WETLAND and BROAD ECOSYSTEM MAPPING

for the

South Cariboo Woodlot Association

Prepared for:
South Cariboo Woodlot Association

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Table of Contents

List of Tables

1.0 INTRODUCTION

In 1998, the South Cariboo Woodlot Association retained DWB Forestry Services Ltd. to provide wetland classification and raptor nest identification for the woodlots with membership in the association. I was retained to complete Phase IV of this project: delineation and labelling of wetlands and broad ecosystem units on 1:15,000 colour air photos. Wetland polygons were also digitized to determine areas of wetlands – this work was completed by DWB Forestry Services Ltd. This report describes the methods used for mapping and provides a brief description of each of the wetland and broad ecosystem map units used in this project.

The goal of this project was to provide the Woodlot Association with a management tool that will enable them to integrate requirements of the Forest Practices Code (primarily for wetlands) and the habitat needs of various wildlife species in developing Woodlot Management Plans.

The mapped woodlots are all located within the 100 Mile Forest District of the Cariboo Forest Region. Within this district, mapped woodlots are primarily located in the following biogeoclimatic units: Interior Douglas-fir Dry Cool Subzone Fraser Variant (IDFdk3), Sub-boreal Pine-Spruce Moist Cool Subzone (SBPSmk), and Sub-boreal Spruce Dry Warm Subzone Horsefly Variant (SBSdw1). A few woodlots are located in the Interior Douglas-fir Very Dry Mild Subzone (IDFxm), Interior Cedar-Hemlock Moist Cool Subzone Horsefly Variant (ICHmk3), and the Interior Douglas-fir Moist Warm Subzone Thompson Variant (IDFmw2). Detailed descriptions of these biogeoclimatic units and the site series in them can be found in *A guide to forest site identification and interpretation for the Cariboo Forest Region* (Steen and Coupé, 1997) and *A guide to site identification and interpretation for the Kamloops Forest Region* (for the IDFmw2 only; Lloyd et al., 1990).

2.0 METHODS

Woodlot boundaries were transferred onto 1:15,000 colour photos (dated 1992 to 1997). Alternate photos were used to map on and were photo-boxed and labeled with the woodlot number and subzone.

Two different methods were used for delineating polygons on 1:15,000 photos: the broad ecosystem mapping methodology for delineating and labeling upland ecosystems and non-vegetated sites (see section 2.1) and a wetland mapping methodology for wetlands and wet meadows (see section 2.2).

2.1 Broad Ecosystem Mapping Methodology

Typically, Broad Ecosystem Mapping is applied at a scale of 1:250,000 for use in broad scale resource management planning. However, the methodology was readily applicable to this scale of mapping (1:15,000) for use in Woodlot Management Plans with minor modifications.

A Broad Ecosystem Unit (BEU) is defined as ‘a permanent area of the landscape that supports a distinct type of dominant vegetative cover, or distinct non-vegetated cover (such as lakes or rock

outcrops)' (Resources Inventory Committee, 1998). Each unit is defined to include both the potential climax vegetation and associated successional stages of sites with similar climax vegetation, terrain, topography and soil characteristics (Resources Inventory Committee, 1998). These units are listed and described in *Standards for Broad Terrestrial Ecosystem Classification and Mapping* (Resources Inventory Committee, 1998b). Two letter codes have been assigned to each of these units, and it is these codes that appear in the polygon label.

The *Standards for Broad Terrestrial Ecosystem Classification and Mapping* document also contains a table which correlates Ministry of Forests site series classifications to the broad ecosystem units. This table was used as the primary guide for applying these units to the landscape. All units used in the broad ecosystem mapping are described in this document. When a particular unit was mapped in more than one subzone, it is described separately under each biogeoclimatic unit (subzone or variant) that it was mapped in. The descriptions of units were taken from the *Standards for Broad Terrestrial Ecosystem Classification and Mapping*, but were modified to better reflect the nature of the unit specific to the subzone/variant in which it was mapped.

In the few cases where a subzone boundary bisected a woodlot, the boundary was drawn on the airphotos. However, these boundaries are approximate as they have not been field verified. Polygons adjacent to boundaries should be considered as transitional between the two subzones, rather than considered as being in a particular subzone.

Non-wetland areas were delineated based on a change in BEU or an abrupt change in seral stage. The changes in the landscape that cause a change to a different BEU differ from subzone to subzone. For example, in the IDFxm, all forests that are mesic or drier fall into the DF (Interior Douglas-fir forest) BEU. Thus, given the scale of the photos, polygons were also delineated where there was in change in the modifer that could be applied to the BEU (see Table 1 for a list of modifiers used). In particular, the occurrence of distinct differences in slope, aspect, moisture, soil depth, or soil texture were used to delineate polygons. Cultivated fields (CF) and non-vegetated sites such as rock outcrops (RO) and lakes (various codes) were also delineated.

Seral stages (see Table 2) are used to indicate broad changes in stand composition (coniferous vs. mixed or deciduous) and age (young vs. mature) for forested areas. Changes in seral stage were rarely used as criteria to delineate polygons, as forest cover maps are available to provide more detailed information about stand compostion and age. Seral stages are shown after the broad ecosystem mapping unit code and indicate the general seral stage of that polygon. Seral stages do not apply well to non-forested units, and stage 0 was divided into stage 0a and 0b to apply to forb/graminoid dominated ecosystems and shrub dominated ecosystems respectively.

Modifications to broad ecosystem mapping methodology:

1) Colour 1:15,000 photos were used instead of 1:250,000 topo maps and 1:250,000 satellite images.
2) Due to the scale of the photos, the size of polygons was much smaller than would be true for 1:250,000 scale mapping. An approximate minimum polygon size of 1 cm^2 (1.5 ha) was used for BEU, although very few polygons were this small. There was no minimum size for wetland polygons, except as pen lines limited the delineation of very small wetlands.

3) Due to the detail visible on 1:15,000 colour photos, the Terrestrial Ecosystem Mapping label format was used as this allows three ecosystems in a label, rather than the two specified for Broad Ecosystem Mapping labels.
4) Linework on photos has not been transferred to a digital map product.
5) Format of map labels follows Terrestrial Ecosystem Mapping Standards (Resources Inventory Committee, 1998a)

Woodlots that occur directly adjacent to each other were mapped on separate photos, however, the mapping was edge-matched to ensure continuity of map units between adjacent woodlots.

Table 1. Modifiers used for Broad Ecosystem Mapping (Resources Inventory Committee, 1998)

Modifier	Definition
c	coarse-textured soils
f	fine-textured soils
l	shallow (lithic) soils (less than 100 cm deep)
m	moister than average soils
n	cool aspect (>25% slope on north to east aspects)
s	steep, warm aspect (>35% slope on southern to western aspects)
t	moderate, warm aspect (25 to 35% slope on southern to western aspects)

Table 2. Seral stages for Broad Ecosystem Mapping and Wetland Mapping (Resources Inventory Committee, 1998)

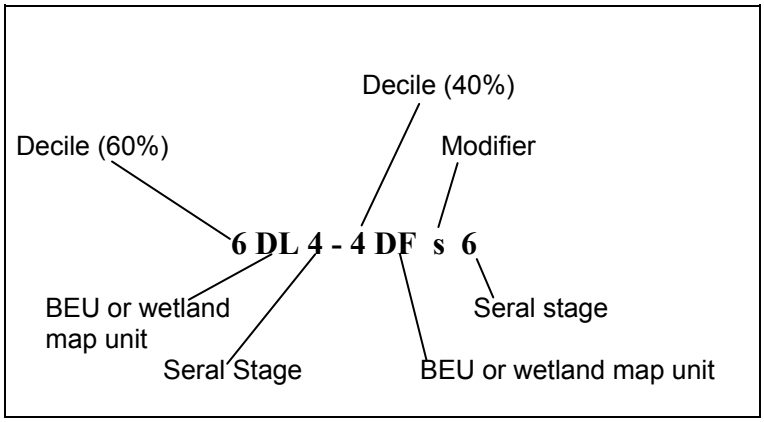
Seral stage	Definition
0	non-forested units
0a*	non-forested dominated by graminoids or forbs
0b*	non-forested dominated by shrubs
1	recent disturbance (eg fire or logging; less than 20 years since disturbance)
2	young forests, coniferous (less than 60 years old)
3	young forests, broad-leaved or mixed broad-leaved and coniferous
4	mature forests, coniferous (generally greater than 60 years old)
5	mature forests broad-leaved or mixed broad-leaved and coniferous
6	old growth (>140 years for SBS; >250 years for IDF)

*these subdivisions of stage 0 were added to use on wetland and other non-forested polygons

2.1.1 Creation of Polygon Labels

Map labels can contain up to three components. More than one component is included in the label for a polygon where there is more than one seral stage, broad ecosystem unit and/or modifier combination but where it was not feasible to delineate separate polygons for each component. The proportion of each unit is indicated with 'deciles'.

Example polygon label:



The label 6DL4 – 4DFs6 would indicate that the polygon is composed of 60% of the DL broad ecosystem unit, seral stage 4 and 40% of the DF broad ecosystem unit on a steep warm aspect, seral stage 4

2.2 Wetland Mapping Methodology

Wetlands were delineated on 1:15,000 colour airphotos. The entire wetland may be one polygon if it was a relatively uniform wetland or several polygons depending if it was a complex of wetland types. Areas were calculated for the whole wetland, rather than components of the wetland. Polygon labels for wetlands are structured the same as for broad ecosystem mapping units (see Section 2.1.1).

Seral stages were applied to the wetlands in the same manner as upland ecosystems. Generally seral stages 0a (graminoid dominated) and 0b (shrub dominated) were the primary seral stages mapped, however, forested structural stages were occasionally mapped. Generally forested wetlands are much more open and trees tend to be stunted relative to upland forests (although some swamps can be an exception).

2.2.1 Definitions of wetland classes

The Forest Practices Code defines a wetland as 'a swamp, marsh, or other similar area that supports natural vegetation that is distinct from the adjacent upland areas. More specifically, a wetland is an area where a water table is at, near, or above the surface or where soils are water-

saturated for a sufficient length of time that excess water and resulting low oxygen levels are principal determinants of vegetation and soil development.' (Province of British Columbia, 1995).

Runka and Lewis (1981) define a wetlands as 'lands that are wet enough or inundated frequently enough to develop and support a distinctive natural vegetative cover that is in strong contrast to the adjacent matrix of better drained lands'. They recognized seven wetland classes for the Cariboo. All but the shrub-carr and meadow classes meet the criteria for wetlands under the Forest Practices Code, however shrub-carrs are managed as wetlands under the code. No wetlands in the shrub-carr or bog wetland classes were encountered in this mapping project. Only a few meadows were encountered, and they are included in the wetland map units (as opposed to the upland units but were not digitized to determine their areas). The name of each wetland unit includes the wetland class at the end of the name (eg Beaked sedge – Water sedge fen falls into the 'fen' wetland class).

Brief descriptions of the wetland classes encountered in this project (derived from Runka and Lewis (1981) definitions, see this publication for more detailed descriptions):

Shallow Open Water:

A wetland comprised of permanent shallow water less than 2m deep lacking extensive emergent plant cover (<10%). Floating aquatic vegetation may be present. For the purposes of this project, this class of wetlands have not been subdivided into a more detailed classification.

Marsh:

A wetland that is permanently or seasonally inundated and that supports an extensive cover of emergent non-woody vegetation (mostly sedges and rushes). Soils are usually mineral but may have a thin organic layer on top

Fen:

A wetland with >40 cm of non-sphagnic peat accumulations. Waters are derived from runoff and groundwater and tend to be quite nutrient rich. Vegetation can include sedges, shrubs and mosses.

Swamp:

A tree- or tall shrub-dominated wetland characterized by periodic flooding and subsurface water flow. Soils are very rich in nutrients and are usually mineral, although thin organic accumulations may be present.

Meadow:

Moist herbaceous communities on mineral soils that are periodically saturated but rarely inundated. Vegetation is primarily grasses, low sedges, and rushes with some forbs.

2.2.2 Origins of wetland units

Wetland units were derived from different sources, depending on the subzone. These units vary somewhat in how specific or general they are, depending on the data and classification available for that subzone. Although none of these wetlands have undergone provincial correlation, most would be considered plant associations in the provincial Biogeoclimatic Ecosystem Classification framework. Each wetland unit has a two-letter code which is used in the polygon label on the photos.

In the IDFdk3, wetland units come from the wetland classification published by Steen and Roberts (1988); a few additional units have been developed from Terrestrial Ecosystem Mapping (TEM) projects. Thus, the classification for this subzone is quite comprehensive.

Many wetlands in the IDFxm are similar to those found in the IDFdk3. TEM units were used to map wetlands in the IDFxm, however, most of these units originated in the Steen and Roberts (1988) classification for the IDFdk3.

In the SBPSmk, wetland units were derived from a preliminary wetland classification developed by Will MacKenzie (Provincial Wetland Ecologist, Research Branch of the Ministry of Forests) and Ray Coupé (Research Ecologist, Cariboo Forest Region). However, many mapping units had already been developed for TEM projects: the codes and names for these units were used for mapping but were correlated to the units developed by MacKenzie and Coupé. Units in MacKenzie and Coupé's classification that did not correlate to TEM units were assigned codes to use in this mapping project. This classification is quite comprehensive, but some units were lumped as they could not be reliably distinguished on the airphotos.

The SBSdw1 has wetlands that are very similar to those found in the SBPSmk. TEM units were correlated to MacKenzie and Coupé's SBPSmk units and new codes were assigned to units that did not correlate to any TEM wetland unit. Again the classification is quite comprehensive, but some units were lumped, as was done for the SBPSmk.

No wetlands, aside from shallow open water (OW) were encountered in the ICHmk3.

No wetland data or classification was available for the IDFmw2, thus broad ecosystem units were used for both upland and wetland areas of this subzone.

2.3 Map Reliability

Presently the reliability of the mapping is unknown. It is recommended that field checking of the mapping be undertaken (check 15 to 25% of the polygons, particularly the wetland polygons) and that the mapping be updated and revised based on the results of the field checking.

2.4 Field Verification and Updating of Mapping

Field verification would allow the reliability of the mapping to be determined and improved upon. Field verification, particularly for wetlands, is likely needed for the maps to have high reliability. Additionally, a provincial wetland classification will be available in April of 1999 and the wetland mapping could be updated and correlated to this classification at the same time as labeling is updated based on field verification. Additional field work could also provide data and interpretations for wetland ecosystems that have not been sampled by either the Ministry of Forests or Terrestrial Ecosystem Mapping contractors.

3.0 MAPPING UNITS

3.1 IDFdk3

3.1.1 BROAD ECOSYSTEM MAPPING UNITS
(Forest, Grassland, Sparsely Vegetated and Anthropogenic Map Units)

AC Trembling Aspen copse

Climax trembling aspen forests with shrub-dominated (typically snowberry and rose) understory, typically found in depressions or swales in grassland areas.

BS Bunchgrass grassland

Habitats dominated by grasses and forbs; generally lacking trees. Does not include cultivated fields or moist meadows adjacent to wetlands (moist meadows are included in the wetland units).

Map Unit	Description
BS	Level to gently sloping grasslands are typically dominated by either bluebunch wheatgrass, short-awned porcupinegrass and/or spreading needlegrass. Sites disturbed by grazing may have reduced covers of the above-noted grasses and increased covers of pussytoes, pasture sage, junegrass and Kentucky bluegrass.
BSl	Grasslands on shallow soils; typically dominated by bluebunch wheatgrass with some needle-and-thread grass. Productivity is typically lower and bunch grasses are more widely spaced than on level, deep soil sites.
BSs	Grasslands on moderate warm aspects; typically dominated by bluebunch wheatgrass.
BSt	Grasslands on steep warm aspects; usually dominated by widely spaced bluebunch wheatgrass clumps.

CF Cultivated field

Non-forested, open areas used for non-native crop production and subject to human agricultural practices.

DF Interior Douglas-fir forest

Coniferous forests that generally progress directly to a Douglas-fir climax.

Map Unit	Description	Equivalent Site Series
DFc	level to gently sloping sites with deep, coarse-textured soils (generally glaciofluvial deposits)	05 (atypical)
DFl	upper slopes and crests with shallow soils	03
DFln	cool aspects with shallow soils	05 (with shallow soils)
DFls	steep, warm aspects with shallow soils	04 (03)
DFn	cool aspects	05
DFs	steep, warm aspects with deep, medium-textured soils	04 (on slopes >45%), 06 (on slopes 35-45%)
DFt	moderate warm aspects with deep, medium-textured soils	06

DL Douglas-fir - Lodgepole pine

Forests that progress through a mixture of lodgepole pine and Douglas-fir or trembling aspen to a Douglas-fir climax.

Map Unit	Description	Equivalent Site Series
DL	level to gently sloping sites with deep, medium-textured soils	01
DLc	level to gently sloping sites with deep, coarse-textured soils (generally glaciofluvial deposits)	01
DLn	cool aspects	cool aspect 01 (generally not steep enough to be 05)

RO Rock

Bedrock outcroppings with little soil development and sparse vegetation cover (<10%).

SD White spruce – Douglas-fir

Coniferous forests that progress through a mixture of lodgepole pine, trembling aspen, hybrid white spruce, and Douglas-fir to a hybrid white spruce climax that may have a minor component of other tree species.

Map Unit	Description	Equivalent Site Series
SD	level to gently sloping sites with deep, medium-textured soils; generally receiving seepage	07, 08
SDn	as above, but on a moderate cool aspect	07, 08

SK White spruce swamp

An open hybrid white spruce forest; understory has abundant horsetails; found on poorly drained sites; characterized by subsurface water flow (generally quite rich sites compared to SL).

Map Unit	Description	Equivalent Site Series
SK	level sites with subsurface water flow	09*

*09 was also mapped as SL

SL White spruce – Lodgepole pine

Poorly drained hybrid white spruce forests. Generally not as rich as the SK unit.

Map Unit	Description	Equivalent Site Series
SL	level sites with high water tables	09*

*09 was also mapped as SK

3.1.2 WETLAND MAPPING UNITS

AF Nuttal's alkaligrass – Foxtail barley meadow

This is a saline wet meadow ecosystem that often occurs as a fringe around marshes and shallow open water in grassland areas of the south-west portion of the 100 Mile Forest District. It is generally quite species poor; dominant species are foxtail barley and Nuttall's alkaligreass (Steen and Roberts, 1988). Soils are moist and generally fine-textured but are rarely innundated. Wet meadows (including this one) do not meet the Forest Practices Code definition for a wetland (Province of British Columbia, 1995). However, best management practices for this unit are likely similar to those used for wetlands.

This is wetland unit W2 in Steen and Roberts (1988). More detailed descriptions and intepretations can be found in this publication.

BU Great bulrush marsh

This marsh generally occurs as a fringe surrounding open water and has standing water for most of the year. It is dominated by great bulrush in association with some aquatic (non-emergent) plants (Steen and Roberts, 1988). It can occasionally be difficult to distinguish this ecosystem on airphotos as bulrush stands may look very similar to open water (OW) from above, particularly when they are not very dense.

This is wetland unit W14 in Steen and Roberts (1988). More detailed descriptions and interpretations can be found in this publication.

BW Beaked sedge – Water sedge fen

This fen ecosystem has generally has standing water until mid-August. Soils are usually organic (>50 cm thick) over fine-textured mineral soils. This ecosystem generally has a continuous cover of beaked sedge and water sedge and either species may be dominant. Scattered aquatic plants and *Drepanocladus aduncus* moss are usually present. Steen and Roberts (1988).

This is wetland unit W9 in Steen and Roberts (1988). More detailed descriptions and intepretations can be found in this publication.

This unit may occasionally include awned sedge fen-marshes (W8 in Steen and Roberts, 1988). This wetland ecosytestem is uncommon but may occasionally occur. It cannot be distinguished from BW on airphotos without field verification.

CT Cattail marsh

This marsh ecosystem is dominated by cattails with scattered aquatic plants. It may occur as patches in a wetland composed of other marsh and fen ecosystems, or it may be the dominant wetland ecosystem present. Often there is a thin organic layer (<15cm) overtop of fine-textured gleyed mineral soils.

This is wetland unit W13 in Steen and Roberts (1988). Detailed descriptions and interpretations can be found in this publication.

LS Labrador tea – Sphagnum poor fen

This wetland unit was developed from Terrestrial Ecosystem Mapping projects in the Cariboo Forest Region and is not included in the Steen and Roberts (1988) publication. This ecosystem is uncommon and generally occurs only in parts of the IDF near the SBPS or SBS zones.

This fen ecosystem has deep organic soils and has many of the characteristics of a bog (dominated by sphagnum mosses and ericaceous plants) but receives some nutrients from sub-surface water flow and has some sedges and herbs generally not found in bogs. This is generally a shrubby ecosystem, with some stunted spruce trees, scrub birch and Labrador tea occurring on raised hummocks. Sedges and herbs are scattered and generally not abundant. The moss layer is continuous and is dominated by sphagnums with minor amounts of brown mosses.

MS MacCalla's willow – Beaked sedge fen

This is a rich fen ecosystem with deep organic soils. These sites are very shrubby, dominated by a variable composition of tall willows such as Maccall's willow, tea-leaved willow and grey-leaved willow, usually with scattered scrub birch and spruce trees. Sedges such as beaked sedge and water sedge are also reasonably abundant, occurring with a scattering of other sedge species. Frequently some grasses and scattered wetland herbs are present. The moss layer is dominated by brown mosses such as golden fuzzy fen moss and *Drepanocladus* spp. (Steen and Roberts, 1988).

This is wetland unit W5 in Steen and Roberts (1988). Detailed descriptions and interpretations can be found in this publication.

OW Shallow open water

Shallow open water is defined as being less than 2m deep with emergent plant cover less than 10%. Submergent vegetation is often abundant.

RS Baltic rush – Field sedge meadow

This is a wet meadow ecosystem that often occurs as a fringe around marshes and shallow open water in grassland areas and some forested areas of the south-west portion of the 100 Mile Forest District. It is dominated by baltic rush and field sedge and often includes a scattering of other graminoids and forbs such as slender wheatgrass, tufted white prairie aster, silver weed, alkali bluegrass and early blue violet. Grazed areas may have some Kentucky bluegrass in these meadows. Soils are moist, carbonated and generally fine-textured but are rarely innundated. (Steen and Roberts, 1988).

Wet meadows (including this one) do not meet the Forest Practices Code definition for a wetland (Province of British Columbia, 1995). However, best management practices would likely coincide more closely with wetland management practices than forest management practices.

This is wetland unit W3 in Steen and Roberts (1988). Detailed descriptions and interpretations can be found in this publication.

SM Slender sedge – Moss fen

This sedge-dominated fen has deep organic soils and a water table at the surface year-round. It is generally quite species poor, being dominated by slender sedge with a scattering of other species such as beaked sedge, water sedge, swamp horsetail, bog willow, slender cotton grass and marsh cinquefoil. The moss layer is nearly continuous and is dominated by *Drepanocladus aduncus*. (Steen and Roberts, 1988).

This is wetland unit W10 in the Steen and Roberts publication (1988). Detailed descriptions and intepretations can be found in this publication.

This unit may also include some Buckbean – Slender sedge fens as well (W11 in Steen and Roberts, 1988). This ecosystem has similar sedges and mosses, but also has abundant buckbean. It could not be distinguished from SM on the air photos.

SW Scrub birch – Water sedge fen

This wetland unit was developed from Terrestrial Ecosystem Mapping projects in the Cariboo Forest Region and is not included in the Steen and Roberts (1988) publication. This ecosystem generally only occurs in areas of the IDFdk3 near the SBPS and SBS zones, and it is very similar to some wetlands found in those subzones.

This wetland occurs on deep organic soils. The surface is generally hummocky, with scrub birch and occasional scattered willows occurring on the hummocks, along with a mixture of wetland mosses (included brown mosses and scattered sphagnum mosses) and upland mosses and herbs such as wild strawberry. The hollows are generally dominated by brown mosses with beaked sedge, water sedge and a scattering of various other sedges and wetland plants such as marsh cinquefoil.

TS Tall willow – Sartwell's sedge swamp

This unit is generally associated with streams and rivers. Soils are enriched by extensive subsurface water flow and are generally saturated to the surface year round. Soils are usually mineral, but often have a layer of organic material on top. It sometimes occurs in association with BW (Beaked sedge – Water sedge fen) and/or MS (Maccall's willow – Beaked sedge fen). (Steen and Roberts, 1988).

These sites are dominated by tall willows (including grey-leaved willow, tea-leaved willow, MacKenzie's willow and Maccall's willow) with patches of sedges (including beaked sedge,

water sedge, Sartwell's sedge). Mosses are generally patchy and include glow moss, leafy mosses and *Drepanocladus aduncus*. (Steen and Roberts,1988).

This is wetland unit W6 in Steen and Roberts (1988). Detailed descriptions and intepretations can be found in this publication.

WB Low willow – Buckbean fen

This fen ecosystem has deep organic soils and is dominated by several sedges (including slender sedge, water sedge, and shore sedge) and buckbean. Shrub cover is generally sparse, but includes some bog willow, hoary willow and scrub birch. Marsh cinquefoil and swamp horsetail are often present. The moss layer is nearly continuous and is dominated by *Drepanocladus aduncus*. (Steen and Roberts, 1988). It often occurs in association with the SM (Slender sedge – Moss fen) ecosystem.

This is wetland unit W7 in Steen and Roberts (1988). Detailed descriptions and intepretations can be found in this publication.

WM Modified wetland

These are wetlands that have been modified by burning of shrubs, ditching, and/or haying. They are generally fens and are usually dominated by large water sedges.

3.2 IDFmw2

3.2.1 BROAD ECOSYSTEM MAPPING UNITS
(Forest, Grassland, Sparsely Vegetated and Anthropogenic Map Units)

CF Cultivated Field

Non-forested, open areas used for non-native crop production and subject to human agricultural practices.

DF Interior Douglas-fir forest

Coniferous forests that progress directly to a Douglas-fir climax.

Map Unit	Description	Equivalent Site Series
DFl	upper slopes and crests with shallow soils	02 or 03
DFs	steep, warm aspects with deep, medium-textured soils	03 (occasionally may be 02)

RD Western Redcedar – Douglas-fir

Forests that are dominated by Douglas-fir and western red cedar at climax (seral stands may be dominated by birch, trembling aspen, Douglas-fir and/or lodgepole pine).

Map Unit	Description	Equivalent Site Series
RD	level to gently sloping sites with deep, medium-textured soils	01 (referred to as 01-YC in Lloyd et al., 1990)
RDm	moister than average level to gently sloping sites with deep medium-textured soils	04
RDn	steep, cool aspects with deep, medium-textured soils	01 (on a cool aspect; referred to as 01-YS in Lloyd et al., 1990)

3.2.2 WETLAND MAPPING UNITS

FE Sedge fen

This is a broad ecosystem mapping unit that represents all sedge dominated fens. Presently, no data is available for wetlands in the IDFmw2 in the Cariboo Forest Region. Sedge fens observed on the airphotos appeared to be dominated by large water sedges (probably beaked sedge and large water sedge).

OW Shallow open water

Shallow open water is defined as being less than 2m deep with emergent plant cover less than 10%. Aquatic vegetation is often abundant.

SH Shrub Fen

This is a generalized shrubby fen unit that corresponds, in part, to the IDFmw2 /05 site series.

No data is presently available for IDFmw2 wetlands in the Cariboo Forest Region. The wetlands mapped as SH appeared to be rich, willow dominated shrub fens.

3.3 IDFxm

3.3.1 BROAD ECOSYSTEM MAPPING UNITS
(Forest, Grassland, Sparsely Vegetated and Anthropogenic Map Units)

BS Bunchgrass grassland

Habitats dominated by grasses and forbs; generally lacking trees. Does not include cultivated fields or moist meadows adjacent to wetlands (moist meadows are included in the wetland units).

Map Unit	Description
BS	Level to gently sloping grasslands are typically dominated by either bluebunch wheatgrass, short-awned porcupinegrass and/or spreading needlegrass. Sites disturbed by grazing may have reduced covers of the above-noted grasses and increased covers of pussytoes, pasture sage, junegrass and Kentucky bluegrass.

DF Interior Douglas-fir forest

Coniferous forests that progress directly to a Douglas-fir climax.

Map Unit	Description	Equivalent Site Series
DF	level to gently sloping sites with deep, medium-textured soils	01 (06 occasionally on receiving sites)
DFln	cool aspects with shallow soils	05 (with shallow soils)
DFls	steep, warm aspects with shallow soils	02 (04 occasionally)
DFn	cool aspects	05
DFs	steep, warm aspects with deep, medium-textured soils	04

RO Rock

Bedrock outcroppings with little soil development and sparse vegetation cover (<10%).

SD White spruce – Douglas-fir

Coniferous forests that progress through a mixture of trembling aspen, hybrid white spruce, and Douglas-fir to a hybrid white spruce climax that may have a minor component of other tree species.

Map Unit	Description	Equivalent Site Series
SD	level to gently sloping sites with deep, medium-textured soils; receiving seepage; most common at the base of north-aspect slopes	07, 08

SK White spruce swamp

An open hybrid white spruce forest; understory has abundant horsetails; found on poorly drained sites with a high water table.

Map Unit	Description	Equivalent Site Series
SK	level sites and depressions; water table within 30 cm	09

3.3.2 WETLAND MAPPING UNITS

TS Tall willow – Sedge swamp

This unit is generally associated with streams and rivers. It was orginally developed for Terrestrial Ecosystem Mapping projects. Soils are enriched by extensive subsurface water flow and are generally saturated to the surface year round. Soils are usually mineral. This unit can be quite variable in some areas, however sites mapped as TS in this project appeared to be very similar to the IDFdk3 TS (Tall willow – Sartwell's sedge swamp) unit.

These sites are dominated by tall willows (including grey-leaved willow, tea-leaved willow, MacKenzie's willow and Maccall's willow) with patches of sedges (including beaked sedge, water sedge, Sartwell's sedge). Mosses are generally patchy and include glow moss, leafy mosses and *Drepanocladus aduncus*.

3.4 SBPSmk

3.4.1 BROAD ECOSYSTEM MAPPING UNITS
(Forest, Grassland, Sparsely Vegetated and Anthropogenic Map Units)

CF Cultivated field

Non-forested, open areas used for non-native crop production and subject to human agricultural practices.

DF Interior Douglas-fir forest

Coniferous forests that progress directly to a Douglas-fir climax.

Map Unit	Description	Equivalent Site Series
DFl	upper slopes and crests with shallow soils	02
DFs	steep, warm aspects with deep, medium-textured soils	03

DL Douglas-fir - Lodgepole pine

Forests that progress through a mixture of lodgepole pine and Douglas-fir or trembling aspen to a Douglas-fir climax.

Map Unit	Description	Equivalent Site Series
DL	level to gently sloping sites with deep, medium-textured soils	04a on submesic sites (low crests) 01 (sites with Fd and good cold air drainage or at transition to IDF or SBS)
DLc	level to gently sloping sites with deep, coarse-textured soils (generally glaciofluvial deposits)	04b
DLlt	moderate, warm upper slopes with shallow soils (50-100cm)	04 on shallower soils (>50cm deep)
DLt	moderate, warm aspects with deep, medium-textured soils	01 (warmer than average)

GP Gravel Pit

An area from which sand and gravel have been removed. (Terrestrial Ecosystem Mapping unit).

SK White spruce swamp

An open hybrid white spruce forest; understory has abundant horsetails; found on poorly drained sites. This unit may very occasionally include Sxw – swamp horsetail swamps (a wetland with a spruce overstory and an understory dominated by swamp horsetail with some sedges and a scattering of various upland and wetland herbs and mosses).

Map Unit	Description	Equivalent Site Series
SK	level sites and depressions with high water tables	07

SL White spruce – Lodgepole pine

Coniferous forests that proceed through lodgepole pine and/or trembling aspen seral forests to a hybrid white spruce climax (often with a component of lodgepole pine).

Map Unit	Description	Equivalent Site Series
SL	level to gently sloping sites with deep, medium-textured soils	01
SLm	moister than average lower and toe slopes and depressions; may have a high water table or may be receiving some seepage	06
SLn	Cool aspects with deep, medium-textured soils	05

3.4.2 WETLAND MAPPING UNITS

BS Scrub birch – Sedge poor fen

This wetland unit was developed from Terrestrial Ecosystem Mapping projects in the Cariboo Forest Region.

This wetland occurs on deep organic soils. The surface is generally hummocky, with scrub birch occurring on the hummocks, along with a mixture of wetland mosses (included brown mosses and scattered sphagnum mosses) and upland mosses and herbs such as wild strawberry. The hollows are generally dominated by brown mosses (predominantly golden fuzzy fen moss with some *Meesia triquetra* and glow moss) and water sedge. Cordroot sedge and a scattering of other sedges and wetland plants such as marsh cinquefoil are also present.

This wetland ecosystem is very common and is relatively diverse, compared to most other wetland units in this subzone.

BW Beaked sedge – Water sedge fen/marsh

This unit was originally developed for Terrestrial Ecosystem Mapping projects. This marsh/fen ecosystem generally has standing water until mid-August. Soils are either organic (>40 cm thick) over fine-textured mineral soils or fine-textured mineral with a thin organic capping. This ecosystem generally has a continuous cover of beaked sedge with some water sedge. Mosses are uncommon and are often lacking. Typically, these wetlands are small pocket wetlands, although occasionally they are larger.

CT Cattail marsh

This unit was originally developed for Terrestrial Ecosystem Mapping projects. This marsh ecosystem is dominated by cattails or bulrush with scattered aquatic plants. It often occurs as floating mats in shallow open water. Often there is a thin organic layer (<15cm) overtop of fine-textured gleyed mineral soils.

DS Drummond's willow – Sedge swamp

This unit was developed for Terrestrial Ecosystem Mapping projects. This unit is generally associated with streams and rivers. Soils are enriched by extensive subsurface water flow and are generally saturated to the surface year round. Soils are usually mineral, but often have a layer or organic material on top. These sites are dominated by Drummond's willow (but other shrubs including MacKenzie's willow, *Ribes* spp., prickly rose and black twinberry are also present in minor amounts). Patches of bluejoint dominate the herb layer although other scattered sedges and grasses including inflated sedge, beaked sedge, and fowl bluegrass are present. Scattered herbs are present, commonly including great northern aster, field mint, and trailing raspberry. Mosses are infrequent and are mostly limited to occasional occurrences of ragged mosses (*Brachythecium* spp.).

LS Small Lake

Permanently flooded lakes, usually 8 to 60 ha in size, with most of th water less than 7m in depth.

OW Shallow open water

Shallow open water is defined as being less than 2m deep with emergent plant cover less than 10%. Aquatic vegetation is often abundant.

SS Slender sedge – *Drepanocladus* fen

This unit was developed from data collected by Coupé and MacKenzie.

This sedge and moss dominated fen has deep organic soils and a water table at the surface year-round. It is generally quite species poor, being dominated by slender sedge with a scattering of other species such as cordroot sedge, shore sedge, swamp horsetail, bog willow, slender cotton grass and marsh cinquefoil. The moss layer is nearly continuous and is dominated by *Drepanocladus aduncus*.

This unit may also include some Cordroot sedge - *Drepanocladus* fens. Cordroot sedge - *Drepanocladus* fens tend to be smaller pocket fens on deep organics dominated by cordroot sedge with some shore sedge, lesser panicled sedge, bog willow, buckbean and marsh cinquefoil and a thick, continuous moss layer dominated by *Drepanocladus aduncus*. These wetlands cannot be distinguished from SM wetlands on the air photos without field verification.

WF Tall willow – Sedge fen

This unit was developed from data collected by Coupé and MacKenzie.

This is a rich fen ecosystem with deep organic soils. These sites are very shrubby, dominated by Maccall's willow, with some scrub birch, tea-leaved willow and grey-leaved willow, and sometimes with scattered spruce trees. Beaked sedge is reasonably abundant, occurring with a scattering of other sedge species (particularly soft-leaved sedge). Some bluejoint, fowl bluegrass and scattered wetland herbs (including small bedstraw, marsh cinquefoil, nagoonberry are usually present. The moss layer is often patchy and is dominated by ragged mosses, leafy mosses and *Drepanocladus* spp. These wetlands are relatively species rich.

This wetland unit is common, but less so than the BS unit.

WM Modified wetland

These are wetlands that have been modified by burning of shrubs, ditching, and/or haying. They are generally fens and are usually dominated by large water sedges.

WS Bog willow – Low sedge fen

This unit was developed for Terrestrial Ecosystem Mapping projects. This fen ecosystem has deep organic soils. It is dominated by shore sedge and buckbean with a well-developed moss layer comprised mostly of *Drepanocladus aduncus* and golden fuzzy fen moss. Some lesser panicled sedge and occasional other sedges and a scattering of wetland plants such as seaside arrow grass and marsh cinquefoil are present. Shrub cover is generally sparse, but includes some bog willow and scrub birch. It often occurs in association with either the BS (Scrub birch – sedge poor fen) ecosystem or the SS (Slender sedge – *Drepanocladus* fen) ecosystem.

3.5 SBSdw1

3.5.1 BROAD ECOSYSTEM MAPPING UNITS
(Forest, Grassland, Sparsely Vegetated and Anthropogenic Map Units)

BG* Bunchgrass grassland

Habitats dominated by grasses and forbs; generally lacking trees. Does not include cultivated fields or moist meadows adjacent to wetlands (moist meadows are included in the wetland units). Code was changed from BS to BG as BS is used as a wetland code.

Map Unit	Description
BGs	Steep, warm aspect grasslands. No field data is available to for vegetation composition.

*BS code was changed to BG for this subzone because the BS code conflicted with a wetland unit

CF Cultivated field

Non-forested, open areas used for non-native crop production and subject to human agricultural practices.

DF Interior Douglas-fir forest

Coniferous forests that progress directly to a Douglas-fir climax.

Map Unit	Description	Equivalent Site Series
DFlt	moderate, warm upper slopes with shallow soils (50 – 100cm)	03 (on shallow soils >50cm deep)
DFs	steep, warm aspects with deep, medium-textured soils	03
DFt	moderate, warm aspects with deep, medium-textured soils	03

DL Douglas-fir - Lodgepole pine

Forests that progress through a mixture of lodgepole pine and Douglas-fir or trembling aspen to a Douglas-fir climax.

Map Unit	Description	Equivalent Site Series
DL	low crests and gentle upper slopes	04
DLc	level to gently sloping sites with deep, coarse-textured soils (generally glaciofluvial deposits)	04
DLl	level to gentle upper slopes and crests with shallow soils	02
DLln	cool aspects with shallow soils	02 (on cool aspect)
DLlt	moderate warm aspects with shallow soils	02 (on warm aspect)
DLt	upper slopes of moderate warm aspects with deep, medium-textured soils	04

SD White spruce – Douglas-fir

Coniferous forests that progress through a mixture of trembling aspen, hybrid white spruce, and Douglas-fir to a hybrid white spruce climax that may have a minor component of other tree species.

Map Unit	Description	Equivalent Site Series
SD	level to gently sloping sites with deep, medium-textured soils	01
SDl	level to gently sloping sites with shallow soils (50 – 100 cm)	01 (on shallow soils)
SDm	moister than average level to gently sloping sites with deep, medium-textured soils (receiving some seepage)	06
SDn	cool aspect slopes with deep, medium-textured soils	05
SDt	moderate warm aspect (25-30%) slopes with deep medium textured soils	01 (warm aspect, drier than average, transitional to 03)

SF White spruce – Subalpine fir

Coniferous forests that progress to a hybrid white spruce and subalpine fir climax, sometimes with lodgepole pine or trembling aspen.

Map Unit	Description	Equivalent Site Series
SF	moist level to gently sloping, often adjacent to streams	08

SK White spruce swamp

An open hybrid white spruce forest; understory has abundant horsetails; found on poorly drained sites.

Map Unit	Description	Equivalent Site Series
SK	level sites, toe slopes and depressions with high water tables	09

SL White spruce – Lodgepole pine

Coniferous forests that proceed through lodgepole pine and/or trembling aspen seral forests to a hybrid white spruce climax (often with a component of lodgepole pine).

Map Unit	Description	Equivalent Site Series
SL	level to gently sloping sites receiving seepage; deep, medium-textured soils	07
SLn	cool aspects receiving seepage; deep, medium-textured soils	07

WR White spruce – Black cottonwood riparian

Mixed hybrid white spruce and black cottonwood forests found in association with fluvial sites.

Map Unit	Description	Equivalent Site Series
WR	streamsides with high water tables	09
WRc	streamsides with high water tables and coarse-textured soils	09 (with coarse soils)

3.5.2 WETLAND MAPPING UNITS

BS Scrub birch – Sedge poor fen

This wetland unit was developed from Terrestrial Ecosystem Mapping projects in the Cariboo Forest Region.

This wetland occurs on deep organic soils. The surface is generally hummocky, with scrub birch occurring on the hummocks, along with a mixture of wetland mosses (included brown mosses and scattered sphagnum mosses) and upland mosses and herbs such as wild strawberry. The hollows are generally dominated by brown mosses (predominantly golden fuzzy fen moss with some *Meesia triquetra* and glow moss) and water sedge. Cordroot sedge and a scattering of other sedges and wetland plants such as marsh cinquefoil are also present.

CT Cattail marsh

This unit was originally developed for Terrestrial Ecosystem Mapping projects. This marsh ecosystem is dominated by cattails or bulrush with scattered aquatic plants. It often occurs as floating mats in shallow open water. Often there is a thin organic layer (<15cm) overtop of fine-textured gleyed mineral soils.

DW Willow – Red-osier dogwood floodplain/swamp

This unit was developed for Terrestrial Ecosystem Mapping projects. This unit is generally associated with streams and rivers. Soils are enriched by extensive subsurface water flow and are generally saturated to the surface year round. Soils are usually mineral, but often have a layer or organic material on top. These sites are dominated by Drummond's willow (but other shrubs including MacKenzie's willow, *Ribes* spp., prickly rose and black twinberry are also present in minor amounts). Patches of bluejoint dominate the herb layer although other scattered sedges and grasses including inflated sedge, beaked sedge, and fowl bluegrass are present. Scattered herbs are present, commonly including great northern aster, field mint, and trailing raspberry. Mosses are infrequent and are mostly limited to occasional occurrences of ragged mosses (*Brachythecium* spp.). Floodplain sites may be slightly different, with other shrubs such as red-osier dogwood and more black twinberry, fewer sedges and more wet forest herbs.

LS Small Lake

Permanently flooded lakes, usually 8 to 60 ha in size, with most of the water less than 7m in depth.

OW Shallow open water

Shallow open water is defined as being less than 2m deep with emergent plant cover less than 10%. Aquatic vegetation is often abundant.

SS Slender sedge – *Drepanocladus* fen

This unit was developed from data collected by Coupé and MacKenzie for the SBPSmk, which has very similar wetland ecosystems.

This sedge and moss dominated fen has deep organic soils and a water table at the surface year-round. It is generally quite species poor, being dominated by slender sedge with a scattering of other species such as cordroot sedge, shore sedge, swamp horsetail, bog willow, slender cotton grass and marsh cinquefoil. The moss layer is nearly continuous and is dominated by *Drepanocladus aduncus*.

This unit may also include some Cordroot sedge - *Drepanocladus* fens. Cordroot sedge - *Drepanocladus* fens tend to be smaller pocket fens on deep organics dominated by cordroot sedge with some shore sedge, lesser panicled sedge, bog willow, buckbean and marsh cinquefoil and a thick, continuous moss layer dominated by *Drepanocladus aduncus*. These wetlands cannot be distinguished from SM wetlands on the air photos without field verification.

WB Beaked sedge – Water sedge fen/marsh

This unit was originally developed for Terrestrial Ecosystem Mapping projects. It is very similar to the BW unit in the SBPSmk. This marsh/fen ecosystem generally has standing water until mid-August. Soils are either organic (>40 cm thick) over fine-textured mineral soils or fine-textured mineral with a thin organic capping. This ecosystem generally has a continuous cover of beaked sedge with some water sedge. Mosses are uncommon and are often lacking. Typically, these wetlands are small pocket wetlands, although occasionally they are larger.

WW Tall willow – Sedge fen

This unit was developed for Terrestrial Ecosystem Mapping projects. However, the description has been developed from data collected by Coupé and MacKenzie for the SBPSmk, which has very similar wetland ecosystems (=SBPSmk WF).

This is a rich fen ecosystem with deep organic soils. These sites are very shrubby, dominated by Maccall's willow, with some scrub birch, tea-leaved willow and grey-leaved willow, and sometimes with scattered spruce trees. Beaked sedge is reasonably abundant, occurring with a scattering of other sedge species (particularly soft-leaved sedge). Some bluejoint, fowl bluegrass and scattered wetland herbs (including small bedstraw, marsh cinquefoil, nagoonberry are usually present. The moss layer is often patchy and is dominated by ragged mosses, leafy mosses and *Drepanocladus* spp. These wetlands are relatively species rich.

3.6 ICHmk3

3.6.1 BROAD ECOSYSTEM MAPPING UNITS
(Forest, Grassland, Sparsely Vegetated and Anthropogenic Map Units)

CR Black cottonwood riparian

Riparian black cottonwood forests, generally with a shrub-dominated understory.

Map Unit	Description	Equivalent Site Series
CRc	riparian sites with coarse-textured soils	none

RB Western redcedar – Paper Birch

Forests that succeed through deciduous stages and/or Douglas-fir and lodgepole pine to a climax of western redcedar, hybrid white spruce and subalpine fir.

Map Unit	Description	Equivalent Site Series
RB	level to gently sloping sites with deep, medium-textured soils	01
RBn	cool aspects with deep, medium-textured soils	01 (cool aspect)

3.6.2 WETLAND MAPPING UNITS

OW Shallow open water

Shallow open water is defined as being less than 2m deep with emergent plant cover less than 10%. Aquatic vegetation is often abundant.

4.0 References:

Lloyd, D., K. Angrove, G. Hope and C. Thompson, 1990. A guide to site identification and interpretation for the Kamloops Forest Region. B.C. Min. For., Victoria, B.C. Land Manage. Handb. No. 23.

MacKenzie, W. 1999. Personal communication and draft portions of provincial wetland classification.

Province of British Columbia, 1995. Riparian management area guidebook. Ministry of Forests and BC Environment. British Columbia.

Resources Inventory Committee, 1998a. Standard for terrestrial ecosystem mapping in British Columbia. The Province of British Columbia. British Columbia.

Resources Inventory Committee, 1998b. Standards for broad terrestrial ecosystem classification and mapping in British Columbia: classification and correlation of the broad habitat classes used in 1:250,000 ecological mapping. Unpublished draft. The Province of British Columbia. British Columbia.

Roberts, A. L., 1984. Guide to Wetland Ecosytems of the Sub-boreal Spruce a Subzone Cariboo Forest Region, British Columbia. Unpublished report.

Runka, G. G. and T. Lewis, 1981. Preliminary wetland managers manual. APD Technical Paper 5. Province of British Columbia. British Columbia.

Steen, O. A. and A. L. Roberts, 1988. Guide to Wetland Ecosystems of the Very Dry Montane Interior Douglas-fir Subzone Eastern Fraser Plateau Variant (IDFb2) in the Cariboo Forest Region, British Columbia. Land Management Report Number 55. Province of British Columbia, Victoria, B.C.

Steen, O. A. and R. A. Coupé, 1997. A field guide to forest site identification and interpretation for the Cariboo Forest Region. B.C. Min. For., Victoria, B.C. Land Manage. Handb. No. 39.

APPENDIX I

Map Database and Wetland Areas (in ha)

APPENDIX II

Woodlot Mapping on Airphotos by Woodlot