trisulca*		
Juniper Haircap Moss	*Polytrichum Juniperinum*		
Keloggs' sedge	*Carex Lenticularis var. Lipocarpa*		
Kidney-leaved Buttercup	*Ranunculus Abortivus*		
Kinnikinnick	*Arctostaphylos Uva-ursi*		
Kneeling Angelica	*Angelica Genuflexa*		
knight's plume	*Ptilium Crista-castrensis*		
Labrador Tea	*Rhododendron Groenlandicum*	Ledum Groenlandicum	
Lady Fern	*Athyrium Filix-femina*		
Large Round-leaved Rein Orchid	*Platanthera Orbiculata*	Habenaria Orbiculata	
Large-leaved Avens	*Geum Macrophyllum*		
Leafy Moss	*Mnium sp.*		
Leafy Moss	*Plagiomnium sp.*		
Leafy Moss	*Rhizomnium sp.*		
Lesser Wintergreen	*Pyrola Minor*		
Lesser-panicled Sedge	*Carex Diandra*		
Lindley's Aster	*Symphyotrichum Ciliolatum*		
Lingonberry	*Vaccinium Vitis-idaea*		
Lodgepole Pine	*Pinus Contorta*		
Longbract Frog Orchid	*Habenaria Viridis*		
Long-bracted Frog Orchid	*Coeloglossum Viride*		
Lyre-leaved Rockcress	*Arabis Lyrata*		
Marsh Cinquefoil	*Comarum Palustre*	Potentilla Palustris	
Marsh Skullcap	*Scutellaria Galericulata*		
Marsh Violet	*Viola Palustris*		
Meadow Horsetail	*Equisetum Pratense*		
Mint	*Mentha sp.*		
Mitrewort	*Mitella sp.*		
Mountain Alder	*Alnus Incana ssp. Tenuifolia*		
Mountain Arnica	*Arnica Latifolia*		
Mountain Heron's-bill Moss	*Dicranum Montanum*		
Mountain Leafy Liverwort	*Barbilophozia Floerkei*		
Mountain Sweet-cicely	*Osmorhiza Berteroi*	Osmorhiza Chilensis	
Nagoonberry	*Rubus Arcticus*		
Narrow-leaved Hawkweed	*Hieracium Umbellatum*		
Net-veined Willow	*Salix Reticulata*		
Norther Lady's-slipper	*Cypripedium Passerinum*		
Northern Anemone	*Anemone Parviflora*		
Northern Bedstraw	*Galium Boreale*		

Appendix 8. Plant Species Identified during Field Surveys

Common Name	Scientific Name	Synonyms	Notes
Northern Blackcurrant	*Ribes Hudsonianum*		
Northern Crane's-bill	*Geranium Erianthum*		
Northern Goldenrod	*Solidago Multiradiata*		
Northern Gooseberry	*Ribes Oxyacanthoides*		
Northern Grass-of-Parnassus	*Parnassia Palustris*		
Northern Green Orchid	*Platanthera Hyperborea*	Habenaria Hyperborea	
Northern Hedysarum	*Hedysarum Boreale*		
Northern Scouring Rush	*Equisetum Variegatum*		
Northern Starwort	*Stellaria Calycantha*		
Northern Twayblade	*Listera Borealis*		
Nuttall's Alkaligrass	*Puccinellia Nuttalliana*		
Oak Fern	*Gymnocarpium Dryopteris*		
One-leaved Foamflower	*Tiarella Trifoliata var. Unifoliata*		
One-leaved Rien Orchid	*Platanthera Obtusata ssp. Obtusata*	Habenaria Obtusata	
One-sided Wintergreen	*Orthilia Secunda*		
Orange Hawkweed	*Hieracium Aurantiacum*		
Pacific Willow	*Salix Lucida ssp. Lasiandra*	Salix lasiandra	
Palmate Coltsfoot	*Petasites Frigidus var. Palmatus*		
Paper Birch	*Betula Papyrifera*		
Pearly Everlasting	*Anaphalis Margaritacea*		
Peat-moss	*Sphagnum sp.*		
Peavine	*Lathyrus sp.*		
Pebbled Pixie-cup	*Cladonia Pyxidata*		
Pendant-pod Locoweed	*Oxytropis Deflexa*		
Pennsylvanian Bitter-cress	*Cardamine Pensylvanica*		
Perennial Sow-thistle	*Sonchus Arvensis*		
Pink Mountain-heather	*Phyllodoce Empetriformis*		
Pink Wintergreen	*Pyrola Asarifolia*		
Pink Wintergreen	*Pyrola Asarifolia*		
Plane-leaved Willow	*Salix Planifolia*		
Prairie Rose	*Rosa Woodsii*		
Prickly Rose	*Rosa Acicularis*		
Prince's-pine	*Chimaphila Umbellata*		
Purple Meadowrue	*Thalictrum Dasycarpum*		
Purple Peavine	*Lathyrus Venosus*		
Purple-leaved Willowherb	*Epilobium Ciliatum*		
Pussy Willow	*Salix Discolor*		
Racemose Pussytoes	*Antennaria Racemosa*		
Ragged-moss	*Brachythecium sp.*		
Rattlesnake Fern	*Botrychium Virginianum*		
Rattlesnake-plantain	*Goodyera Oblongifolia*		
Rayless Mountain Butterweed	*Senecio Indecorus*		
Red Clover	*Trifolium Pratense*		Exotic
Red Elderberry	*Sambucus Racemosa*		
Red Raspberry	*Rubus Idaeus*		
Red Swamp Currant	*Ribes Triste*		
Red Swamp Current	*Ribes Triste*		
Red-osier DogwoodS	*Cornus Stolonifera*		
Red-stemmed Feathermoss	*Pleurozium Schreberi*		
Reedgrass	*Calamagrostis sp.*		
Reindeer Lichens	*Cladina sp.*		
Rocky Mountain Fescue	*Festuca Ovina var. Saximontana*		
Rose	*Rosa sp.*		
Ross' Sedge	*Carex Rossii*		
Rosy Twistedstalk	*Streptopus Roseus*		
Rough-fruited Fairybells	*Disporum Trachycarpum*		
Roundleaf Orchid	*Amerorchis Rotundifolia (?)*		
Running Club-moss	*Lycopodium Clavatum*		
Rush	*Juncus sp.*		
Rush Aster	*Symphotrichum Boreale (?)*	Aster Borealis	

Appendix 8. Plant Species Identified during Field Surveys

Common Name	Scientific Name	Synonyms	Notes
Saskatoon	*Amelanchier Alnifolia*		
Scarlet Paintbrush	*Castilleja Miniata*		
Scentless Chamomile	*Tripleurospermum Inodorum*	Matricaria Maritima	Exotic
Scouler's Willow	*Salix Scouleriana*		
Scrub Birch	*Betula Nana*		
Sedge	*Carex sp.*		
Self-heal	*Prunella Vulgaris*		
Shepard's Purse	*Capsella Bursa-pastoris*		Exotic
Shining Willow	*Salix Lucida*		
Shiny Liverwort	*Pellia Neesiana*		
Shore Sedge	*Carex Limosa*		
Showy Aster	*Eurybia Conspicua*	Aster Conspicuus	
Showy Locoweed	*Oxytropis Splendens*		
Single Delight	*Moneses Uniflora*		
Sitka Burnet	*Sanguisorba Canadensis*		
Sitka Columbine	*Aquilegia Formosa*		
Sitka Mountain-ash	*Sorbus Sitchensis*		
Sitka Valerian	*Valeriana Sitchensis*		
Sitka Willow	*Salix Sitchensis*		
Skunk Current	*Ribes Glandulosum*		
Slender Hawkweed	*Hieracium Gracile*		
Small Bedstraw	*GaliumTtrifidum*		
Small Twistedstalk	*Streptopus Streptopoides*		
Small Yellow Water-buttercup	*Ranunculus Gmelinii*		
Small-coloured Paintbrush	*Castilleja Parviflora*		
Small-flowered Penstemon	*Penstemon Procerus*		
Smallflowered Woodrush	*Luzula Parviflora*		
Smooth Brome	*Bromus Inermis ssp. Inermis*		
Smooth-stemmed Sedge	*Carex Laeviculmis*		
Soft-leaved Sedge	*Carex Disperma*		
Soopolallie	*Shepherdia Canadensis*		
Soopolallie	*Shepherdia Canadensis*		
Sparse-flowered Sedge	*Carex Tenuiflora*		
Spiny Wood Fern	*Dryopteris Expansa*		
Spotted Coarlroot	*Corallorhiza Maculata*		
Spreading Dogbane	*Apocynum Androsaemifolium*		
Spreading-pod Rockcress	*Arabis Divaricarpa*		
Spruce	*Picea sp.*		
Star-flowered False Solomon's-seal	*Smilacina Stellata*		
Step Moss	*Hylocomium Splendens*		
Stiff Club-moss	*Lycopodium Annotinum*		
Stinging Nettle	*Urtica Dioica*		
Strawberry	*Fragaria sp.*		
Striped Coarlroot	*Corallorhiza Striata var. Striata*		
Subalpine Fir	*Abies Lasiocarpa*		
Swamp Horsetail	*Equisetum Fluviatile*		
Sweet Coltsfoot	*Petasites Frigidus*		
Sweet-scented Bedstraw	*Galium Triflorum*		
Swollen Beaked Sedge	*Carex Rostrata*		
Tall Bluebells	*Mertensia Paniculata*		
Tall Larkspur	*Delphinium Glaucum*		
Tamarack	*Larix Laricina*		
Thimbleberry	*Rubus Parviflorus*		
Three-leaved False Solomon's-seal	*Maianthemum Trifolium*		
Three-leaved Foamflower	*Tiarella Trifoliata*		
Timothy	*Phleum Pratense*		
Toad Pelt	*Peltigera Scabrosa*		
Touch-me-not	*Impatiens sp.*		
Trailing Black Currant	*Ribes Laxiflorum*		
Trailing Raspberry	*Rubus Pubescens*		

Appendix 8. Plant Species Identified during Field Surveys

Common Name	Scientific Name	Synonyms	Notes
Traper's Tea	*Rhododendron Neoglandulosum*	Ledum Glandulosum	
Trembling Aspen	*Populus Tremuloides*		
Twinflower	*Linnaea Borealis*		
Twistedstalk	*Streptopus sp.*		
Veiny Meadowrue	*Thalictrum Venulosum*		
Velveleaf Huckleberry	*Vaccinium Myrtilloides*		
Violet	*Viola sp.*		
Water Avens	*Geum Rivale*		
Water Sedge	*Carex Aquatilis*		
Water Speedwell	*Veronica Anagallis-aquatica*		Exotic
Water-moss	*Calliergon sp.*		
Western Blue Flax	*Linum Lewisii subsp. Lewisii*		Exotic
Western Dock	*Rumex Occidentalis*	R. Aquaticus var. Fenestratus	
Western Meadowrue	*Thalictrum Occidentale*		
Western Mountain-ash	*Sorbus Scopulina*		
White Clover	*Trifolium Repens*		
White Hawkweed	*Hieracium Albiflorum*		
White Pussytoes	*Antennaria Microphylla*		
White Rhododendron	*Rhododendron Albiflorum*		
white spruce	*Picea Glauca*		
White Sweet-clover	*Melilotus Alba*		Exotic
White Water-buttercup	*Ranunculus Aquatilis*		
White-flowered Rhododendron	*Rhododendron Albiflorum*		
Wild Lily-of-the-valley	*Maianthemum Canadense*		
Wild Sarsaparilla	*Aralia Nudicaulis*		
Wild Strawberry	*Fragaria Virginiana*		
Wildrye	*Elymus sp.*		
Willow	*Salix sp.*		
Willowherb	*Epilobium sp.*		
Wintergreen	*Pyrola sp.*		
Wood Horsetail	*Equisetum Sylvaticum*		
Wood Strawberry	*Fragaria Vesca*		
Wood-moss	*Hylocomium sp.*		
Wormseed Mustard	*Erysimum Cheiranthoides*		
Wormwood	*Artemisia sp.*		
Yarrow	*Achillea Millefolium*		
Yellow Avens	*Geum Aleppicum*		
Yellow Bog Sedge	*Carex Gynocrates*		
Yellow Coarlroot	*Corallorhiza Trifida*		
Yellow Monkey-flower	*Mimulus Guttatus*		
Yellow Mountain Avens	*Dryas Drummondii*		
Yellow Rattle	*Rhinanthus Minor*		
Yellow Sweet-clover	*Melilotus Officinalis*		Exotic
	Antennaria sp.		
	Anthemis sp.		
	Arabis sp.		
	Aster spp.		
	Astragalus sp.		
	Barbilophozia sp.		
	Bromus sp.		
	Carex Lenticularis (variety?)		Potential Listed Species
	Carex spp.		
	Castilleja sp.		
	Cladonia Cornuta		
	Cladonia Ecmocyna		
	Dryas sp.		
	Elymus sp.		
	Epilobium sp.		
	Erigeron sp.		

Appendix 8. Plant Species Identified during Field Surveys

Common Name	Scientific Name	Synonyms	Notes
	Galium sp.		Potential for Multiple Additional Species
	Gaultheria sp.		
	Geranium sp.		
	Geum spp.		
	Hieracium sp.		
	Juncus spp.		
	Lupinus sp.		
	Luzula sp.		
	Melilotus sp.		Exotic
	Mimulus sp.		
	Plagiochasma sp.		
	Ptilidium sp.		
	Ranunculus sp.		
	Rosa sp.		
	Rubus sp.		
	Rumex sp.		
	Salix spp.		
	Sedum sp.		
	Senecio sp.		
	Silene sp.		
	Solidago sp.		
	Sparganium sp.		
	Sparganium sp.		
	Spiraea sp.		
	Stellaria sp.		
	Taraxacum sp.		
	Vaccinium Vitis-idaea		
	Vicia sp.		
	Viola sp.		