SPECIES OF MANAGEMENT CONCERN
FOR
BC TIMBER SALES CARIBOO BUSINESS AREA

Prepared for
BC Timber Sales
200 - 640 Borland Street
Williams Lake, BC V2G 4T1

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1. INTRODUCTION

British Columbia Timber Sales (BCTS) needs management strategies for species within their operating areas that are potentially adversely affected by forestry related activities. Species at risk are identified by the provincial governments red- and blue-lists, and by the federal government through the Committee on the Status of Wildlife in Canada (COSEWIC) and the Species at Risk Act (SARA). Government direction, especially the Identified Wildlife Management Strategy (IWMS), provides some guidance for forest management of a minority of species at risk; however, most species at risk are not included in the present list of species in the IWMS. Other species (some of which are at risk and some are not) have been identified as having specific management requirements through Local Resource Management Plans (LRMPs), Sustainable Resource Management Plans (SRMPs), Forest and Range Practices Act (FRPA) Section 7 Orders, or as Regionally Important Wildlife by the Ministry of Environment. Some of these species are species at risk; others are not at risk but require management for social and/or economic reasons. Species at risk, which includes ecological communities (provincially red/blue-listed and federally COSEWIC/SARA-listed species), commercial management species (primarily for hunting or fishing purposes), and regionally important species together comprise the species of management concern.

The BCTS Cariboo-Chilcotin Business Area (CCBA) includes the Chilcotin, Central Cariboo, and Quesnel Forest Districts in central British Columbia. Forest operations interact with a wide range of wildlife species, including mammals, birds, fish, amphibians, reptiles, plants, ecological communities, and invertebrates (limited to insects and molluscs at this time). This report provides a summary for all the species of management concern in the CCBA area, including a risk assessment for those species in the context of BCTS operations, a summary of the legal/policy and biological issues for each species, a concise synopsis of important information for each species, and management recommendations for each species.

Figure 1. Location of BCTS Cariboo-Chilcotin Business Area
1.1. DOCUMENTS

A list of the documents used to identify potential species of management concern for the Cariboo-Chilcotin Business Area is provided in Table 1.

Table 1. Documents Reviewed for Species of Management Concern

<table>
<thead>
<tr>
<th>Legislation</th>
<th>Species Lists and Accounts</th>
<th>Review Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Federal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Species at Risk Act</td>
<td>COSEWIC Species at Risk</td>
<td>1 Jan 2009</td>
</tr>
<tr>
<td></td>
<td>COSEWIC Candidate List</td>
<td>1 Jan 2009</td>
</tr>
<tr>
<td></td>
<td>SARA Schedules 1-3</td>
<td>1 Jan 2009</td>
</tr>
<tr>
<td></td>
<td>SARA Species Candidates</td>
<td>1 Jan 2009</td>
</tr>
<tr>
<td></td>
<td>SARA Minister's Decisions</td>
<td>1 Jan 2009</td>
</tr>
<tr>
<td>Fisheries Act; Fisheries (General) Regulations</td>
<td></td>
<td>1 Jan 2009</td>
</tr>
<tr>
<td><strong>Provincial</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accounts and Measures for Managing Identified Wildlife</td>
<td>1 Jan 2009</td>
</tr>
<tr>
<td></td>
<td>Conservation Data Centre</td>
<td>1 Jan 2009</td>
</tr>
<tr>
<td>Forest and Range Practices Act</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Regional</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cariboo-Chilcotin Land Use Plan</td>
<td></td>
<td>1 Jan 2009</td>
</tr>
<tr>
<td>Ministry of Environment’s 1997 Regionally Important Wildlife table</td>
<td></td>
<td>1 Jan 2009</td>
</tr>
</tbody>
</table>

1.2. CONSERVATION STATUS OF SPECIES

In the context of species conservation in British Columbia, the term “species” includes species, subspecies, plant varieties, some ecotypes, some populations, and ecosystems (plant communities). All of these categories have been designated by one or more jurisdictions as being of conservation or management concern, under the loose umbrella term “species at risk”. It is therefore important to understand which list or regulation a species falls under, to understand the legal and policy management requirements.

The conservation status of species, subspecies, plant varieties, ecotypes, and geographically distinct populations are determined by COSEWIC and SARA for Canada as a whole; the BC conservation status is determined by the BC Conservation Data Centre. Ecosystems (plant communities) are not considered under COSEWIC or SARA, their conservation status is determined by the province.

The various lists of species at risk are constantly changing. In general, there is an update of the provincial red/blue-list change once each year, the provincial Identified Wildlife list potentially changes once each year, the federal COSEWIC list changes twice each year after their meetings, and the federal Schedule 1 list of species approved by the Minister changes at most twice each year. The changes tend to occur in the spring and/or fall. The Conservation Data Centre has a policy of updating their conservation ranks and red/blue lists once each year, in April. The intent is to somewhat stabilize the rankings, and to make changes more predictable.

The changes to the lists consist of addition of new species, changes in scientific and common names, changes in conservation status, and removal of species (i.e. the conservation status has been changed
so that the species is no longer of conservation concern). An update to at least the list of species, with or without an update to this report, is therefore advisable at least once each year.

1.2.1. COSEWIC AND SARA LISTS – CANADA

There are two federal lists of species at risk – one from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and one from the Species at Risk Act (SARA). COSEWIC is an arms-length body that independently assesses the conservation status of potential species at risk, and provides a conservation ranking of Endangered (E), Threatened (T), Special Concern (SC), or Data Deficient (DD).

COSEWIC recommends a conservation status for each species to the “competent” federal Minister, who then accepts, rejects, or changes the recommended conservation status, after a public review and comment process. Once the Minister has established a conservation status for a species, it becomes part of Schedule 1 of the Species at Risk Act. The Minister quite often rejects a species for SARA listing, usually for socio-economic reasons rather than a disagreement with the actual conservation status. The COSEWIC list and the SARA Schedule 3 (see below) have moral, but not legal, status; the SARA Schedule 1 list has a limited legal status (see below).

1.2.2. COSEWIC – CANADA

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determines the national conservation status of all wildlife in Canada. It provides recommendations for species to be managed under the Species at Risk Act, but not all COSEWIC-listed species become SARA-listed. COSEWIC determines the conservation status of species primarily based on their distribution and abundance in Canada; the status outside Canada is a only minor consideration. The ranking system used by COSEWIC for species at risk is:

- **NAR** (Not at Risk) – the species has been determined to be not of conservation concern.
- **SC** (Special Concern) – species may become threatened or endangered because of biological factors and identified threats.
- **T** (Threatened) – species may become endangered if limiting factors are not reversed.
- **E** (Endangered) – species is facing imminent extinction or extirpation.
- **DD** (Data Deficient) – species that lack sufficient data to allow the designation of a defensible conservation status; these species should be considered to be of conservation concern, but without any specific rank.

There are also other ranks, but they are not relevant to the species in this report.

1.2.3. SARA – CANADA

The Species at Risk Act (SARA) is the legislation that specifies the legal national conservation status of all wildlife in Canada. The ranking system is the same as that used by COSEWIC. The “competent minister” (one of several federal cabinet ministers) establishes the legal conservation status of species based on information and recommendations provided by COSEWIC, and information and recommendations provided by individuals, organizations, and governments during a public review and comment period. SARA has three “Schedules”.

**Schedule 1.** A lists of all the species that legally fall under SARA; most SARA species in the BCTS CCBA are on this Schedule.

**Schedule 2.** A list of all the species that COSEWIC listed as Endangered or Threatened when SARA came into force, but for which the COSEWIC status report was inadequate. No BCTS CCBA species are on this Schedule.

**Schedule 3.** A list of all the species that COSEWIC listed as Special Concern when SARA came into force, but for which the COSEWIC status report was inadequate. One mammal, one bird, and one fish in...
the CCBA are on this Schedule. Schedule 3 species may still be rejected for inclusion under SARA, once modern status reports are completed, and so do not have full status under SARA.

For the CCBA, three COSEWIC-listed species (Coho Salmon Upper Fraser Population, Grizzly Bear, and Wolverine) have been rejected by the competent minister for socio-economic reasons and are therefore not included in SARA Schedule 1. The notice of the rejection is provided in the Canada Gazette, of which the English-language portion² is shown in Figure 2 for Grizzly Bear and Wolverine. There are also several species that have been referred by COSEWIC (2007 and later) to the competent minister, and no decision has yet been made as to whether to add them to SARA Schedule 1.

Figure 2. Order Rejecting Grizzly Bear and Wolverine from SARA Schedule 1 Listing

Once a species is on Schedule 1 of the Species at Risk Act, SARA still applies only on federally owned land, or elsewhere if the species is aquatic (i.e., falls under the federal Fisheries Act) or is a migratory bird (i.e., falls under the federal Migratory Birds Convention Act). Species listed as Special Concern do not have any legal management requirements, but should have sufficient management to prevent them from becoming Endangered or Threatened. SARA does not apply to terrestrial amphibians, reptiles, mammals, non-migratory birds, plants, and invertebrates except on federally owned land (primarily Indian Reserves and Military Reserves, in a forestry context). Instead, the province has the responsibility of implementing management requirements for these species.

The Species at Risk Act requires that permits be obtained from the federal government if operations may affect the habitat of an aquatic species or migratory bird that is listed under SARA as Endangered or Threatened. There is only one species in the CCBA, the Peregrine Falcon, that is clearly migratory and hence needs a SARA permit before its habitat can be impacted.

1.2.4. RED AND BLUE LISTS – BRITISH COLUMBIA

Species of provincial conservation concern are grouped in “red” (endangered or threatened) and “blue” (special concern) lists. The species may or may not be of national conservation concern; they may be common elsewhere in Canada.

RED LIST: Includes any indigenous species, subspecies or ecological community (= “element”) that is Extirpated, Endangered, or Threatened in British Columbia. Extirpated elements no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered elements are facing imminent extirpation or extinction. Threatened elements are likely to become endangered if limiting factors are not reversed.

BLUE LIST: Includes any indigenous species, subspecies or community considered to be Vulnerable (= Special Concern) in British Columbia. Vulnerable elements are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed elements are at risk, but are not Extirpated, Endangered or Threatened.

YELLOW LIST: Ecological communities and indigenous species that are not at risk in British Columbia.

Plant communities, better referred to as ecological communities, are considered to be “species” in the context of provincial rare species conservation. A specific more or less stable climax or near climax natural plant community (= ecological community) usually results from one or a few site series. It is the plant community that defines the ecosystem. Hence a unique ecological community results from one or a few site series, with forested communities (and some non-forested) usually defined by the Ministry of Forests and Range (MFR) Field Guide to Site Identification and Interpretation for each Region. Not all the ecological communities are in the Field Guides, because many of the Guides are outdated. The Field Guides for grassland (and related) ecosystems are being written at this time. There are also additional ecological communities that result from special ecological factors that are outside the variables used to define MFR site series. The book Wetlands of British Columbia (MacKenzie and Moran. 2004) is the primary reference for wetland and other “wet” ecosystems.

The Biogeoclimatic (BGC) Ecosystem Classification system unit(s) in which each ecological community is known to occur (future inventories may indicate range extensions) are listed for each community. The two digit number following the slash (/01 and up) indicates that the ecological community occurs on a site series that is part of the B.C. Ministry of Forests (MOF) site series classification. A two digit number of /00 indicates that the ecological community occurs on a site unit that is not part of the MOF site series classification but is recognized from other vegetation and site classifications, and ecosystem mapping projects. References are provided for each ecological community.

Determination of the known locations of rare ecological communities is not be feasible for many areas at this time, because of lack of inventory. Even those that have been mapped have not been databased by government in an accessible manner. In local areas Terrestrial Ecosystem Mapping (TEM) has been completed, and shows the locations of each community, to a greater or lesser level of accuracy. Predictive Ecosystem Mapping (PEM) is generally available in the CCBA, but has a lower accuracy and hence is less useful. In any case, site series (= ecosystem) identification is a standard part of forest operations planning, and hence, with some increase in this part of planning, will result in the detection of the ecological communities that may be affected by operations.

1.2.5. CONSERVATION DATA CENTRE RANKS – BRITISH COLUMBIA

The Conservation Data Centre (CDC) uses a conservation status ranking system developed by NatureServe (http://www.natureserve.org/aboutus/index.jsp). The provincial CDC is functionally both the provincial branch of the international NatureServe organization and part of the BC government. The conservation status ranking codes are summarized in Table 2. Those ranking codes determine whether a species is placed on the red-list or blue-list, as shown in Table 3.
Table 2. Global and Subnational (Provincial) Conservation Status Ranking Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Subnational level (status in a province, i.e., British Columbia)</td>
</tr>
<tr>
<td>G</td>
<td>Global level (status throughout its global range)</td>
</tr>
<tr>
<td>S1/G1</td>
<td>Critically imperilled due to extreme rarity (5 or fewer occurrences)</td>
</tr>
<tr>
<td>S2/G2</td>
<td>Imperilled because of rarity (6 to 20 occurrences)</td>
</tr>
<tr>
<td>S3/G3</td>
<td>Rare or uncommon (21 to 100 occurrences)</td>
</tr>
<tr>
<td>S4/G4</td>
<td>Apparently secure, with many occurrences</td>
</tr>
<tr>
<td>S5/G5</td>
<td>Abundant and secure, with many occurrences</td>
</tr>
<tr>
<td>SX, SH</td>
<td>Species extinct (X) or only historically (H) occurred in BC.</td>
</tr>
<tr>
<td>SR</td>
<td>Reported but without persuasive documentation to either accept or reject the report</td>
</tr>
<tr>
<td>SU</td>
<td>Uncertain status, possibly in peril; more information is required</td>
</tr>
<tr>
<td>T</td>
<td>Rank for subspecific taxon (subspecies or variety)</td>
</tr>
<tr>
<td>Q</td>
<td>Taxonomic problems involved; more information is required</td>
</tr>
<tr>
<td>?</td>
<td>Rank tentatively assigned; no information is available or number of occurrences is estimated</td>
</tr>
<tr>
<td>B</td>
<td>Breeding rank, where breeding and non-breeding have separate significance</td>
</tr>
<tr>
<td>N</td>
<td>Non-breeding rank</td>
</tr>
<tr>
<td>S#S#</td>
<td>This format indicates that the conservation status is somewhere in the range of ranks.</td>
</tr>
</tbody>
</table>

Table 3. Conservation Status Ranks included in Red and Blue Lists

<table>
<thead>
<tr>
<th>Category</th>
<th>Red List</th>
<th>Blue List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals</td>
<td>SX, SH, S1, S1S2, S2, S2?, S1S3</td>
<td>S2S3, S3, S3?, S3S4</td>
</tr>
<tr>
<td>Plants</td>
<td>SX, SH, S1, S1S2, S2</td>
<td>S2S3, S3</td>
</tr>
<tr>
<td>Ecological Communities</td>
<td>SX, SH, S1, S1S2, S2</td>
<td>S2S3, S3</td>
</tr>
</tbody>
</table>
1.2.8. **WILDLIFE ACT – BRITISH COLUMBIA**

The BC Wildlife Act specifically protects four species (Burrowing Owl, Sea Otter, Vancouver Island Marmot, American White Pelican); two of which occur in the CCBA. The web versions of the Wildlife Act and its Regulations are not always up to date; and additional species are likely to be added in the future. The Wildlife Amendment Act of 2004 made significant changes to the Wildlife Act, with some consequential changes to other Acts such as the FRPA. Other than the four listed species, no species at risk in BC are directly protected under the Wildlife Act.

1.2.9. **SENSITIVE SPECIES**

There are a number of species in BC for which release of the locations of important sites is restricted (Table 4). The reasons for the restrictions are concerns for direct persecution of species feared by some members of the public, illegal collection for species popular as pets or hunting birds for a segment of the public, and indirect harassment through viewing by curious public. These species are restricted to the dry BGC zones (Fig. 4), in contrast to the widespread distribution of non-sensitive species at risk (Fig. 5). Badger and Great Basin Spadefoot are not on the list of sensitive species, but should be treated as such at the request of Regional Ministry of Environment.

**Table 4. List of Species and Sensitive Information**
List revised March 23, 2001

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>COMMON NAME</th>
<th>LATIN NAME</th>
<th>SENSITIVE SITE INFORMATION</th>
<th>INCLUSION BECAUSE OF POTENTIAL FOR:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REPTILES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gopher Snake</td>
<td><em>Pituophis catenifer</em></td>
<td>Hibernacula</td>
<td>Direct persecution</td>
<td></td>
</tr>
<tr>
<td>Painted Turtle</td>
<td><em>Chrysemys picta</em></td>
<td>Nest sites</td>
<td>Illegal collection</td>
<td>Indirect harassment</td>
</tr>
<tr>
<td>Racer</td>
<td><em>Coluber constrictor</em></td>
<td>Hibernacula</td>
<td>Direct persecution</td>
<td>Illegal collection</td>
</tr>
<tr>
<td><strong>FISH</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bull Trout</td>
<td><em>Salvelinus confluentus</em></td>
<td>All sites</td>
<td>Direct persecution</td>
<td></td>
</tr>
<tr>
<td><strong>MAMMALS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fringed Myotis</td>
<td><em>Myotis thysanodes</em></td>
<td>Hibernacula and maternity colonies</td>
<td>Direct persecution</td>
<td>Indirect harassment</td>
</tr>
<tr>
<td>Grizzly Bear</td>
<td><em>Ursus arctos</em></td>
<td>Den sites Sept. 30-May 31 of observation year</td>
<td>Direct persecution</td>
<td>Indirect harassment</td>
</tr>
<tr>
<td>Northern Myotis</td>
<td><em>Myotis septentrionalis</em></td>
<td>Hibernacula and maternity colonies</td>
<td>Direct persecution</td>
<td>Indirect harassment</td>
</tr>
<tr>
<td>Townsend's Big-eared Bat</td>
<td><em>Corynorhinus townsendii</em></td>
<td>Hibernacula maternity colonies</td>
<td>Direct persecution</td>
<td>Indirect harassment</td>
</tr>
<tr>
<td>Western Small-footed Myotis</td>
<td><em>Myotis ciliolabrum</em></td>
<td>Hibernacula and maternity colonies</td>
<td>Direct persecution</td>
<td>Indirect harassment</td>
</tr>
<tr>
<td>Wolverine</td>
<td><em>Gulo gulo</em></td>
<td>Den sites Jan. 1-May 31 of observation year</td>
<td>Direct persecution</td>
<td>Indirect harassment</td>
</tr>
<tr>
<td><strong>BIRDS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Great Blue Heron</td>
<td><em>Ardea herodias</em></td>
<td>Nest sites</td>
<td>Indirect harassment</td>
<td></td>
</tr>
<tr>
<td>Northern Goshawk, <em>laingi</em></td>
<td><em>Accipiter gentilis laingi</em></td>
<td>Nest sites</td>
<td>Illegal collection</td>
<td></td>
</tr>
<tr>
<td>subspecies</td>
<td>Species</td>
<td>Occurrence Sites</td>
<td>Threats</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>--------------------------</td>
<td>--------------------------</td>
<td>--------------------------------</td>
<td></td>
</tr>
<tr>
<td>Peregrine Falcon</td>
<td><em>Falco peregrinus</em></td>
<td>Nest sites</td>
<td>Illegal collection</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Indirect harassment</td>
<td></td>
</tr>
<tr>
<td>Prairie Falcon</td>
<td><em>Falco mexicanus</em></td>
<td>Nest sites</td>
<td>Illegal collection</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Indirect harassment</td>
<td></td>
</tr>
<tr>
<td>Sharp-tailed Grouse, <em>columbianus</em> subspecies</td>
<td><em>Tympanuchus phasianellus</em></td>
<td>Dancing grounds and leks</td>
<td>Indirect harassment</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 3. Sensitive Species at Risk Occurrences (Approximate Locations)**

**Figure 4. Non-Sensitive Species at Risk Occurrences**

Size of occurrence polygon reflects precision of location data. Cariboo and White Sturgeon omitted.
1.2.10. **HISTORICAL SPECIES**

There are a number of plant species known in the CCBA from old, historical records (Fig. 5). The occurrence of these species at or near the historical locations is doubtful; in any case the precision of the collection data is too poor to determine exactly where the specimens were found.

**Figure 5. Historical Species at Risk Occurrences**
Size of occurrence polygon reflects precision of location data. Cariboo and White Sturgeon omitted.

1.2.11. **FURBEARERS**

The CCLUP requires management for furbearers. Furbearers are mammals whose pelt or skins are harvested for commercial value. The Wildlife Act Designation and Exemption Regulation[^3] defines the species; Table 5 lists the 19 species of furbearers that are present in the CCBA.

**Table 5. Furbearers under the Wildlife Act that occur in the CCBA**
Common names have been updated to match those used by the Conservation Data Centre

<table>
<thead>
<tr>
<th>American Beaver</th>
<th>Fisher</th>
<th>American Marten</th>
<th>Northern River Otter</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Black Bear</td>
<td>Red Fox</td>
<td>American Mink</td>
<td>Striped Skunk</td>
</tr>
<tr>
<td>Bobcat</td>
<td>Least Weasel</td>
<td>Common Muskrat</td>
<td>Grey Wolf</td>
</tr>
<tr>
<td>Coyote</td>
<td>Long-tailed Weasel</td>
<td>Northern Flying Squirrel</td>
<td>Wolverine</td>
</tr>
<tr>
<td>Ermine</td>
<td>Canada Lynx</td>
<td>Red Squirrel</td>
<td></td>
</tr>
</tbody>
</table>

1.2.12. **HIGHER LEVEL PLANS**

The CCLUP is the only higher level plan relevant to the area covered by this report. *The Summary of CCLUP Legal Requirements and Non-legal Direction of 2005* summarizes its legal and non-legal direction[^4].

1.2.13. Karst Areas

There are many plants and ecosystems that are dependent on rock types that are rich in calcium and other minerals. These rock types are frequently, but not always, associated with karst topography, which is characterized by caves, sinkholes, disappearing streams, and underground drainage. Karst forms when groundwater dissolves pockets of limestone, dolomite, or gypsum in bedrock.

2. METHODS

2.1. SPECIES SUMMARIES

2.1.1. SPECIES LIST

An initial list of *Species at Risk* was developed by Cooper, Manning and Associates (2008); it was completely reviewed and revised by re-examining the original information sources, plus some minor additional sources. There were substantial changes to the original list.

A list of COSEWIC-listed, SARA-listed, and red/blue-listed species was obtained from the BC Conservation Data Centre for the CCBA, by Forest District. A list of species with other management concerns was compiled from a variety of sources, especially the CCLUP. The list of species that comprise furbearers was taken from the Wildlife Act. The resulting lists were compiled into a single Excel spreadsheet. All the species together are *species of management concern*, and the recommended management strategies reflect the various types and levels of concern.

2.1.2. SPECIES SUMMARY

The basic biological and ecological information was summarized for each individual species. The known sites in the CCBA were listed and mapped for rare species, where adequate data is available. Most rare bird species lack data for mapping, because the data used in the 4-volume book *Birds of British Columbia* has not been available to the Conservation Data Centre (it is now in the process of being acquired).

Accurate identification of most species generally requires the use of the references provided for each species, by someone experienced in identifying species in each specific group of organisms (botanist, herpetologist, entomologist, malacologist, ichthyologist, mammologist, ornithologist). Many general biologists and naturalists are also competent to identify many of the species in one or more of the major groups of organisms. Most species cannot be reliably identified by someone lacking experience in each group of organisms.

The description provided for each ecological (plant) community, in conjunction with use of the appropriate guide to site identification, should be sufficient for a forester experienced in site series classification to recognize the community. In a few cases detailed community descriptions are not presently available, but enough information has hopefully been provided to allow recognition of the community. Professional Foresters should be able to identify all the rare ecological communities, perhaps with supplementary training for the non-forested communities.

**Common Name**

The common name, also known as the English name, is provided for each species. It is the name given by the Conservation Data Centre; other sources may use other common names. Note that all common names are capitalized except for those of plants and ecological communities; in those two cases only proper names (such as names of people or countries) are capitalized. Capitalization of common names usually has no "official" standard, it is a matter of convention and personal preference; hence the CDC usage is accepted as the standard for this document.

**Scientific Name**

The scientific name, also known as the Latin name, is provided for each species. Note that a rigid set of rules requires that all scientific names have the genus capitalized and italicized, and the species, subspecies, and variety names lower case and italicized. For plants, terms such as "var." (variety) and "ssp." (subspecies) may be used as part of the scientific name; they are English words and therefore are not italicized. The CDC version of the scientific names is accepted as the standard for this document; other sources (especially older documents) may use other scientific names for the same species.

**Distribution**

The range and known locations (distribution) of each species were summarized to the extent it affects the management recommendations. In the case of rare ecosystems, the Biogeoclimatic (BGC) Ecosystem Classification variants(s) in which occurrence is known defines the range. Only BGC Variants that occur within the BCTS-Cariboo area are listed; the ecological community may occur elsewhere in other variants. The BGC units are given for individual species where relevant.

It is important to note that the CDC was, at the time of writing this report, still using Version 6 of the BGC map. Version 7 has been available since May 2008, and has significant changes from the previous version. All the maps in this report use Version 7.

**Distribution Map**

The distribution (= known locations) of each species in the CCBA is mapped, where the species is not a “sensitive species” (Table 4). A map illustrating the known distribution of each species is included, where sufficient data is available from the CDC or other sources and where the species is not “sensitive”. Most of the available distribution data is from an ArcView shapefile provided by the Conservation Data Centre. Some distribution data was obtained from other sources, and is noted as such.

A GIS database of known occurrences (sites) of rare species was obtained from the Conservation Data Centre (CDC), in the form of an ArcView shapefile map layer (Fig. 4). A significant source of additional data was an Excel spreadsheet provided by Regional MoE (Williams Lake). The map has each occurrence shown as a circle that reflects the degree of precision of the coordinates for each record of an occurrence, or as a polygon for populations inhabiting an area of land. Many of the older species occurrence records have very imprecise location information, and hence the circle for such sites may be
very large. Supplementary plant data was obtained from the CDC as an Excel spreadsheet with coordinates – the Excel spreadsheet was converted to an ArcView shapefile to map the locations. Unfortunately the CDC database is not complete and is not always accurate; this reflects their low funding and staffing levels. Therefore care was taken to address these issues when using their data. The issues identified during the preparation of this report are mentioned in the text, and the CDC has been notified so that they can update their database. Historical records (species occurrences that may or may not still exist) are especially lacking in the CDC database, and are unlikely to be added very soon. The few that are in the database (all are plants) are shown in Figure 5. Some additional data was obtained from the E-Flora BC website’s interactive mapping.

Records with imprecise location data have correspondingly low usefulness in operational planning. During annual updates, it will be advisable to contact Regional sources and ask for location records that may not have been sent to the CDC. The CDC database lacks many records of species, because those involved have not provided the CDC with the information.

Illustration

An illustration of each species is provided where it was obtained by Cooper, Manning, and Associates (2008), or there was another immediately available. Space has been left in most species accounts to allow insertion of illustrations when acquired.

2.1.3. Species Range and Distribution

The Forest Districts in which the species occur are tabulated.

2.1.4. Conservation Status

The conservation status, for the various categories discussed in the Introduction, was tabulated by Forest District.

2.1.5. Forest Management Issues and Risk Assessment

Forest management issues relevant to the species were summarized, with a risk assessment for each aspect of forest operations. For the risk assessment, the known locations, habitat, and ecology of each species was reviewed to determine potential impacts by forest operations, based on

- the probability of the species being affected,
- the legal or policy implications of the species being affected, and
- the significance of the effect on the conservation status or management objectives for the species.

The phase of forest operations that might impact the species as also determined. This risk assessment is discussed in more detail in Section 2.2.

2.1.6. Management Direction

The existing management objectives and strategies were summarized for each species. The references used in this review are provided at the end of the Introduction (complete list), with the relevant references listed at the end of each species discussion. References that are recent compilations of information specific to BC that have undergone extensive peer review include

- Identified Wildlife Volume 1 (1997; 1999),
- Land Use Plan (CCLUP),
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada) species status reports
- Species Recovery Strategies and Plans
- BC Conservation Data Centre reports,
Species of Management Concern BCTS Cariboo Region

- Ministry of Forests guides to site identification and interpretation,
- Wetlands of BC book,
- E-Flora BC and E-Fauna BC websites.

Wildlife Habitat Areas are noted, where legally designated. All species that have been designated Identified Wildlife were reviewed to determine which have had WHAs established or WHAs have been incompletely established, or other management measures implemented. Apparently no species presently have the government-allocated full complement of WHAs established. It should be noted that, in any case, WHAs alone will not be sufficient for adequate management of most species – WHAs will only protect known critical sites.

There are five Wildlife Habitat Areas in the BCTS CCBA that are “data sensitive” (Table 6). BCTS will need to contact the MoE Regional Species at Risk Specialist (Julie Steciw) to obtain information on which species are involved, and the exact locations of the sites.

Table 6. Data Sensitive Wildlife Habitat Areas

<table>
<thead>
<tr>
<th>WHA Number</th>
<th>WHA Name</th>
<th>Forest District Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-003</td>
<td>West Hanceville</td>
<td>Chilcotin</td>
</tr>
<tr>
<td>5-004</td>
<td>Sword Creek</td>
<td>Central Cariboo</td>
</tr>
<tr>
<td>5-005</td>
<td>Doc English Gulch</td>
<td>Central Cariboo</td>
</tr>
<tr>
<td>5-062</td>
<td>Milburn</td>
<td>Quesnel</td>
</tr>
<tr>
<td>5-730</td>
<td>Heron Lake</td>
<td>Quesnel</td>
</tr>
</tbody>
</table>

2.1.7. MANAGEMENT OBJECTIVES AND STRATEGIES

Strategies were developed to ensure that each species will be adequately managed when there is interaction with BCTS operations. In many cases, most of the measures that are actually required to sustain the species are in the scope of activities of government or other industries – forest development effects on the species may be peripheral. In a few cases, it is noted that forest development may have a positive effect on a species by improving or creating habitat.

A recommended management strategy was developed, addressing stand level and landscape level species management during forest operations. The management strategies are designed to take effect only when forest operations are planned in an area important to a species.

These strategies provide advice to BCTS as to the actions that should be taken during forest harvesting to meet the stated objective for each species. It is the responsibility of Professional Foresters to weigh these objectives and strategies against other, possibly conflicting, objectives and strategies relevant to the forest land base when planning forest operations. None of strategies included in this document are knowingly in conflict with each other.

Legal requirements such as higher level plan direction, FPPR Section 7 notices, and legislative changes, may over-ride the report’s management recommendations. Management of species should follow the highest standard set by either the legal requirements or these management strategies.

Government has not provided explicit management objectives useful for developing forest management strategies for most species. Therefore the first step for each species was to develop an overall objective. In most cases the objectives are as listed in Table 7, but there is some species-specific variation.
Table 7. Data Sensitive Wildlife Habitat Areas

<table>
<thead>
<tr>
<th>Conservation Status</th>
<th>Level of Protection</th>
<th>Summary of Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue-listed (BC)</td>
<td>Protect 70% of occurrences</td>
<td>Where possible, avoid harming all known populations, in recognition that you will unknowingly harm some unrecorded populations</td>
</tr>
<tr>
<td>Special Concern</td>
<td>Protect 80% of occurrences</td>
<td>Inventory to determine if the species is present, but loss of an occasional population is acceptable.</td>
</tr>
<tr>
<td>(Canada)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue-listed and globally uncommon</td>
<td>Protect 85% of occurrences</td>
<td>Inventory to determine if the species is present, but loss of a very occasional population is acceptable.</td>
</tr>
<tr>
<td>Red-listed (BC)</td>
<td>Protect 100% of occurrences</td>
<td>Extraordinary measures to protect all populations are warranted</td>
</tr>
<tr>
<td>Threatened, Endangered (Canada)</td>
<td>Protect 100% of occurrences</td>
<td>Extraordinary measures to protect all populations are warranted</td>
</tr>
</tbody>
</table>

The strategies developed for management of each species were based on
- the potential impact of forest operations,
- the probability of impact by forest operations,
- the conservation status of the species, and
- the existing management objectives, recommendations and/or government direction.

Included in the assessment process was considerable personal knowledge and experience with fish, wildlife, biodiversity, and ecosystems in general, as well as personal knowledge of either the species concerned or ecologically similar species.

The management strategies refer to “known” (in the sense that the site has been recorded, and BCTS has acquired the information, not in a legal sense) and “unrecorded” occurrences. The intent is that the number of “known” occurrences will increase with time as additional sites are found, and that the management recommendations will apply to these new sites as well as those known when the report is written.

The management recommendations provided in this report are often quite prescriptive, to make them clearly understandable. If the management recommendations will not work for a particular site, such as if there is no alternative road location other than where it will adversely impact a species at risk, consultation with a biologist or other specialist regarding mitigation and/or compensation measures may be advisable. The management recommendations for ecological communities sometimes include significant buffer widths; they are derived from examples of biologically similar communities in Identified Wildlife 2004, which have undergone extensive peer review. They are therefore the best available management recommendations.

For red-listed species, maintaining the viability of each individual population is critical to maintain the species as a whole. The species is red-listed because it is very rare, with very few occurrences (< 20, or rapidly declining). In the “best-case” scenario, loss of viability of one population from a threatened species with 20 populations would result in the loss of 5% of the populations of the species. In most cases there are under 20 populations of a red-listed species, hence much more than 5% of the populations would be lost. For most populations of most red-listed species the general objective is to avoid all impacts to a population, because the amount of impact that is possible without compromising the viability of a population is unknown and will be unique to every site. If this objective cannot be met, a biologist should be consulted regarding mitigation and/or compensation measures.

For blue-listed species (provincially special concern), maintaining the viability of each individual population is probably not required to maintain the species as a whole. However, the objective should be to maintain the majority of the populations in good condition.
2.1.8. REFERENCES

The published sources for the information used in each species account were listed as references at the end of each species discussion. Wherever possible references available on the internet were chosen, from the many that are frequently available.

2.2. RISK ASSESSMENT

The risk rating system is designed to identify the likelihood that a BCTS forestry activity will adversely affect a species at risk, when forest operations are planned in an area important to a species. There is a “total risk rating” category, calculated through use of a formula to integrate the “consequences of interaction” (split into “biological” and “legal/policy” consequences) with the “probability of interaction”. BCTS may choose to use this total risk rating as a first approximation of prioritization, if not all management recommendations can be addressed at one time.

Each identified plant, animal, and ecological community was compared to the BCTS operational phases and rated accordingly. The ratings were determined through review of habitat requirements for each species and comparing those with the specifics of each BCTS activity. Future reviews of activities or changes in species information may lead to future changes in the risk ratings.

2.2.1. RISK ASSESSMENT OF INTERACTION WITH OPERATIONAL COMPONENTS

A risk assessment is included in the “Forest Management Issues and Risk Assessment” section of each individual species treatment. These individual species risk assessments are compiled in a separate Excel spreadsheet. The spreadsheet provides the opportunity to sort the species by any of the variables in the spreadsheet. The operational management recommendations and the risk ratings are consistent for each species.

The total risk rating reflects the legal and specified non-legal management direction or rankings. It is the product of the combination of the probability of interaction x the consequence of interaction.

The probability of interaction (Table 8) is the known or judged probability of interaction with BCTS forest management activities (influence or alteration on the species or its’ habitat), based on the entire range of activities undertaken by BCTS. The largest group of species will be potentially affected only by road construction, because the sites are not suitable for harvesting. There are actually two types of “probability of interaction”. One is “the probability of operations occurring at the same location as a species occurrence (known or unknown)”. The other is “the probability of operations affecting a species, if operations occur at the same location as a species occurrence”. These two options are lumped together as a single variable, because of difficulty in determining the probability of operations occurring in the same location as a species occurrence.

The consequence of interaction with a species has been split into two components – the legal/policy consequence of the influence or alteration (Table 9), and the biological consequence of the influence or alteration (Table 10). There may be a high legal consequence of not managing for a species where there is a legal requirement, but the biological consequence could be anywhere from low to high (and vice-versa). The degree of policy emphasis that was chosen is a logical ordering based on various levels of recognized conservation concern – neither BCTS nor Government has an explicit management policy for most species. The ranking of biological consequences has been done using a logical hierarchy. The equation used for calculating the total value was somewhat arbitrarily created but seems to result in a logical ordering of risk.

The interaction with operational phase was ranked as in Table 11.
### Table 8. Probability of Forestry Interaction with a Species

<table>
<thead>
<tr>
<th>Probability</th>
<th>Species Habitat</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>Habitat is not available for Crown land forest development, or is very unlikely to be unaffected by forest operations BCTS development activities</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>- Parks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Private land</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Indian Reserves</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- S1 river; Lakes &gt;= 1000 ha</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Non-forested subalpine, alpine</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Habitat is uncommonly or little affected by BCTS development activities</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- S2, S3 stream</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Non-forested or non-commercial forested terrestrial</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Classified lakes &lt; 1000 ha</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Classified wetlands</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Cliffs</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>Habitat is commonly affected by BCTS development activities</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>- Commercial deciduous forest</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Commercial riparian forest areas of streams, lakes or wetlands</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Commercial conifer forest habitats</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Habitat is S4, S5, S6 streams, non-classified lakes or wetlands.</td>
<td></td>
</tr>
</tbody>
</table>

### Table 9. Legal/Policy Consequence of Forestry Interaction with a Species

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Legal or Policy Direction</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low policy concerns</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- CDC blue-listed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- CCLUP general species at risk, biodiversity, furbearer direction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- COSEWIC assessment candidate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- COSEWIC-SC but not SARA-listed.</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Moderate policy concerns</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>- CDC red-listed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- COSEWIC-T, E, or DD, but not SARA-listed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- CCLUP non-legal (policy) objective</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- SARA-SC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- SARA-Schedule 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- IWMS (2004)</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>High policy and legal concerns</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>- SARA-E (Schedule 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- SARA-T (Schedule 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Wildlife Amendment Act species</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- GAR Order</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Section 7 Notice</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- HLP legal objective</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Fisheries Act</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Migratory Birds Convention Act</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- SARA-listed on Federal land</td>
<td></td>
</tr>
</tbody>
</table>
Table 10. Biological Consequence of Forestry Interaction with a Species

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Biological Impact in the absence of Special Management</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil - Low</td>
<td>Low impact of forest operations</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>• Habitat suitability will not be significantly reduced</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ecological community will not be significantly reduced</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Population size and viability will not be significantly reduced</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>Moderate impact of forest operations</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>• Habitat suitability will be significantly reduced (blue-listed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ecological community will be significantly damaged, but will recover</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Population size and viability will be significantly reduced, possibly to zero (blue-listed)</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>High impact of forest operations</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>• Habitat suitability will be permanently damaged or destroyed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ecological community will be damaged (red-listed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Population size and viability will be significantly reduced (red-listed, or blue-listed but globally uncommon)</td>
<td></td>
</tr>
</tbody>
</table>

Table 11. Risk of Interaction with Phases of Forestry Operations

<table>
<thead>
<tr>
<th>Rank</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Minimal risk or contact between species and activity</td>
</tr>
<tr>
<td>1</td>
<td>Species is known to utilize similar habitat as activity therefore there is a potential for interactions between species and activity.</td>
</tr>
<tr>
<td>2</td>
<td>Known interactions or effects on species by activity, or high likelihood of interactions</td>
</tr>
</tbody>
</table>

2.2.2. BC GOVERNMENT CONSERVATION FRAMEWORK

The British Columbia government has established three conservation goals:

1. To contribute to global efforts for species and ecosystem conservation
2. To prevent species and ecosystems from becoming at risk.
3. To maintain the diversity of native species and ecosystems

The Conservation Framework is the approach chosen to achieve these goals\(^5\). It is being developed by the Ministry of Environment in collaboration with scientists, conservation organizations, industry and government. It uses clearly defined scientific criteria to determine priorities and the most appropriate management actions for species and ecosystems of conservation concern. The process starts with prioritization, followed by determination of appropriate actions to be taken, and then implementation of those actions. To date, more than 3,000 species have been run through the Conservation Framework tools, with about the same number scheduled to be assessed over the next three years.

1. **Priorities** range from rank of 1 (highest) through 6 (lowest). Prioritization is based on five criteria:
   - global and provincial status,
   - population trend,
   - threats,
   - stewardship responsibility,
   - feasibility of recovery.

2. **Actions** required for each species with a high conservation priority rank are then determined. Actions are grouped into **assessing, planning & listing**, and **acting** (Table 12).

3. **Implementation** requirements will determine the conservation activities conducted by the Ministry of Environment, as part of the annual business planning cycle. Actions will be implemented by allocating resources to priority species and ecosystems.

The **Ecosystem Component** of the Conservation Framework is under development, led by staff at the Ministry of Environment in collaboration with scientists from universities, government and conservation organizations. This component will address ecosystem conservation at both a fine and a coarse scale.

The **Conservation Framework** has not been directly used in this report, because it is only partially implemented and the results incomplete. However, the key principles used by the **Conservation Framework** are reflected in this report through the approaches taken to assess each species and recommend management strategies. The next revision of this report should consider the results of the **Conservation Framework** in more detail.

**Table 12. Conservation Framework Action Groups for Species in British Columbia**

<table>
<thead>
<tr>
<th>Category</th>
<th>Conservation Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessing</td>
<td>Re-assess status rank</td>
<td>Latest trend and threat information may not be incorporated: return to CDC (S-ranks) or NatureServe (G-ranks) for re-evaluation.</td>
</tr>
<tr>
<td></td>
<td>Detailed assessment inventory</td>
<td>Compile or update a detailed assessment (status report). May require research on threats, trends, habitat use, life history or demography.</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
<td>Monitor the species or its habitat at an interval appropriate to the life history of the organism. May require research on monitoring techniques.</td>
</tr>
<tr>
<td></td>
<td>Taxonomic studies</td>
<td>Invest in taxonomic studies to determine taxonomic validity.</td>
</tr>
<tr>
<td>Planning &amp; Listing</td>
<td>Planning processes</td>
<td>Includes preparing a Management Plan or Recovery Strategy and Action Plan, or updating an existing plan; also includes implementing and monitoring effectiveness of the plan and monitoring the effect on the population or habitat of the species.</td>
</tr>
<tr>
<td></td>
<td>Send to COSEWIC</td>
<td>Send to COSEWIC for assessment as a first step to listing under the federal Species at Risk Act as Extirpated, Endangered, Threatened, or Special Concern or for delisting under that process.</td>
</tr>
<tr>
<td></td>
<td>Legal listing processes</td>
<td>List under Wildlife Act as an Extirpated, Endangered or Threatened species. Includes describing residences as per the provisions of the act where warranted.</td>
</tr>
<tr>
<td>Acting</td>
<td>Habitat protection tools</td>
<td>Assign to appropriate habitat management tool(s) (e.g., Forest and Range Practices Act, stewardship, land use planning, protected area, wildlife management area). May require research on habitat needs and more information about where species is located.</td>
</tr>
<tr>
<td></td>
<td>Non-habitat conservation tools</td>
<td>Assign to appropriate non-habitat tools (e.g. captive breeding, translocation, alien species control, predator or competitor control, public education). May require research and monitoring.</td>
</tr>
<tr>
<td></td>
<td>Adjust harvest levels</td>
<td>Adjust harvest levels and/or increase penalties and enforcement.</td>
</tr>
<tr>
<td></td>
<td>No new action</td>
<td>Existing management is effective, no additional conservation action is warranted. Assess whether ongoing programs need to be maintained. May require effectiveness evaluation of existing activities and monitoring of the species and habitat.</td>
</tr>
</tbody>
</table>
3. RESULTS AND DISCUSSION

3.1. SPECIES LIST AND RISK ASSESSMENT SUMMARY

There were 265 species assessed for this report (Table 13). Two bird species were added to the initial lists of species at risk provided by the Conservation Data Centre for the three Forest Districts in the CCBA – California Gull and Rusty Blackbird. Two species were removed from the initial CDC lists – Autumn Meadowhawk (dragonfly) and Fischer’s Chickweed (plant); neither of these species actually occurs in the CCBA. There were also 13 ecological communities determined to not actually occur in the CCBA. The CDC has been notified of these errors. There are therefore a total of 250 species of management concern in the CCBA; the list is provided as a separate Excel spreadsheet.

The “forest management risk rank” can be used as a first approximation of management priority, because it is calculated from a combination of the probability of impacts occurring at some time during forest operations, the legal/policy requirements for management, and the biological consequences of impacting the species. The forest management risk ranks are provided in the individual species treatments, and consolidated in the spreadsheet. A summary of the risk ranks is provided in Table 13.

Table 13. Forest Management Risk Summary

<table>
<thead>
<tr>
<th>SPECIES GROUP</th>
<th>HIGH Score 10-12</th>
<th>MEDIUM Score 6-9</th>
<th>LOW Score 1-5</th>
<th>NONE Score 0</th>
<th>TOTAL SPECIES</th>
<th>DELETED FROM LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insects, Molluscs</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>5</td>
<td>(2)</td>
</tr>
<tr>
<td>Amphibians, Reptiles</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td>4</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>Mammals</td>
<td>7</td>
<td>20</td>
<td>2</td>
<td>3</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Birds</td>
<td>12</td>
<td>12</td>
<td>2</td>
<td>2</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Plants – Mosses</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Plants – Vascular</td>
<td>3</td>
<td>55</td>
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<td>14</td>
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<tr>
<td>SUBTOTALS</td>
<td>33</td>
<td>89</td>
<td>9</td>
<td>20</td>
<td>151</td>
<td>(2)</td>
</tr>
<tr>
<td>Communities – Forested</td>
<td>12</td>
<td>31</td>
<td>1</td>
<td>0</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>Communities – Coastal</td>
<td>7</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Communities – Shrubland</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Communities – Herbaceous</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Communities – Wetland/Transition</td>
<td>5</td>
<td>11</td>
<td>0</td>
<td>12</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>SUBTOTALS</td>
<td>33</td>
<td>52</td>
<td>1</td>
<td>13</td>
<td>99</td>
<td>(13)</td>
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<td>TOTALS</td>
<td>66</td>
<td>141</td>
<td>10</td>
<td>33</td>
<td>250</td>
<td>(15)</td>
</tr>
</tbody>
</table>

3.2. SPECIES ASSESSMENTS

The assessments of each of the species that occur in the BCTS Business Area are provided in Section 5. The species and ecosystems that were deleted are listed at the end of Section 5 as “Extralimital Species”, until they are no longer listed by the CDC as occurring in the CCBA, so that they can be accounted for during monitoring.
3.3. RECOMMENDATIONS

1. The map products of the TEM projects in the CCBA should be consolidated, error-checked, and the community codes made consistent. The PEM map products should then be integrated with the TEM. An ArcView layer will then be available that is useable for identifying the probable locations of most of the rare ecological communities in the CCBA, subject to field confirmation.

2. The available data for known locations is dispersed through half a dozen shapefiles and Excel spreadsheets. The data should be consolidated into one or two shapefiles, so that it can be easily overlaid onto development planning maps.

3. There are a small number of species for which general reconnaissance inventory in the CCBA is recommended, presumably using FIA funding. These are globally uncommon to rare species for which little information is available on which to base management strategies, and yet forestry operations potentially will have strong adverse effects. The first priority species is the Magnum Mantleslug, with the upswept moonwort second priority, and stalked moonwort third priority.
4. REFERENCES

4.1. LEGISLATION, REGULATIONS, AND ORDERS


4.2. LITERATURE AND WEBSITES

This list includes the literature cited in the general report sections, as well as those in the individual species treatments.


Species of Management Concern BCTS Cariboo Region


Species of Management Concern BCTS Cariboo Region


Species of Management Concern BCTS Cariboo Region


http://www.mollus.ca/tgc/pdfs/Key_to_Slugs.pdf.

http://www.ou.edu/cas/botany-micro/ben/ben320.html.

Victoria, BC: Ministry of Environment, Lands and Parks, Wildlife Branch and Resources Inventory Branch. 


Government of Canada. 2008. Order Giving Notice of Decisions not to add Certain Species to the List of 
http://www.sararegistry.gc.ca/virtual_sara/files/orders/g2%2D14008%5Fe%2Epdf.

Govindarajulu, P. P. 2008. Literature review of impacts of glyphosate herbicide on amphibians: What risks can the silvicultural use of this herbicide pose for amphibians in B.C.? B.C. Ministry of Environment, 

Green, R.N., and K. Klinka. 1994. A field guide to site identification and interpretation for the Vancouver 


Columbia: final summary report (1999-2002). HCTF report by Osiris Wildlife Consulting, Victoria, BC and 


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Species of Management Concern BCTS Cariboo Region

Ministry of Environment, Lands and Parks, Vancouver Island Region.


5. INVERTEBRATES
1. **JUTTA ARCTIC, CHERMOCKI SUBSPECIES**

1.1 **Species Summary: Identification and Habitat**

Jutta Arctic, *chermocki* subspecies (*Oeneis jutta chermocki*) is a medium-size butterfly that is dark grey-brown above, and the underside of the hindwings is striated with grey and brown, resembling bark. Near the margin of the upperside of the forewings and hindwings is a row of orange brown patches, some of which contain eyespots. Males have a prominent dark sex patch on the dorsal forewing, and the orange patches are enlarged in females. Jutta Arctics fly in June and July, in black spruce bogs and open wet white spruce forests in the CCBA (C. Guppy, unpubl. data). Elsewhere they also fly in other habitats. Males establish territories in open areas, and have favourite perches from which they dart out to see whether something flying by is a female. Females fly apparently aimlessly through the habitat. The local larval foodplants are unknown, but are likely wet habitat sedges (*Carex*, *Eriophorum*, etc.).

They probably occur in most black spruce bogs and many open, wet white spruce forests in most parts of the CCBA; the present lack of records is due to lack of inventory (C. Guppy). The only inventory that has been done is a few historical collections, and some recent collecting by C. Guppy. Map data is from Guppy and Shepard (2001) and C. Guppy (unpubl. data).

![underside Photos © Crispin Guppy](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Quesnel</td>
<td>G5T4Q</td>
<td>S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.2 **Management Direction**

Management direction is provided by CCLUP direction to manage for species at risk, and biodiversity and riparian management in general.

1.3 **Forest Management Issues and Risk Assessment**

Forest management issues are minimal, because there is little road construction or harvesting in the black spruce bog and open wet white spruce forest habitats. Where there is harvesting, most sites will only be partially harvested, due to the wet soils, and the butterfly will recolonize rapidly as the forest regenerates.
### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### 1.4 MANAGEMENT STRATEGY

None required.

### 1.5 REFERENCES AND ADDITIONAL INFORMATION


2. ROCKSLIDE CHECKERSPOT

2.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Rockslide Checkerspot (*Chlosyne whitneyi*) is a small butterfly occurs only above timberline and, for that reason alone, cannot be confused with other *Chlosyne* species. The dorsal forewing has fewer black markings than the other two BC *Chlosyne* species. On the underside of the hindwings the light coloured spots are much whiter than for other *Chlosyne* species.

It flies from mid-July to early August in normal years, but until early September when snow melt is delayed. Nothing is known of the larval foodplant or overwintering stage. In the CCBA it is only known from the Itcha Ilgachuz Park. However, it is likely to occur in alpine areas along the Coast Range, and possibly even in the Cariboo Mountains.

The Conservation Data Centre incorrectly lists this species as occurring in the “ESSF; IDF; MS; PP”. In reality it occurs only in the alpine and high subalpine; it does not occur at low elevations. The map data is from Guppy and Shepard (2001).

![underside Photos © Crispin Guppy](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilcotin</td>
<td>G4G5</td>
<td>S3S4</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.2 MANAGEMENT DIRECTION

Management direction is provided by CCLUP direction to manage for species at risk, and biodiversity management in general.

2.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

This species lives in alpine rockslide habitats that will not be affected by forest operations.
## Total Risk Ranking

A = Probability of Interaction
B = Legal Consequence of Interaction
C = Biological Consequence of Interaction

Risk Ranking = A \times (B + C)

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Planning</td>
<td>Road Construction</td>
<td>Bridge Removal</td>
<td>Site Preparation</td>
</tr>
<tr>
<td></td>
<td>Area Layout</td>
<td>Road Maintenance</td>
<td>Falling</td>
<td>Planning</td>
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<td>Road Deactivation</td>
<td>Yarding</td>
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<td></td>
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<td>Bridge Installation</td>
<td>Stacking</td>
<td>Density Management</td>
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<td></td>
<td></td>
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<td>Loading</td>
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<tr>
<td>0</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
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</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### 2.4 Management Strategy

None required.

### 2.5 References and Additional Information


3. FORCIPATE EMERALD

3.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Forcipate Emerald (*Somatochlora forcipata*) is a medium-size “green-eyed” dragonfly. The thorax sides have two whitish oval spots. The abdomen has small, dull-yellow spots (on segments 5 to 8 on males, and 3 to 7 on females), which are usually absent on the more common Mountain Emerald (*S. semicircularis*).

They inhabit pools in bogs and small mountain streams. The adults are in flight mid-June to early August.

The Conservation Data Centre is incorrect in listing this species as known from the Quesnel Forest District. The nearest site was discovered by C. Guppy, in the sphagnum bog of the Ecological Reserve near Cinema, north of Quesnel in the Prince George FD. However, they probably do occur in the east end of the Quesnel Forest District. They are known to occur in the ESSF, MS, SBPS, and SBS. The map data was obtained through the MoE *Species Inventory Web Explorer* [http://a100.gov.bc.ca/pub/siwe/search_reset.do](http://a100.gov.bc.ca/pub/siwe/search_reset.do).

![Map of Quesnel Forest District with the location of Forcipate Emerald](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED</th>
<th>COSEWIC WILDLIFE</th>
<th>SARA SCHEDULE</th>
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</thead>
<tbody>
<tr>
<td>Quesnel</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

3.2 MANAGEMENT DIRECTION

Management direction is provided by CCLUP direction to manage for species at risk, and biodiversity management in general.

3.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect the aquatic habitats of Forcipate Emerald, through road construction.
3.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Forcipate Emerald.

Overall Objective

Retain 100% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status, and may eliminate it from the Cariboo Region.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the aquatic habitat feature, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - Avoid concentrating and/or diverting adjacent water flows into or away from the habitat.
- If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

None.

3.5 REFERENCES AND ADDITIONAL INFORMATION


4. HAGEN'S BLUET

4.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Hagen's Bluet (*Enallagma hageni*) is a blue and black striped damselfly. Males have a broad black shoulder stripe, and the abdomen has more blue than black. The black color is most extensive on abdominal segments six and seven. Segments eight and nine are entirely blue. Immature males have a tan coloration in place of the blue. The lighter color on females is variable – blue, tan, or greenish, with an abdomen that is mostly black on top. Only an expert can reliably distinguish Hagen’s Bluet from similar common species of damselflies, using the shape of the male appendages on the tip of the abdomen.

They inhabit ponds, lakes, and slow-moving streams, with a preference for acid (bog) conditions. They are known to occur in most BGC zones in the CCBA – BG, ESSF, ICH, IDF, and MS, east of the Fraser River in Quesnel and Central Cariboo Forest District.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Quesnel</td>
<td>G5</td>
<td>S3S4</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.2 MANAGEMENT DIRECTION

Management direction is provided by CCLUP direction to manage for species at risk, and biodiversity management in general.

4.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect the aquatic habitats of Hagen's Bluet, through road construction.
4.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Hagen's Bluet.

Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a $\geq 30$ m buffer between the edge of the bladed road right-of-way and the edge of the aquatic habitat feature, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - Avoid concentrating and/or diverting adjacent water flows into or away from the habitat
- If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

None.

4.5 REFERENCES AND ADDITIONAL INFORMATION


5. MAGNUM MANTLESLUG

5.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Magnum Mantleslug (*Magripelta mycophaga*) is a medium-size native slug. It is light brown with darker spots and paired dark brown mantle stripes on the mantle. The mantle is very large, smooth or slightly granular with no folds or ridges, covering ¾ of the length of the animal. It is the only BC species with such a large mantle; it grows to 7 cm long. An image is available at http://www.mollus.ca/rforsyth/bc/cd.

The species exists in spotty occurrences and at low densities throughout its BC range. It prefers cool, moist relatively undisturbed forest with an intact duff layer, such as occurs in moist valleys, ravines, and talus areas. It lives under moist logs, pieces of bark, in depressions in moist earth and within talus. A specific example of habitat, from a subalpine area in the Kootenays (Mt. Fernie massive), was in a very moist microsite along a seepage and a small creek with a water fall; the site had a dense growth of shrubs and herbs (Kristiina Ovaska, pers. comm.). It is important that habitat is protected from desiccation; hence it does not survive in clearcuts or small retention patches. The slug is absent from all but undisturbed sites. Magnum Mantleslug feeds on green plant material, possibly including moss, and fungi.

Harvesting and road construction destroy the habitat of this species. Its ability to recolonize after forest regeneration is unknown, but, given the low mobility of slugs in general, is likely to be slow and short-distance. This species occurs in habitats that are routinely affected by road construction and harvesting, with habitat within and adjacent to operations being made completely unsuitable for the species. Therefore forest operations may significantly adversely affect its conservation status, and forest operations will be the primary cause of any worsening of the conservation status.

It is known from the ESSF, ICH, IDF, and MS. No location data for the CCBA was available for this report. Two experts on terrestrial molluscs, Robert Forsyth and Kristiina Ovaska, were consulted, but they could supply little information. This species is at the "rare end" of the blue-list, with a rank of S2S3, and it is globally uncommon with a significant proportion of the global population in BC. Therefore there should be extra effort to conserve this species.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo</td>
<td>G3</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.2 MANAGEMENT DIRECTION

Management direction is provided by CCLUP direction to manage for species at risk, and biodiversity management in general.

5.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect the Magnum Mantleslug through road construction and harvesting.
### 5.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Magnum Mantleslug.

**Overall Objective**

Retain 85% of occurrences of this globally uncommon and blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its global conservation status.

**Stand Level**

Strategies to address known occurrences of this species are:

- Map patches of potential habitat (defined above) within the area proposed for development that are at or near a known Magnum Mantleslug site.
  - **Option 1:** Reserve areas of potential habitat from development, with a 100 – 200 m buffer to minimize the loss of interior forest condition.
  - **Option 2:** Inventory the patches of potential habitat to determine which are actually used by the slug. Develop a management strategy for the development area in consultation with a biologist.

**Landscape Level**

This species is globally uncommon, with a significant proportion of the global population in BC. There is therefore an extra responsibility to manage for this species. However, lack of inventory data and lack of well defined habitat descriptions prevents effective management of the species during forest operations. To provide additional information for this species to permit meaningful management for the species during forest operations:

- Conduct a Magnum Mantleslug, and Magnum Mantleslug habitat, reconnaissance inventory for the CCBA. Given the wide potential range of the species this inventory will need to be stratified by BGC unit and habitat type. A primary objective of the inventory should be to describe the habitats used by the species, to allow predictions of occurrence/absence by habitat type; hence as much of the inventory as possible should occur in areas with Terrestrial Ecosystem Mapping and Predictive Ecosystem Mapping, to enable correlations with TEM and PEM habitat types.
  - Record all other terrestrial molluscs encountered.
  - Record all moonwort plant species at risk encountered – they are also highly susceptible to forest operations, are poorly inventoried, are globally uncommon, and some species use moist forest floor habitats similar to some Magnum Mantleslug habitat.

### Table: Total Risk Ranking and Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Risk Ranking</strong></td>
<td>Planning, Area Layout, Road Construction, Road Maintenance, Road Deactivation, Bridge Installation, Bridge Removal, Falling, Yarding, Skidding, Forwarding, Loading, Processing, Handling, Site Preparation, Planting, Vegetation Management, Density Management</td>
<td>Density Management</td>
<td>Density Management</td>
<td>Density Management</td>
</tr>
<tr>
<td><strong>A</strong> Probability of Interaction</td>
<td><strong>B</strong> Legal Consequence of Interaction</td>
<td><strong>C</strong> Biological Consequence of Interaction</td>
<td><strong>Risk Ranking</strong></td>
<td><strong>Risk Ranking</strong></td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

### Risk Ranking Calculation

\[ \text{Risk Ranking} = A \times (B + C) \]
5.5 REFERENCES AND ADDITIONAL INFORMATION


6. AMPHIBIANS AND REPTILES
6. GREAT BASIN SPADEFOOT

6.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Great Basin Spadefoot (*Spea intermontana*) is the only spadefoot toad in British Columbia. It differs from the Western Toad by having eyes with **vertical pupils** (not horizontal), **no visible parotid gland** (a conspicuous, oval smooth area) on each side of the head, and **relatively smooth skin** (not very "warty"). It has well-developed, sharp-edged black tubercles or “spades” on the bottom of each hind foot, which are used for burrowing. The under surface is cream coloured or white, whereas the dorsal surface may be olive or grey with spots or streaks. The basic body shape is "rotund", rather than relatively elongated and slender body of frogs.

Spadefoots live in semi-arid habitats such as bunchgrass grasslands, sagebrush steppe, and open ponderosa pine or Douglas-fir forests in the BGxh, BGxw, IDFdk3, IDFxw, and are known in 100 Mile Forest District from the IDFdk3. No sites are known in the Central Cariboo FD, but likely exist. Spadefoots escape dry conditions by retreating into underground refuges such as small mammal burrows or by burrowing into the soil. Loose and deep soils provide suitable burrowing habitat. They may also retreat under coarse woody debris. They typically breed in shallow pools that dry up by early to mid-summer, but also use shallow water of permanent ponds and lakes; some ephemeral pools are used in “wet” years but not in dry years. Eggs are attached to vegetation or other floating or submerged objects in small, loose, irregularly shaped clusters. They forage in semi-arid grasslands, shrublands, and open woodlands with sandy soil. Adults prey on a variety of invertebrates including earthworms, ants, beetles, crickets, and flies. They forage at night, particularly in warm (>12°C) wet conditions, and are seldom seen during the day. The distinct, loud advertisement calls of male Spadefoots can be heard during the mating season. Great Basin Spadefoots hibernate underground for the winter, often in small mammal burrows, at depths of 0.5 – 1.0m.

Great Basin Spadefoot is protected in that they cannot be killed, collected, or held in captivity without special permits, under the provincial *Wildlife Act*. A *Recovery Strategy* for Great Basin Spadefoot Toad has not yet been finalized; the timing of a final *Recovery Plan* (Recovery Strategy plus an Action Plan) is unknown. The Great Basin Spadefoot populations in the BC south Cariboo Region are likely to be genetically isolated from populations further south; therefore there is extra concern for conservation.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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<td>BGxh; BGxw; IDFdk3; IDFxw; IDFxm; IDFdk3</td>
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<td>G5</td>
<td>S3</td>
<td>Blue</td>
<td>May 2004</td>
<td>T (Apr 2007)</td>
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6.2 MANAGEMENT DIRECTION

Management direction is provided through the provisions of the CCLUP for maintaining species at risk and biodiversity in general, through the provincial amphibian and reptile “best management practices” referenced below, through the Identified Wildlife Management Strategy, and through the draft Recovery Strategy.

6.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

The key forest management issues are the physical protection of breeding sites and nearby areas, including connectivity. Road mortality of toadlets and adults can be significant near breeding sites – the Recovery Strategy identifies road mortality as one of the main conservation issues. Great Basin Spadefoots often breed in FRPA non-classified wetlands and ephemeral (seasonal) ponds/wetlands that are dry by mid-summer, which are frequently not protected during forest operations.
### 6.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Great Basin Spadefoots.

#### Overall Objective

Retain 100% of occurrences of this nationally Threatened species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.


#### Stand Level

Strategies to address known occurrences of this species are:
- Manage WHAs (when designated) according to their specified strategies; when strategies have not been specified manage consistent with Identified Wildlife (2004).
- Manage a known Great Basin Spadefoot site that is not a WHA consistent with Identified Wildlife Management strategies for a WHA. Assume that seasonal and permanent pond(s) in the vicinity are used for breeding, and treat the area within 250 m of the pond(s) consistent with the recommendations for a WHA in Identified Wildlife (2004).

#### Landscape Level

Strategies to address unrecorded occurrences of this species are:
- Manage sites in the BGxh, BGxw, IDFdk3, IDFxw, IDFxm, IDFdk3 that are in or adjacent to grasslands or open dry forest⁶, to minimize the potential for adverse effects should an unrecorded spadefoot population be present:
  - Survey areas within 250 m of proposed operations for the presence of seasonal or permanent ponds.
  - Construct roads as far as possible (preferably > 250 m) from seasonal and permanent ponds, and, where possible, deactivate roads that are < 250 m distance to minimize road mortality.
  - Conduct harvesting and road construction so as to minimize changes in the hydrology of seasonal and permanent ponds, to maintain them as breeding habitat.
  - Leave as much coarse woody debris on the ground as possible within 250 m of seasonal and permanent ponds, as terrestrial cover for adults.
  - Avoid any level of compaction of loose, sandy soils within 250 m of seasonal and permanent ponds.

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⁶ There is no specific definition for “open forest”; for the purpose of defining the habitat of this species it is defined here as forest having a canopy closure less than or equal to 40%.
ponds, for construction of underground retreats.

- Stock only to natural densities, maintaining natural open forest characteristics with clearings.
- Avoid herbicide applications within 250 m of seasonal and permanent ponds; the surfactants in herbicides adversely affect the “breathability” of amphibian skins.
- Alternatively, inventory potential habitat in the BGxh, BGxw, IDFdk3, IDFxw, IDFxm, IDFdk3 in the spring for frogs and toads, through “calling” surveys.

All the recommendations will also be beneficial to general biodiversity maintenance by managing for amphibian species that are not of conservation concern, if spadefoots are actually not present.

6.5 REFERENCES AND ADDITIONAL INFORMATION


7. WESTERN TOAD

7.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Western Toad (*Bufo boreas*) varies in colour from olive-green, to reddish-brown, to almost black. It differs from the Great Basin Spadefoot by having eyes with horizontal pupils (not vertical), a conspicuous, oval smooth parotid gland on each side of the head, “wary” skin (not smooth), and cream-coloured or white dorsal stripe (see Great Basin).

The parotoid glands, along with glands of the back and the dorsal surface of the upper legs, contain a white mild poison that is secreted when threatened by a predator. The underside is pale and coarsely mottled, and the hind feet are equipped with two horn-like tubercles, which assist it in burrowing. Males are 60 to 110 mm long, they possess longer arms and narrower heads than females and develop dark nuptial pads on their thumbs during the breeding season. Females are larger, up to 125 mm long. Western Toad eggs look like small black pearls laid single file in long strings in the water. Tadpoles are black or charcoal coloured, with a dark, rounded fin along the length of their tail. Tadpoles often form long and noticeable swarms in shallow waters. Tadpoles metamorphose into toadlets as small as 6 mm long that resemble miniature adults.

Western Toads live 9 – 11 years, with males becoming sexually mature at 3 years and females at 4 – 5 years. They breed by congregating along the shallow margins of breeding sites (ponds, wetlands, shallow lake or stream edges) for a one- to two-week period each spring. Key habitat features are shallow (<0.5 m) wetlands with submergent vegetation and non-polluted waters. Females lay 5,000 to 16,500 eggs per breeding season. Tadpoles forage mainly on algae. The black tadpoles metamorphose in approximately three weeks, at which time they typically form large shoreline aggregations. Most males return to breeding sites annually; females return every 1 – 3 years. Females travel farther than males from breeding sites, 400 to 600+ m upland to summer ranges, with occasional long distance excursions of up to 7.2 km. Summer home ranges are distinct, and are 3 – 7 hectares in size.

Toads are found in a variety of habitats, including forests, wetlands, clearcuts, and grasslands, with their summer ranges usually including a combination of upland and wetland areas. Toads exploit open areas, often basking in the sun to thermoregulate. Toads hibernate for roughly four to six months each winter in animal burrows and under debris where they remain in contact with moisture. Some breeding sites can be source populations for large areas; a few productive breeding sites may sustain local and regional populations.

Forest harvesting is thought to be a significant source of declines in the number and size of amphibian populations in North American temperate-zone forests; logging typically leads to fragmentation, modification, or loss of habitat. Toads are often abundant in clearcut habitats both terrestrially and at breeding sites in many areas of BC; however the condition of individuals inhabiting these areas has not been studied. Direct toad mortality may occur from timber harvesting, while increased warmth in cut-over areas may be beneficial where the growing season is limited. Clearcuts may harbour more snakes and other predators, which could increase the predation rate on newly metamorphosed young. Studies are needed to address whether the increased abundance of toads in clearcuts is a true reflection of habitat suitability, or whether these areas act as reproductive sinks. Because toads are attracted to warm open areas, they may spend a great deal of time on roads, increasing mortality. The small metamorphs are particularly vulnerable, and easily decimated.

Western Toad has an extensive range throughout western North America, including southern areas of the Yukon Territory, most of British Columbia, and western Alberta. It is one of the few amphibians inhabiting alpine areas. Western Toad is red-listed by The World Conservation Union (IUCN), because of declines and local extinctions over much of its range in the United States, and is listed as Special Concern in Canada because of population declines and loss of populations in southern BC. Western Toads, including their eggs, and larvae, are protected by the *BC Wildlife Act*. 
7.2 MANAGEMENT DIRECTION

Management direction is provided through the provisions of the CCLUP for maintaining species at risk and biodiversity in general, and through the provincial amphibian and reptile “best management practices” referenced below.

7.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

The forest management issues for the Western Toad are harvesting, road construction and silviculture, which results in habitat fragmentation, modification, or loss of habitat. Direct toad mortality may occur from timber harvesting, but increased warmth in cut-over areas may be beneficial where the growing season is limited. Western Toads often breed in FRPA non-classified wetlands and ephemeral (seasonal) ponds/wetlands that are dry by mid-summer, which are frequently not protected during forest operations. Clearcuts may harbour more snakes and other predators, which could increase the predation rate on tadpoles and newly metamorphosed young. Roads increase mortality of migrating adults and juveniles, which may be significant if there is regular traffic. Silvicultural impacts are reductions in vegetation cover through site preparation, and direct mortality caused by the surfactants in herbicides damaging the skin “breathability” of adults and juveniles resting on land. Terrestrial habitats are of less management concern, compared to wetland breeding areas, as Western Toads use a wide variety of upland habitats.
7.4 MANAGEMENT STRATEGY

The following strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Western Toads.

Overall Objective

Retain $\geq 80\%$ of occurrences of this COSEWIC Special Concern species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level and Landscape Level

Western Toads are widespread and occur in most BGC units in the CCBA, but are poorly inventoried. Inventory before the start of forestry operations is not likely to be a practical option because of the abundance of potential breeding sites, hence general habitat management for amphibians in general is the most practical option. The following strategies should be applied near\(^7\) water bodies:

- Preserve, as much as possible, all wetlands, ponds, pools, and streams – however small or ephemeral; these small areas can be very important for amphibians. Protect shallow water areas (including small in-block pools or non-classified wetlands) and the vegetation in and within 30-50 m of them from disturbance; these areas serve as breeding habitat and cover for many amphibians.
- Avoid altering natural patterns of flooding and drying of ponds and wetlands; temporary wet areas often have few predators and are important for amphibians.
- Maintain, and avoid disturbance of, existing downed logs and bark, especially large diameter pieces; downed wood in various stages of decay provides important shelter. This should be implemented throughout harvest areas, not just near the aquatic feature.
- Retain coarse woody debris in harvested areas. Create debris or slash piles if coarse woody debris is of small diameter, to increase effectiveness of debris.
- Avoid constructing permanent roads within 100 m (preferably further, where feasible) of ponds and wetlands, to minimize road mortality.
- Minimize ditch sediment input to ponds and wetlands.

\(^7\) “Near” is here selected as 30-50 m, to correspond to standard Riparian Management Areas, with the 30 m also applied to small, non-classified features. Amphibians frequently move much further away from ponds and wetlands, hence the preferred minimum distance for permanent roads is selected as 100 m. Where possible the distances should be increased, especially for larger patches of aquatic habitat.
• Avoid broadcast use of herbicides within 30-50 m of ponds and wetlands, including spraying over non-classified features that may be dry at time of spraying – glyphosate spray, probably primarily the surfactants in the formulation, are toxic to amphibians in or out of the water. If herbicides must be applied, hotter and drier conditions are better so that the adults are more likely to be under cover.

• Restrict use of mechanized machinery, vehicles, or ATVs within 30-50 m of aquatic features, as much as possible. Ribboned no-machine reserves or stubs may serve this function during and after harvesting.

7.5 REFERENCES AND ADDITIONAL INFORMATION


8. Gopher Snake, Deserticola Subspecies

8.1 Species Summary: Identification and Habitat

Gopher Snake, *deserticola* subspecies (*Pituophis catenifer deserticola*) is a large non-venomous snake **up to 2 m in length**, occasionally to 2.4 m. Great Basin Gopher Snake is the name applied to subspecies *deserticola*; the species as a whole is known as Gopher Snake.

They are usually **very light brown or yellowish-brown with superimposed dark brown-black squares running from the head to the tail**; on the tail the squares become more like stripes or cross-bands. The under surface is a creamy yellowish colour. They lack the "striped" pattern of garter snakes. In a defence posture, Gopher Snakes will hiss and make snorting noises while shaking their tails rapidly. There are no Northern Pacific Rattlesnakes in the CCBA; hence they cannot be confused with that species despite such behaviour.

They kill small rodents, such as voles, pocket mice, and deer mice, through constriction before ingesting them. Egg-laying sites are known to occur in abandoned rodent burrows in sandy substrates, commonly in flat areas or on south-facing slopes; talus slopes in rocky areas also may be used. Eggs are laid in May, and hatchlings emerge in late August or early September; hibernation is from November to March. Migratory movements of up to 2 km may occur, between winter dens and egg laying sites. Foraging occurs in open grassland habitats, and riparian areas within grasslands are also important.

Great Basin Gopher Snakes have a patchy distribution throughout the warm, dry grassland valleys of the BC interior. Suitable habitat is primarily in the IDFxw, BGxh, and BGxw but may also occasionally occur at higher elevations. They inhabit a variety of habitats from grasslands, bunchgrass, shrub-steppe to open coniferous forest and riparian areas. In the summer, snakes spend a large proportion of their time underground in abandoned rodent burrows, logs, or rock crevices as shelter sites from predators and unfavourable environmental conditions.

Females lay clutches of eggs in late June and early July in abandoned animal burrows on sparsely vegetated south facing slopes in sandy substrate. Nests may also occur under coarse woody debris or in talus slopes. Nests can be shared by multiple females and also with other snake species such as Racers (*Coluber constrictor*) and incubation of eggs is passive with no parental input. Hatchlings emerge in late August or early September.

Great Basin Gopher Snakes feed on small mammals (voles, deer mice) and occasionally take juvenile birds and lizards. They forage in grasslands, riparian areas within grasslands and at edge habitat where sand and riparian interface. Movements from foraging areas to den sites are generally < 200m although females may travel further in order to find optimal nesting sites for eggs. They hibernate in talus slopes below cliffs, in horizontal cracks in rock and in abandoned burrows; hibernation may be communal with other species. Hibernacula are selected for microclimate characteristics such as specific temperature and moisture regimes. Typically they move 200 – 900 m between hibernacula and summer areas.

Great Basin Gopher Snakes are protected in that they cannot be killed, collected, or held in captivity without special permits, under the provincial *Wildlife Act*. The Thompson/Fraser population may be genetically isolated from populations further south; hence its conservation is of extra concern. Map data is from Regional MoE (Williams Lake).
8.2 MANAGEMENT DIRECTION

Management direction is provided through the provisions of the CCLUP for maintaining species at risk and biodiversity in general, through the provincial amphibian and reptile “best management practices” referenced below, and through the Identified Wildlife Management Strategy.

8.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

The key forest management issues are the physical protection of winter den sites and nearby areas, including connectivity. Road mortality of snakes can be significant near breeding and denning sites; they will bask on the warm road surface. Road mortality is identified in the Recovery Strategy as an important issue for some sites.

8.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Great Basin Gopher Snakes.
Overall Objective
Retain 100% of occurrences of this nationally Threatened species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen the conservation status of the Thompson/Fraser population.


Stand Level
Strategies to address known occurrences of this species are:
• Manage WHAs (when designated) according to their specified strategies; when strategies have not been specified manage consistent with Identified Wildlife (2004).
• Manage a known Great Basin Gopher Snake site that is not a WHA consistent with Identified Wildlife (2004) management strategies for a WHA.
  ➢ Maintain structural elements such as rocky outcrops, talus slopes, coarse wood debris (CWD), rodent burrows, friable soils, vegetative cover and concentrations of boulders that provide important physical and thermoregulatory cover.
  ➢ Maintain moderate to dense cover to conceal snakes and maximize foraging opportunities, do not harvest within 200 m of den sites and retain CWD.
  ➢ Construct permanent roads as far as possible (preferably > 250 m) from south-aspect rock rubble slopes, and, where possible, deactivate all roads that are < 250 m distance to minimize road mortality.
  ➢ Avoid machine activity (harvesting, roads) from April to October when snakes are active.
• Where migration routes from winter hibernacula to summer denning areas have been bisected by roads consider installing drift fences, embedded culverts or seasonal road restrictions to allow safe passage of snakes.

Landscape Level
Strategies to address unrecorded occurrences of this species are:
• In the IDFxw, BGxh, and BGxw manage sites associated with rock rubble areas (suitable as winter den sites) to minimize potential adverse effects should an unrecorded Great Basin Gopher Snake population be present:
  ➢ Construct roads as far as possible (preferably > 250 m) from south-aspect rock rubble slopes, and, where possible, deactivate roads that are < 250 m distance to minimize road mortality.
  ➢ Leave as much coarse woody debris on the ground as possible within 250 m of south-aspect rock rubble slopes, as terrestrial cover for adults.
  ➢ Avoid compaction of loose, sandy soils within 250 m of south-aspect rock rubble slopes, for egg-laying sites.

All the above recommendations will also be beneficial to general biodiversity maintenance by managing for snake species that are not of conservation concern, if Great Basin Gopher Snakes are not present.

8.5 References and Additional Information


Appendix 1. Species Accounts.

9. RACER

9.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Racer (*Coluber constrictor mormon*) is a slender, stream-lined snake up to 1.2 m long, with a large, long, flattened head and rounded snout. The back and sides are usually a uniform slate-grey or olive green color, the belly is an even vivid to whitish yellow (blotched in very young snakes). The Rubber Boa is similar in colour but has a wider body, blunt tail and tiny eyes with vertical pupils. They lack the stripes of garter snakes. Western Yellow-bellied Racer is the name applied to subspecies *mormon*; the species as a whole is known as Racer.

They primarily occur in the IDFxw, PP and BG north to Churn Creek on the west side of the Fraser River and to Canoe Creek on the east side. They live in sandy desert areas, grasslands, farmland, marshes, woodlands or open, sparsely-treed areas. They forage in sandy terraces along riparian margins, and hibernate on south-facing rocky slopes, often with other species of snakes. Juveniles eat insects; adults eat insects, young mammals, small reptiles, birds and frogs. Nests are in loose soil, beneath flat stones, in decaying wood, in abandoned rodent burrows, or on stable talus slopes. Nests may be shared by multiple females and also with other snake species such as Great Basin Gopher Snakes. Incubation is passive with no parental care; hatchlings emerge in August. The same egg-laying sites are used over many years. Racers hibernate in talus slopes, small rock piles, rock outcrops, abandoned burrows, and unconsolidated road beds. Hibernacula are selected for microclimate characteristics to act as a refuge from winter conditions. Racers often aggregate during hibernation and may seek shelter communally with other snake species. Movement between winter hibernacula and summering areas can be up to 1800 m.

Racers are protected in that they cannot be killed, collected, or held in captivity without special permits, under the provincial *Wildlife Act*. The Thompson/Fraser population is genetically isolated from populations further south. Map data is from Regional MoE (Williams Lake).

![Photo © David Shackleton](image)

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<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
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<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
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<td>Central Cariboo; Chilcotin</td>
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<td>Blue</td>
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<td>SC (Nov 2004)</td>
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9.2 MANAGEMENT DIRECTION

Management direction is provided through the provisions of the CCLUP for maintaining species at risk and biodiversity in general, through the provincial amphibian and reptile “best management practices” referenced below, and through the Identified Wildlife Management Strategy.

9.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

The key forest management issues are the physical protection of winter den sites and nearby areas, including connectivity. Road mortality of snakes can be significant near breeding sites; they will bask on the warm road surface.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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9.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Racers.

Overall Objective

Retain 100% of occurrences of this nationally Special Concern species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen the conservation status of the Thompson/Fraser population.


Stand Level

Strategies to address known occurrences of this species are:

- Manage WHAs (when designated) according to their specified strategies; when strategies have not been specified manage consistent with Identified Wildlife (2004).
- Manage a known Racer site that is not a WHA consistent with Identified Wildlife (2004) management strategies for a WHA.
  - Maintain structural elements such as rocky outcrops, talus slopes, coarse wood debris (CWD), rodent burrows, friable soils, vegetative cover and concentrations of boulders that provide important physical and thermoregulatory cover.
  - Maintain moderate to dense cover to conceal snakes and maximize foraging opportunities, do not harvest within 200 m of den sites and retain CWD.
  - Construct permanent roads as far as possible (preferably > 250 m) from south-aspect rock rubble slopes, and, where possible, deactivate all roads that are < 250 m distance to minimize road mortality.
  - Avoid machine activity (harvesting, roads) from April to October when snakes are active.
Where migration routes from winter hibernacula to summer denning areas have been bisected by roads consider installing drift fences, culverts or seasonal road restrictions to allow safe passage of snakes.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- In the **IDFxw, BGxh, and BGxw** manage sites associated with rock rubble areas (suitable as winter den sites) to minimize potential adverse effects should an unrecorded Racer population be present:
  - Construct roads as far as possible (preferably > 250 m) from south-aspect rock rubble slopes, and, where possible, deactivate roads that are < 250 m distance to minimize road mortality.
  - Leave as much coarse woody debris on the ground as possible within 250 m of south-aspect rock rubble slopes, as terrestrial cover for adults.
  - Avoid compaction of loose, sandy soils within 250 m of south-aspect rock rubble slopes, for egg-laying sites.

All the above recommendations will also be beneficial to general biodiversity maintenance by managing for snake species that are not of conservation concern, if Great Basin Gopher Snakes are not present.

**9.5 REFERENCES AND ADDITIONAL INFORMATION**


10. RUBBER BOA

10.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Rubber Boa (Charina bottae) is a small (≤ 75 cm length), smooth, stout-bodied snake that has the appearance and feel of soft rubber. It is shiny reddish-brown to yellow brown and the belly is cream to yellow in colour. Scales are very small, with the top of the head covered with large symmetrical plates. The eyes are small and the pupils are vertical. The tail is short and blunt, giving the appearance of another head – the tail is often scarred as it is used as a defensive strategy to thwart predators from damaging the snake’s head. The Racer is similar in colour but has a thinner body, whip-like tail, obvious scales, and large eyes. The Rubber Boa is rarely seen as it is nocturnal and secretive.

Rubber Boas inhabit a wide variety of habitats from grasslands, montane forest and riparian areas. An important habitat component for rubber boas is the abundance of coarse woody debris which is used for protective cover and for thermoregulation. In addition to being found under cover objects, snakes also spend a large proportion of their time underground in abandoned rodent burrows or rock crevices. Females give birth to live young in summer habitat in late August and early September. Reproductive success depends on a female’s ability to properly thermoregulate while gravid, and therefore summer habitat must provide ample cover options (dens and CWD) for females to adjust to variable climatic conditions. Rubber Boas feed nocturnally, primarily on young rodents. The species has also been recorded foraging on juvenile birds, rabbits, lizards and bird eggs. In foraging, it selects habitats that are favourable to these prey species; these include riparian areas, moist montane forest stands and grassland. Rubber Boas may spend time thermally ‘basking’ on roads at night. Rubber Boas hibernate in sites located within their summer range, with movements between the two areas up to 1.5 km. Snakes sometimes aggregate during hibernation, but are more likely to hibernate alone than other snakes, and do not do so communally with other snake species.

In the CCBA they inhabit the IDFwx, BGxh, IDFxm and BGwx; the most northern record is Quesnel, but the northern limit of its range is usually considered to be about the Hwy 20 crossing of the Fraser River. The most western record is Bull Canyon in the Chilcotin.

Rubber Boas are protected against harassment, capture, being held in captivity or killing under the BC Wildlife Act. The species is listed by COSEWIC as nationally Special Concern, but is provincially not considered to be of conservation concern and is no longer an Identified Wildlife species. Map data is from Regional MoE (Williams Lake).
10.2 MANAGEMENT DIRECTION

Management direction is provided through the provisions of the CCLUP for maintaining species at risk and biodiversity in general, through the provincial amphibian and reptile “best management practices” referenced below, and through the Identified Wildlife Management Strategy Volume 1 (no longer in force).

10.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

The key forest management issues are the physical protection of winter den sites and nearby areas, including connectivity. Road mortality of snakes can be significant near breeding sites; they will bask on the warm road surface at night. Hibernation sites are in the forest soil and in rock outcrops; hence harvesting could make the sites unsuitable. Large diameter coarse woody debris is especially important, and may be decreased or lost from harvest areas.

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10.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Rubber Boa.

Overall Objective

Retain 100% of occurrences of this nationally Special Concern species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen the conservation status of the Thompson/Fraser population.

Stand Level

Strategies to address known occurrences of this species are:

- Manage a known Rubber Boa site to maintain important habitat attributes.
  - Maintain structural elements such as rocky outcrops, talus slopes, coarse wood debris (CWD), rodent burrows, friable soils, vegetative cover and concentrations of boulders that provide important physical and thermoregulatory cover.
  - Maintain moderate to dense cover to conceal snakes and maximize foraging opportunities, and retain as much large diameter coarse woody debris as possible.
  - Construct *permanent* roads as far as possible (preferably > 250 m) from concentrations of habitat...
features listed in the first bullet; deactivate all roads that are < 250 m distance to minimize road mortality.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- In the BGxh, BGxw, IDFxm, and IDFxw, manage warm level or south aspect sites as if Rubber Boas are present:
  - Maintain structural elements such as rocky outcrops, talus slopes, coarse wood debris (CWD), rodent burrows, friable soils, vegetative cover and concentrations of boulders that provide important physical and thermoregulatory cover.
  - Maintain moderate to dense cover to conceal snakes and maximize foraging opportunities, and retain as much large diameter coarse woody debris as possible.

All the above recommendations will also be beneficial to general biodiversity maintenance by managing for snake species that are not of conservation concern, if Rubber Boas are not present.

10.5 REFERENCES AND ADDITIONAL INFORMATION


11. WESTERN PAINTED TURTLE - INTERMOUNTAIN - ROCKY MOUNTAIN POPULATION

11.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Western Painted Turtle – Intermountain-Rocky Mountain Population (*Chrysemys picta* pop. 2) is a medium sized (shell length 9-25 cm) freshwater turtle. The upper shell (carapace) is smooth, oval in shape and is dark olive-green to brownish-black in colour. There are yellow stripes on the head, neck, tail, and legs superimposed on an overall green/brown body. The lower shell (plastron) is orange-red with a dark pattern that branches out over the surface. The introduced Red-eared Slider Turtle has distinctive markings on the neck and head, which the Painted Turtle lacks.

Western Painted Turtles are highly aquatic and live in shallow waters of ponds, lakes, marsh, slow-moving stream reaches or the quiet backwater sloughs of rivers. Aquatic habitat typically has a muddy bottom with abundant emergent aquatic vegetation, logs and open banks. Turtles may move overland to migrate between summer and winter hibernating ponds. Females usually dig their nests within 200 m of water in open, warm sandy soil, but may travel further. Painted Turtles usually nest on open south-facing gentle slopes. Survival of hatching Painted Turtles is related to winter nest temperatures; they usually remain within the shallow subterranean nest until the following spring. Thus, hatchlings must cope with subzero temperatures during winter months – their northern limits of distribution is the limit of acceptable winter temperatures. Summer basking substrates include mudbanks, rocks, logs, or other floating objects. There is no aggression shown during basking; individuals will even pile into stacks of several layers. Juveniles and adults hibernate in the muddy substrate of ponds, or seek muskrat burrows or other suitable shelter, in shallow water below the freezing limit, remaining in one location or small area throughout the winter.

The Intermountain-Rocky Mountain Population of Western Painted Turtle is uncommon, and is declining and threatened by loss of habitat, and increased mortality and population isolation and fragmentation from the expanding road network. In the CCBA it occurs in the IDFx, BGxh, IDFxm, and BGxw.

Painted Turtles are protected against harassment, capture, being held in captivity or killing under the *BC Wildlife Act*. Map data is from Regional MoE (Williams Lake).

Photo © Peter Ballin

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
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<td>SC (Apr 2006)</td>
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</table>
11.2 MANAGEMENT DIRECTION

Management direction is provided through the provisions of the CCLUP for maintaining species at risk and biodiversity in general.

11.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management issues are soil compaction leading to the loss of the terrestrial nesting sites, and road mortality when roads are built near the aquatic habitat of turtles. Harvesting may temporarily increase the amount of suitable nesting habitat by removing shade from areas of sandy soil. Eggs followed by hatchlings are present within the ground in nesting areas hence mortality from machines, vehicles, and pedestrians can occur throughout the entire operational season in the CCBA.

<table>
<thead>
<tr>
<th>Relative Risk of Activities</th>
<th>Total Risk Ranking</th>
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<tbody>
<tr>
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<td>Harvesting</td>
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<td>Vegetation Management</td>
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<td>Density Management</td>
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</table>

11.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Western Painted Turtle.

**Overall Objective**

Retain 100% of occurrences of this nationally Special Concern and blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen the conservation status of the Cariboo Region population.

**Stand Level**

Strategies to address known occurrences of this species are:

- Manage a known Western Painted Turtle site to maintain important habitat attributes.
  - Maintain a 50 m³ no-harvest reserve adjacent to the aquatic feature that supports the turtles.
  - Avoid any level of compaction of loose, sandy soils within 250 m of seasonal and permanent ponds, for construction of underground retreats.
  - Construct *permanent* roads as far as possible (preferably > 250 m) from the pond, lake, or other aquatic habitat that supports a turtle population; deactivate all roads that are < 250 m distance to minimize road mortality.
  - Consult with a biologist for addition management measures.

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8 There is no clear guidance on this matter; hence the 50 m reserve is inherently arbitrary. The 50 m reserve is to maintain natural rates of trees falling into the lake for basking, to maintain existing nesting sites (if present) closely adjacent to the lake, and to minimize increases in windthrow near the lake.
Landscape Level
Strategies to address unrecorded occurrences of this species are:
• Field crews should report all sightings of “turtles”, with photographs taken if possible. Turtles are easily identifiable as such, and further field work can be done later to determine if the turtles are Western Painted Turtles or Red-eared Sliders.

11.5 REFERENCES AND ADDITIONAL INFORMATION


7. FISH
12. BULL TROUT

13. DOLLY VARDEN

13.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Bull Trout (Salvelinus confluentus) and Dolly Varden (Salvelinus malma) have a large head and jaws in relation to their long, slender body. Their colouration ranges from dark green to greyish-blue, spotted with pale yellowish-orange spots; there are no black spots on the dorsal fin. In mature fish, the pelvic and anal fins develop a tri-colour sequence beginning with white leading edges (visible in the photograph), progressing to a black band fading to grey, and ending with a bright orange trailing edge. Spawning adult males may have a reddish colour on the belly. Compared to Dolly Varden, the Bull Trout head is larger, broader, and flatter, the upper jaw curves downward, the snout is more pointed, the body is more “flattened” from top to bottom, and the spots on the back are larger and further apart. An expert can reliably tell them apart. Rainbow Trout are pale with dark spots, including spots on the dorsal fin.

Some Bull Trout and Dolly Varden are resident in relatively small mountain headwater streams, others are resident in lakes or large rivers, and others are migratory – living in the large rivers but migrating to smaller streams to spawn. Most (but not all) interior watersheds just have Bull Trout, most (but not all) coastal watersheds have Dolly Varden. Some watersheds have both, in which they hybridize, but the gene pools of each species remain separate.

They are cold-water (<15°C) specialists, and typically inhabit cool, clear mountain streams that contain an abundance of cobbles, stones, coarse woody debris and overhanging vegetation; these characteristics create sheltered pools, providing thermally buffered protective/hiding cover. They require large deep pools in streams or lakes for over-wintering.

Bull trout and Dolly Varden that live in large rivers and lakes migrate to the smaller, colder streams to spawn. Ground water inputs to gravel riffles may be required for optimal spawning quality. Specific large deep pools and specific riffles may be used by a large proportion of a Bull Trout and/or Dolly Varden population for pre-spawning aggregations and spawning sites respectively. These sites are especially critical for maintenance of a given population. Bull Trout are found throughout the CCBA; Dolly Varden are restricted to the West Chilcotin.

The Bull Trout and Dolly Varden are protected, in that they cannot be killed, collected or held in captivity without special permits, under the provincial Wildlife Act or a fishing license, under the provincial Wildlife Act and the federal Fisheries Act. Bull Trout and Dolly Varden are both provincially blue-listed, with Bull Trout also Identified Wildlife. Most of the global population, and most of the best remaining habitat, occurs in BC; hence there is a special obligation to manage for this species.

<table>
<thead>
<tr>
<th>Known BGC Unit</th>
<th>Forest District</th>
<th>Global Rank</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
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<td>Central Cariboo; Chilcotin; Quesnel</td>
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<td>Blue</td>
<td>Jun 2006</td>
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</tbody>
</table>
Species of Management Concern BCTS Cariboo Region

Photo © Crispin Guppy (either Bull Trout or Dolly Varden – the watershed had both)

Map data is from Ministry of Environment FISS Database, “corrected” by changing all Fraser River watershed records of Dolly Varden to Bull Trout. The Coast Range distribution of both species may actually be more overlapping than is shown.

13.2 MANAGEMENT DIRECTION

The management direction for Bull Trout and Dolly Varden is provided through general FRPA and Fisheries Act requirements for management of game fish habitat, through the Identified Wildlife Management Strategy (2004), and through the CCLUP direction to maintain species at risk and water, fish and fish habitat values. The federal Fisheries Act requires protection of the fish and their habitat.

13.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management issues for Bull Trout and Dolly Varden are disruption of migration patterns by non-fish passable road crossing structures such as culverts; reduced in-stream and riparian cover resulting from harvesting without tree and shrub retention in riparian area; and increased sediment and increased water temperature resulting from harvesting without tree and shrub retention in the riparian area or resulting from road construction that results in sedimented and/or warm ditch water flowing into streams. At the landscape level, harvesting and road construction can alter watershed hydrology, resulting in increased channel erosion and decreased summer flows.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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<tr>
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<td>2 1 1 1 0 0 0 0</td>
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</tbody>
</table>
13.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Bull Trout and Dolly Varden.

**Overall Objective**

Retain 100% of occurrences of these species in healthy condition. Each loss of part or all of an occurrence of these species will incrementally worsen the conservation status.

Implement the Bull Trout Identified Wildlife (2004) strategy at both the stand and landscape level, for both Bull Trout and Dolly Varden. Some specific recommendations are summarized below.

**Stand Level**

Strategies to address known occurrences of this species are:

- Manage Bull Trout Wildlife Habitat Areas, once established, using the strategies in the “Orders” for each WHA.
- Manage Bull Trout and Dolly Varden concentration sites (request data from Regional MoE) that are not WHAs, by not building permanent roads within 500 m, minimizing bladed structures near the stream or immediate tributaries (fish-bearing streams, non-fish streams, and NCD), and retaining sufficient windfirm streamside trees to contribute a long-term supply of large woody debris. Design tree retention to minimize the windthrow risk along the stream banks; one option is to use discontinuous wide patches rather than a thin continuous strip.
- Minimize public access to Bull Trout and Dolly Varden concentrations, by not building permanent roads within 500 m and by promptly deactivating temporary roads within 500 m.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize activities within mapped critical fish habitat; a primary function of that area is to protect smaller Bull Trout and Dolly Varden streams.
- Use bridges where possible for fish stream crossings; if an open-bottom arch or an embedded culvert is used, ensure that the width is considerably wider than the stream channel to minimize the risk of streambed instability, beaver plugging, debris jams, bedload deposition, or excessive current speed.
  - Consider having a trained Environmental Monitor develop an *Environmental Management Plan* and monitor the on-site work for installation or removal of all fish stream crossing structures.
  - Wherever possible remove pre-FPC culverts from fish streams.
  - Apply the FPC *Fish Stream Crossing Guidebook* when constructing road crossings of all fish streams; ensure that all crossing structures in fish streams are “fish friendly”.
- Minimize the risk of changes in stream water quality and flow patterns, especially for small higher elevation streams in Bull Trout and/or Dolly Varden watersheds
  - Maintain the quality and flow patterns of surface water flowing into streams, when harvesting and constructing roads.
  - Gravel the surface of road approaches to all stream crossings and armour all ditches that empty into streams.
  - Avoid broadcast herbicide applications within the entire Riparian Management Area, to maintain a healthy shrub layer (spot applications are acceptable).
  - For S4 (and larger) streams with moderate to high quality fish habitat (defined in *Fish Stream Crossing Guidebook*), ensure high tree (≥ 80% in RMA) and understory retention to minimize changes in water temperature, shade, sediment, flow patterns, and food and nutrient inputs; this may require further tree retention to reduce windthrow risk adjacent to the streams.
  - For marginal-habitat S4s, S5s, S6s, and NCDs that flow directly into moderate to high quality fish habitat, maintain high shrub and residual tree retention in the Riparian Management Area (within a 10 m width for NCDs), to maintain water quality (temperature, sediment, flow patterns). If abundant shrubs and residual trees are not present, retention of mature trees may be required to
prevent harmful alteration, disruption, or destruction of fish habitat.

13.5 REFERENCES AND ADDITIONAL INFORMATION


B.C. Ministry of Fisheries. Undated. B.C. Fish Facts: Dolly Varden *Salvelinus malma*  


14. CHISELMOUTH

14.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Chiselmouth (*Acrocheilus alutaceus*) are large minnows (up to 30 cm long) with a short, blunt head and large eyes, and generally dull colouration. The dorsal surface is dark brown with grey sides speckled in black. Some orange colouration may be observed in the pectoral/pelvic region. Chiselmouth have a streamlined look, partly attributable to their deeply forked tail and the very narrow base of the tail. The upper lip is fleshy, while the lower jaw is covered in hard cartilage which acts as a chisel to scrape algae off of substrate for consumption. Lake Chub are similar to Chiselmouth, but are smaller when mature, lack the rigid plate that Chiselmouth possess on the lower jaw, and have a fleshy projection near the corner of the mouth.

Chiselmouth prefer warmer streams with moderately fast currents. Adults scrape their chisel-like jaw along the substrate to prey upon diatoms and small aquatic plants. Their spawning locations are not known in the Cariboo, but they may spawn in the lower reaches of small tributaries to the main channels. Eggs have been observed on open bottom and buried among boulders.

Chiselmouth in the CCBA are only known from the main channels of the Fraser River, Blackwater River, Euchiniko River, Baezaeko River, Nazko River, Victoria Creek, and Chilcotin River. The map data is from the FISS database.

Chiselmouth are provincially blue-listed; COSEWIC has determined them to be not at risk.

14.2 MANAGEMENT DIRECTION

The management direction for Chiselmouth is provided through CCLUP direction to maintain species at risk and water, fish and fish habitat values.

14.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management issues for Chiselmouth are disruption of migration patterns by non-fish passable road crossing structures such as culverts, and reduced in-stream and riparian cover resulting from harvesting without tree and shrub retention in riparian area.
### 14.4 Management Strategy

None. All known Chiselmouth populations inhabit known game-fish streams, and normal fish-stream management will address their management.

### 14.5 References and Additional Information


15. COHO SALMON, INTERIOR FRASER POPULATION

15.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Coho Salmon (*Oncorhynchus kisutch*) adults are medium size (up to 61 cm) salmon. Spawning adults have dark reddish-maroon sides and a bright greenish-yellow dorsal surface, with males developing large teeth and a strongly hooked snout. Fry are pale and marked with vertical bars and spots.

They spawn during fall and early winter, frequently under ice in the CCBA, making spawning inventory difficult. Fry emerge from the gravel the following spring and usually reside in freshwater for a year before migrating to sea as smolts. Most Coho Salmon spend 18 months at sea before returning to freshwater; they have a 3-year life cycle. Juvenile Coho Salmon tend to cluster in areas of suitable habitat in shallow gradient streams and sometimes lakes. Much of the interior Fraser watershed where Coho are found has been logged and is used for a variety of agricultural activities. Juvenile Coho Salmon migrate down the Fraser River and spend an unknown time in the highly developed Fraser River estuary. The majority of their oceanic residence is usually spent near the coast in southern BC.

The “Interior Fraser” population of Coho Salmon spawn in the Fraser River watershed upstream from the Fraser canyon. They are genetically unique and can be distinguished from Coho Salmon from the lower Fraser River watershed. Their distribution in most tributaries of the interior Fraser is very poorly known, due to inventory difficulties; DFO (Shane Smith, pers. comm.) recommends assuming that all Chinook Salmon streams also support Coho Salmon. The CCBA supports the “Upper Fraser unit” of the Interior Fraser population.

Coho salmon (Interior Fraser River population) is listed by COSEWIC as Endangered because of concerns that if Interior Fraser Coho distribution becomes too fragmented, genetic exchange within the populations may be insufficient to ensure long-term survival. However the Minister decided not to add them to the *Species at Risk Act* Schedule 1 “based on uncertainties associated with changes in the marine environment and potential future socio-economic impacts on users associated with the uncertainty. Not listing provides future management flexibility related to uncertainty about marine survival and possible difficulties in recovery if marine survival worsens.” The BC Conservation Data Centre does not list the Upper Fraser population of Coho Salmon separately from the rest of the species; the species as a whole is not at risk.

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<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
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</table>
Species of Management Concern BCTS Cariboo Region

Coho Salmon (Interior Fraser Population) Known Occurrences
Data from Ministry of Environment FISS Database.

NOTE: The distribution of Coho Salmon (Interior Fraser pop.) is very poorly known. DFO (Shane Smith, pers. comm.) recommends treating the distribution of Chinook salmon as being the distribution of Coho salmon.

15.2 MANAGEMENT DIRECTION

Management direction for Coho Salmon is provided through CCLUP direction to maintain species at risk and water, fish and fish habitat values. Coho Salmon and their associated habitat are managed and protected at the federal level under the Fisheries Act. A Recover Strategy has been completed (see references).

15.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

The forest management issues for the Coho Salmon are disruption of migration patterns by non-fish passable road crossing structures such as culverts; reduced in-stream and riparian cover resulting from harvesting without tree and shrub retention in riparian area; and increased sedimentation and water temperature resulting from harvesting without tree and shrub retention in the riparian area or resulting from road construction that results in sediment and/or warm ditch water flowing into the stream. Landscape level intensity of harvest and road construction can alter watershed hydrology, resulting in increased channel erosion and decreased summer flows.

<table>
<thead>
<tr>
<th>Risk</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
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<td>3</td>
<td>2</td>
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</table>

84
15.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Coho Salmon.

Stand and Landscape Level

To address Interior Fraser River Coho Salmon streams:

- Treat all Chinook Salmon streams as being Coho Salmon streams, in the absence of definitive inventory data for Coho Salmon distribution.
- When forest operations are considered in the vicinity of a known Coho or Chinook Salmon stream, provide a windfirm forested reserve for the stream and all S4, S5, and S6 streams directly tributary to that stream. For NCDs that are directly tributary, maintain high shrub and residual tree retention in the Riparian Management Area (within a 10 m width for NCDs), to maintain water quality (temperature, sediment, flow patterns). If abundant shrubs and residual trees are not present, retention of mature trees may be required to prevent harmful alteration, disruption, or destruction of riparian fish habitat.
- Manage Coho and Chinook Salmon spawning or rearing streams by not building permanent roads within 500 m (where feasible), minimizing bladed structures near the stream or immediate tributaries, and retaining sufficient windfirm streamside trees to contribute a long-term supply of large woody debris. Design tree retention to minimize the windthrow risk along the stream banks; one option is to use wide patches rather than a thin continuous strip. If bladed structures are required within 500 m of a Coho Salmon stream, take extra care to ensure that sediment does not enter the stream (including, in necessary to prevent sedimentation, graveling of the entire road surface).
- If necessary, consult a biologist regarding mitigation measures or inventory to determine the presence or absence of Coho Salmon in a specific stream.

These strategies will probably not be sufficient to meet the objectives; government land-use planning is required to achieve them.

15.5 REFERENCES AND ADDITIONAL INFORMATION

http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr%5Fcoho%5Fsalmon%5Fe%2Epdf.


Fisheries and Oceans Canada. 2007. Aquatic Species at Risk: Coho Salmon, Interior Fraser River Population. Available:  

http://www.sararegistry.gc.ca/virtual_sara/files/orders/g2%2D14008%5Fe%2Epdf.
16. GOLDEYE

16.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Goldeye (Hiodon alosoides) have a large mouth extending back beyond the middle of the eye. The dorsal fin originates above or behind the front of the anal fin. Goldeye have a dark blue or blue-green back with silvery sides and a milky-white belly. Fins are clear, or yellowish to pink. They average 10 – 15 inches long.

Goldeye inhabit turbid waters of lakes, ponds, marshes and quiet, large rivers. They eat aquatic insects, crustaceans, zooplankton, molluscs, small fish, frogs, mice and shrews. Spawning occurs in May or June, in shallow firm-bottomed sites in stream pools or backwaters or over gravel shoals in tributary streams. Eggs are semi-buoyant and drift downstream or into quiet water. They are a valued game fish, and are sold on the prairies as gourmet food.

In the CCBA they occur only in Stum Lake, which is protected as a Provincial Park and as American White Pelican breeding habitat. Under the Wildlife Act, Public Access Regulation\(^9\) fishing access to the lake is forbidden from March 1 to August 31 to protect the nesting pelicans. The map data is from the FISS database.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
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<tr>
<td>Chilcotin</td>
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<td>Blue</td>
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</table>

16.2 MANAGEMENT DIRECTION

The management direction for Goldeye is provided through general FRPA and Fisheries Act requirements for management of game fish habitat, and through the CCLUP direction to maintain species at risk and water, fish and fish habitat values.

16.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management issues for Goldeye are disruption of migration patterns by non-fish passable road crossing structures such as culverts, and reduced in-stream and riparian cover resulting from harvesting without tree and shrub retention in riparian area.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Relative Risk of Activities</th>
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</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning &amp; Layout</td>
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<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
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<td>10</td>
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</tbody>
</table>

16.4 **MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Goldeye.

**Overall Objective**

Retain 100% of occurrences of this species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen the conservation status, and may eliminate the only CCBA occurrence.

**Stand and Landscape Level**

Manage all streams directly tributary to Stum Lake, including the stream between Stum Lake and Beaver Lake, as fish streams (potential spawning habitat) whether or not they have known game fish use. Consult a biologist if this appears unreasonable.

16.5 **REFERENCES AND ADDITIONAL INFORMATION**


17. WHITE STURGEON (MIDDLE FRASER RIVER POPULATION)

17.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

White Sturgeon (Middle Fraser River Population) (Acipenser transmontanus pop. 6) are the largest freshwater fish in BC, reaching over 6 m in length. Sturgeons have a ridged dorsal spine, grey to dark grey body, a white underbelly, pointed nose, and forked tail, and have no teeth.

They can live to over 100 years old; mortality due to fishing is the primary cause of population declines, because of low reproductive rates. Development such as damming of rivers and flow regulation, construction of dykes, dredging of channels and gravel mining are also significant threats. Contamination of white sturgeon from pulp mill effluent in the Fraser River downstream of Prince George has occurred.

They are generally dormant from October until March, remaining in deep water in lakes or river pools. Spawning occurs in large side channels at depths of 3 to 4.5 m over sand, gravel, or cobble river bottoms, during high water. White Sturgeon may make extended migrations of greater than 200 km to foraging, overwintering, and spawning sites.

White Sturgeon occur in 6 genetically distinct subpopulations within British Columbia, with the Middle Fraser population occurring in the CCBA, and the Nechako River and Upper Fraser populations being further upstream. In the CCBA they only occur in the Fraser River and the very lower end of some of its major tributary rivers. There is also a small, isolated population in Williams Lake. Map data is from the FISS database.

White Sturgeon are provincially red-listed, listed as nationally endangered by COSEWIC, and protected globally through listing in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). White Sturgeon and their associated habitat are managed and protected at the federal level under the Fisheries Act.
17.2 MANAGEMENT DIRECTION

Management direction for White Sturgeon is provided through CCLUP direction to maintain species at risk and water, fish and fish habitat values. White Sturgeon and their associated habitats are managed and protected at the federal level under the Fisheries Act.

17.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not directly interact with White Sturgeon habitat, because their large river habitat is not directly affected by the forest harvesting or road construction. Forest management was not identified in the COSEWIC status report as being a factor in Sturgeon conservation. Forest management does not affect the conservation of the species, except for the broad issue of Fraser River watershed rate of cut, which is outside the control of BCTS.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
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<td>Risk Ranking = A * (B + C)</td>
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<td>Harvest Area Layout</td>
<td>Road Construction</td>
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</table>

17.4 MANAGEMENT STRATEGY

None.

17.5 REFERENCES AND ADDITIONAL INFORMATION


8. MAMMALS
18. American Beaver

18.1 Species Summary: Identification and Habitat

American Beaver (Castor canadensis) is a large dark-furred rodent with a large wide, flat tail. It slaps its tail on the water surface to communicate with other beavers, typically to warn family members of potential predators. The small eyes can see well in water due to a specialized transparent membrane that is drawn over the eyes for protection while diving. The nostrils are small and can be closed for underwater swimming, as can the ears. The tail is flexible and muscular. In the water, the animal uses its tail as a four-way rudder. On land, the tail acts as a prop when the beaver is sitting or standing upright. The beaver’s hind feet are very large, with five long blunt-clawed toes that are webbed for swimming.

American Beaver is a "keystone" species – it creates habitat not just for itself, but for many other species. They generally occur in relatively flat reaches of streams and rivers, and they generally impound slow moving water to create ponds. They also live in large rivers and lakes without building dams. They typically fell large deciduous trees such as aspen and cottonwood, which stimulates the growth of shrubs and young deciduous trees as a long-term food supply. Habitat disturbances that result in deciduous regeneration, including timber harvesting, create high quality habitat until a conifer forest regenerates.

Beaver behaviour and habitat requirements generally increase fish diversity and distribution, although beaver dams may also exclude fish from stream headwaters. Fish can move upstream over most beaver dams during high water (especially relevant for Rainbow Trout that move to spawning areas in the spring), but are frequently blocked during low water (especially relevant for late summer/fall spawning Salmon and Bull Trout). Beaver ponds increase habitat for fish-feeding furbearers such as otter and mink, and increased CWD and ground level structural complexity provides habitat structure for fisher, marten, wolverine, and weasels. Many aquatic insect species and wetland plants, and Moose, rely heavily on beaver ponds and associated wetlands, and they are used as nesting and feeding habitat by waterfowl. Watershed hydrology is strongly, and positively, influenced by beavers – the ponds decrease peak flows and provide a slow input of water to maintain higher low flows. In addition to dams, beavers construct lodges in shallow water or excavate bank dens, they dig canals between water bodies or channels to deepen shallow water, and in the fall they create food caches in deep water close to the lodge or bank den for a winter food supply below the ice.

Beavers occur throughout the CCBA, but are less abundant at higher elevations and in grasslands. Beavers are probably the most ecologically important vertebrate of the CCBA, other than humans, and they had a very high historical economic importance as furbearers. The Wildlife Act makes it an offence to disturb, molest or destroy a beaver or muskrat house, den or dam, except where the person is a licensed trapper or if MoE has issued a permit to BCTS.
### 18.2 MANAGEMENT DIRECTION

The CCLUP requires management for furbearers.

### 18.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Harvesting generally improves beaver habitat by removing a closed-canopy conifer forest, resulting in stimulus of the growth of deciduous trees and shrubs. Road construction may result in the destruction of beaver dams, and associated ponds, sometimes with the direct or indirect death of the beavers. Beaver dams frequently obstruct stream crossing structures, and beaver ponds sometimes saturate and weaken roadbeds and/or flood road surfaces and/or plantations – resolution of these impacts results in loss of dams, and also sometimes with the direct or indirect death of the beavers. Vegetation management during silviculture can result in the reduction or loss of the beaver’s deciduous shrub and tree food supply, resulting in starvation if they cannot establish in a new site before winter.

Beaver dam removal can have a number of impacts to instream habitat, fish habitat, and channel stability, in addition to stress to beavers including potential death.
- A flush of silty water that can smother downstream fish spawning and rearing habitat.
- A rapid reduction of pond depth, that can result in stranding and mortality of fish, amphibians, bird species as well as aquatic and terrestrial plants.
- Scouring and erosion of the downstream channel and banks, which often impacts private property and infrastructure.
- Rapidly fluctuating temperatures in the remaining pond, especially during summer months.
- Flooding and erosion may occur downstream.
- Potential contamination of downstream human water intakes.

#### Relative Risk of Activities

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<thead>
<tr>
<th>Total Risk Ranking</th>
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<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
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</table>
18.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the American Beaver.

Overall Objectives

Minimize forest operation impacts to beavers and their habitat.

Stand and Landscape Level

- Permanent stream crossing structures should be bridges, to avoid culvert plugging, at sites where beaver activity is apparent. Oversize (≥ 3 m height and width) open-bottom arches are a less preferred option that may also work, by making it less likely that a beaver dam will completely plug the culvert.
- Install “beaver stops” on the inlets of existing culverts; however in the CCBA these are frequently crushed in the winter, even along unplowed roads. Apparently ice builds up on them, and they collapse from the weight. Beaver stops cannot be used on culverts larger than about 1600 mm, cannot be used on streams with debris or bedload movement, and always require constant monitoring and maintenance to remove debris.
  - The culvert length should extend through the dam plus at least 1 m into the upstream pond with the cage fixed to its end.
  - The cage should be sized to fit the appropriate culvert and protrude far enough from the end of the culvert, in order to remain submerged and to prevent the beaver from plugging the wire mesh
  - The cage should be constructed of a durable material that will provide service for a period of not less than that expected for the culvert (“homebuilt” ones can be made from steel reinforcing mesh used in concrete work).
  - The cage should be suspended (from rebar stakes) at least 0.5 m above the pond floor to deter anchoring of dam materials to the bed of the pond by the beaver
  - The wire mesh should have openings ≥ 15 cm to allow fish passage, if it is a fish stream.
  - The culvert and mesh assembly should be designed to withstand a 1:10 year storm event and must be sized to allow fish passage (if fish are present).
- When installing all new stream crossing structures in beaver areas:
  - Install a 20 cm high rock weir about 2 metres upstream of the crossing structure inlet without impeding fish passage, to encourage beaver dam construction away from the inlet. This should only be done if it will not result in the stream flooding over its banks during high water, and only if fish passage will not be impeded and fish habitat will not be damaged.
  - If the stream channel is being reconstructed during structure installation, the surface of the new stream channel should be carried to the top of the weir, resulting in a shallow pool above the upstream end of the new channel.

Beavers will usually choose to construct their dam on the top of the weir, back from the crossing structure inlet, reducing the chance that the crossing structure itself will be dammed. In addition, beavers use mud from the stream/pond bottom and sides for the bulk of the dam; if the channel bottom and sides are rocky upstream from the crossing structure, they will tend to prefer to build their dam upstream where there is mud present. This effect will be enhanced if the constructed stream channel has a measurable gradient, because beavers prefer to pond low gradient sites, although this may not be possible to achieve at low gradient crossings.
- During silvicultural vegetation management, maintain a supply of shrubs and deciduous regeneration within 50 m of an active beaver pond. Avoid broadcast herbiciding; use spot treatments – in many cases the beavers will provide adequate vegetation management.

18.5 REFERENCES AND ADDITIONAL INFORMATION


19. AMERICAN MARTEN

19.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

American Marten (*Martes americana*) has long shiny fur. The head is gray, legs and tail are very dark brown or black, the chest has a cream colored patch, and the back is light brown. They are long and slender, with large eyes, pointed nose, and cat-like ears. Claws are sharp and curved. They are much smaller than Fisher.

They usually occur in dense deciduous, mixed, or (especially) coniferous upland and lowland forest; late successional, mesic, coniferous forests are preferred. Wetlands may be important in the West Chilcotin. They spend a lot of their time in trees, but do most of their hunting on the ground. They den in holes in dead or live trees, abandoned squirrel nests, conifer crowns, rock piles, or burrows. Young are born in a den, usually in a hollow tree, sometimes in a rock den. In the winter they use subnivean (below snow) sites created by CWD piles or even active squirrel middens (sometimes simultaneously with the incumbent squirrel) for both denning and hunting prey such as mice and voles. Ground level structural complexity, coarse woody debris and coniferous canopy cover represent high quality habitat components. During the summer months marten use exposed resting sites on the ground or on tree branches. Dens are often located in features characteristic of mature forest stands – large trees with existing cavities, logs, snags, etc. Home range size varies (2-8 km²) and may be dependent on timber harvesting practices. Marten are omnivorous but mammalian prey dominates their diet particularly during the winter, they often hunt along the edges of disturbed habitat in search of small rodents, birds, insects and berries often using subnivean and subterranean hunting strategies. They have low fat reserves and must eat frequently and may undergo metabolic rate depression during cold weather.

One of the most economically important furbearers in the province, marten are present throughout B.C. with the BWBS and SBS zones supporting the highest population densities. They occur widely in the CCBA. The American Marten is protected, in that it cannot be killed, collected or held in captivity without special permits, under the provincial *Wildlife Act*.

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<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
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<td>S4S5</td>
<td>Yellow</td>
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19.2 MANAGEMENT DIRECTION

Management direction for the American Marten is provided by CCLUP direction to manage for fur-bearer habitat, and biodiversity and riparian management in general.

19.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

The forest management issues for the American Marten are habitat loss and fragmentation. These occur through harvesting that removes the key large standing and downed tree components of their habitat. Timber harvesting removes pine, large spruce trees, and to a lesser extent large cottonwoods. Forest harvesting may negatively affect the distribution of the remaining habitat, so that marten have to search more widely for sufficient resources. Increased access may increase trapping mortality. Maintaining structurally diverse and productive marten habitat in logged areas is a function of the method and extent of timber harvesting, and also the type of site preparation and subsequent stand tending.
### 19.4 Management Strategy

The following forest management strategy is designed to address both stand level (recorded sites) and landscape level (unrecorded sites) management of the American Marten.

**Overall Objective**

Retain 70% of actively used habitat of this species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally reduce the economic value.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:
- None – individual sites are less important than general management over the landscape.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:
- Implement the landscape level recommendations for Fisher; they have very similar habitat requirements, other than American Marten prefer somewhat lower elevations.

### 19.5 References and Additional Information


20. AMERICAN MINK

20.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

American Mink (*Neovison vison*) has a long (0.6 m), sleek weasel-like body with short legs, a long neck, small ears and eyes and a long, thick tail. It is medium to dark brown in color with a white chin and usually white spots along the belly. Its fur is very soft and thick and covered with oily guard hairs that make the mink’s coat waterproof. The mink has slightly webbed feet. Mink have long whiskers, small rounded eyes, and small fuzzy ears.

Mink dig dens in river banks or they use a hollow log or an abandoned beaver or muskrat den. It never uses the same den for long. Mink are mostly aquatic. They are excellent swimmers. They live by the fresh waters of lakes, streams, rivers, and wetlands. Mink are active during the night but can often be seen during daylight hours. Mink are solitary and very territorial. Mink primarily feed on small mammals (mice, voles, muskrats), birds, eggs, frogs, crayfish, fish, small snakes and insects – they eat just about anything they can catch. They sometimes store extra food in the den. Though not entirely limited to the riparian zone, wetlands are essential for Mink with habitat value decreasing further than 100 m from a water body. Structural complexity provides security or hunting cover, and tree roots along stream banks, old beaver lodges, abandoned burrows, log jams and CWD are often utilized as den sites, and provide security cover for hunting and resting. Riparian area structural diversity (snags, boulders, littoral vegetation, etc.) is an important component of habitat quality.

The American Mink is protected, in that it cannot be killed, collected or held in captivity without special permits, under the provincial *Wildlife Act*.

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<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
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<th>BC RANK</th>
<th>BC LIST</th>
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<td>Central Cariboo; Chilcotin; Quesnel</td>
<td>G5</td>
<td>S5</td>
<td>Yellow</td>
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</table>

20.2 MANAGEMENT DIRECTION

The management direction for the American Mink is provided by CCLUP direction to manage for fur-bearer habitat, and biodiversity and riparian management in general.

20.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

The forest management issues for the American Mink are habitat loss and fragmentation, although they are somewhat sheltered from forestry impacts by normal riparian management. Increased access may increase trapping mortality.
20.4 MANAGEMENT STRATEGY

The following forest management strategy is designed to address both stand level (recorded sites) and landscape level (unrecorded sites) management of the American Mink.

**Stand and Landscape Level**

- Follow the same management strategy as for Fisher in areas within 100 m of a classified wetland, classified lake or low gradient S1 or S2 stream.
- Implementation of the Moose strategy should be highly beneficial to American Mink near large wetlands.

## REFERENCES AND ADDITIONAL INFORMATION


21. AMERICAN BLACK BEAR

21.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Black Bear (*Ursus americanus*) occurs throughout BC. Their fur can be black, brown, rust, or blonde; hence colour should not be used to distinguish them from Grizzly Bear. Unlike the Grizzly, they have no shoulder hump and they have shorter claws. They are usually under 1 m tall at the shoulder, or 1.5 when standing upright.

They prefer heavily forested mixed-wood stands or areas with dense bush, and generally avoid alpine, grassland and heavily developed urban areas. Black Bears are solitary outside of breeding season except for strong mother and cub bonds, relatively abundant and usually tolerant of human activity. Black bears take advantage of a wide variety of food sources, including herbaceous vegetation, berries, salmon, carrion, mammals and insects. Spring habitats include beaches, estuaries, forested and non-forested wetlands, skunk cabbage swamps and avalanche chutes. Summer berry habitats include low, mid- and high-elevation open forests and forest openings. The fall diet is heavily oriented to spawning salmon, where available. They are usually dependent on old-growth structure for winter denning, although they sometimes den in strange locations such as culverts. Large diameter old growth trees, snags, stumps and logs are selected as winter den sites. Black bears will den in second growth stands in or under old-growth stumps or CWD piles. Some dens are elevated up to 20 m above ground level, and den openings are small relative to body size. Cavity re-use is common.

The Black Bear is protected, in that it cannot be killed, collected or held in captivity without special permits, under the provincial *Wildlife Act*.

![Black Bear](https://example.com/blackbear.jpg)

Photo © Corey Melchior

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<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
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</table>

21.2 MANAGEMENT DIRECTION

The management direction for the Black Bear is provided in the CCLUP direction to manage for furbearers and biodiversity in general.
21.3  **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

The forest management issues for the Black Bear are mortality risk associated with human food, garbage, and roads; protection of critical denning and foraging habitat; provision of stable landscape level forage supply; suitable escape trees in and near forest openings; and disturbance from bear viewing (associated with roads).

<table>
<thead>
<tr>
<th>Relative Risk of Activities</th>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
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<td>Risk Ranking = A * (B + C)</td>
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21.4  **MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the Black Bear.

**Stand Level**

Strategies to address known occurrences of this species are:

- If an active Black Bear den is found, avoid all disturbance during the winter hibernation period (while there is snow present). Place a minimum 50 m no-machine “winter-only” reserve around the den if there will be low machine activity; at higher levels of machine activity a reserve of several hundred metres may be required. A bear that is forced to abandon its winter den will almost certainly die.
- WTPs should be “anchored” at existing Black Bear dens; this is proven suitable denning habitat. The WTP should be at least 1 ha in size.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Locate roads to avoid important habitats (forested and non-forested wetlands, avalanche chutes, riparian areas). Where this is not possible, provide visual screening with natural vegetation.
- Minimize public use of branch roads to minimize the potential for bear human conflict and resulting Black Bear mortalities; deactivate and render impassable roads not presently needed for industrial use.
- Address loss of potential den cavities in large, old trees through “enhanced wildlife tree patches”, which are at least 1 hectare in size and contain standing live trees > 1m diameter and > 5 m height.
- Leave piles of CWD on cutblocks, preferably within 30 m of standing timber and especially near wetlands, to provide denning opportunities.
- Retain large trees in harvest areas; focus WTPs on large diameter trees.

21.5  **REFERENCES AND ADDITIONAL INFORMATION**


22. BADGER

22.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Badgers (Taxidea taxus) are squat medium-size carnivores with dense, coarse hair reaching nearly to the ground, giving the impression of an animal with very short legs. The head has alternating black and white bands, with a white dorsal stripe, black in front of the eyes and white behind, black on the cheeks, and white in front of the ears. The legs are dark brown to black legs and the body hair is a mottled mix of white, black, grey, and reddish-brown. They have extremely long claws and rapidly burrow when disturbed or in pursuit of food.

The estimated BC population is 230 – 340 badgers. Badgers prefer prey that den in the ground, such as Columbian Ground Squirrels, Yellow-bellied Marmots, Northern Pocket Gophers, Red-backed Voles, Deer Mice, and Great-Basin Pocket Gophers. However, their diet includes everything they can catch, such as birds, eggs, reptiles, amphibians, birds, fish, amphibians, snakes, invertebrates, ungulates (carrion?), and plants. Some individuals are active throughout most of the winter, and others remaining in one burrow for up to 98 days. Most dens are repeatedly used by the same or different badgers, continuously or sporadically over many years. Badger burrow and hunting sites are typically in sites dominated by grass, forbs, or low shrubs, either in non-forest, open forest, or very young forest. In the Cariboo, burrows were found to be on grassland slopes adjacent to wetland areas in soil deposits with little canopy cover (≤ 7%). Occasionally, these burrows were located within small openings in the forest, particularly on hill tops. Badgers appear to be relatively tolerant of human presence, using golf courses, abandoned buildings, and roadsides. A variety of soil types with fine sandy loam structure (generally friable soils without large rocks) are used. Suitable soil types frequently occur in small pockets, with areas of only tens of square meters. Habitat has been lost over the past century due to forest encroachment and in-growth, which has locally been temporarily compensated for by logging. Post-harvesting habitat is generally short lived due to current stocking densities and “free-to-grow” requirements. Badgers are active in the winter but their movements and activities are likely impeded by cold temperatures and snow. Winter burrows are located within their summer ranges. Badgers enter torpor, a short period of hibernation, for up to 100 days at a time, in order to conserve energy in the winter. Juveniles disperse (up to 100 km) during July and August to establish their own home ranges when road mortality can be high. Badgers are generally found at low elevations in dry regions; in Central Cariboo FD they mostly occur in the IDFdk3/dk4, IDFxm, and SBPSmk. However, badgers have also been documented using cutblocks, burns, various early-seral forests and other open sites in the BG’h3/xw2, ICHmk3, MSxk, ESSFmw, SBSdw1/dw2/mc1 and occasionally the AT. The most northern record is from Soda Creek, and the western extent was an inactive site at Bald Mountain.

Badgers are protected against harassment, capture or killing under the BC Wildlife Act. A draft Recovery Strategy (the first phase of a Recovery Plan) is under review. Map data is from Regional MoE (Williams Lake).
22.2 MANAGEMENT DIRECTION

The management direction for Badger is provided in the CCLUP direction to manage for species at risk and biodiversity in general, and Identified Wildlife Management Strategy (2004). There are no Wildlife Habitat Areas in the CCBA at this time, but there likely will be in the future.

22.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest industry related threats to badgers include road construction, gravel pits, damage to soils suitable for burrowing, and forest in-growth and encroachment (including planned regeneration at higher stocking densities than natural). Reduced free-to-grow standards may be needed specific cutblocks for Badger habitat.

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<tr>
<th>Total Risk Ranking</th>
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22.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Badgers.
Overall Objective
Retain ≥100% of actively used habitat of this nationally Endangered and red-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen the conservation status.

Implement the Identified Wildlife (2004) strategy at both the stand and landscape level.

Stand Level
Strategies to address known occurrences (dens) of this species are:
- Obtain from Regional MoE (Williams Lake) a digital map or Excel spreadsheet of the locations of known Badger burrow sites.
- When operations occur near a known burrow site that is not a WHA, manage as a Wildlife Habitat Feature (WHF) consistent with the Identified Wildlife (2004) strategy – provide a 20 m radius machine-free zone around the burrow(s), or incorporate into a Wildlife Tree Patch.
- Avoid road construction near a burrow; locate permanent roads as far as possible from burrows (especially high concentrations of burrows) to reduce road mortality.
- Identify badger burrows along road-sides slated for ditch cleaning or re-contouring so they may be avoided; be aware of badger activity and burrows in gravel pits before excavation so they will not be disturbed.
- Leave abundant scattered CWD within the cutblock to enhance populations of Badger prey species.
- Regenerate cutblocks, where badger burrows are present, with reduced stocking standards to produce an open forest suitable as badger habitat (determine the details in consultation with a biologist).
- Refer to Hoodicoff (2005) page 29-30 for additional road management guidelines.
- Refer to Hoodicoff (2005) page 28 for silviculture management guidelines.

Landscape Level
Strategies to address unrecorded occurrences of this species are:
- Protect ground squirrel and marmot colonies (as prey) by placing machine-free zones around burrows. In any case, damage to such colonies may be contrary to the Wildlife Act.
- While laying out proposed road or harvest development areas, watch for and record the location of any badger burrows (send GPS coordinates and photographs to Regional MoE, Williams Lake).
- When badger burrows are found, manage as described above under Stand Level management.

22.5 REFERENCES AND ADDITIONAL INFORMATION


23. BIGHORN SHEEP

23.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Bighorn Sheep (*Ovis canadensis*) have a dark to medium brown head, neck, and dorsal body with a short black tail and a white muzzle, rump, and ventral patches. Both sexes have sturdy muscular bodies and strong necks that support horns that curve back in females and are much larger and curled around in males. There is a continuous black or brown dorsal stripe dividing the white rump patch to the tip of the tail. They have been split into various subspecies at various times; California Bighorn Sheep are those present in the CCBA.

California Bighorn Sheep were extirpated from most of North America by disease contracted from domestic sheep in the 1800s; they have since been reintroduced throughout much of their historic range. Both males and females have strong home range fidelity, with different parts of the range used during different seasons. They live in sexually segregated groups except during the fall rutting season. Use of habitat varies daily and seasonally with changes in requirements for food, rest, safety, thermal cover, rutting, and lambing. Mineral licks are an important source of essential minerals. Lambing and nursing, which occurs between June and July, may take place in the winter range or at separate lambing areas. Scree slopes facing south or southwest and steep terrain interspersed by rock cliffs are typically used as they provide security in birthing, nursing and resting. Lambing areas are typically sparsely vegetated but protection from predators may outweigh access to high quality forage during this time. Typically, females shrink their home range and movements during lambing. In the summer, Bighorn Sheep typically use high elevation alpine and subalpine areas. They eat a variety of grasses, sedges and forbs following the green up of vegetation. Access to watering holes that are safe from predation is an important component of foraging habitat especially for ewes nursing lambs. Sheep use a wide variety of localized features within their home range including meadows, riparian areas, plateaus, and early successional stage forests. They depend on natural grassland such as bunchgrass and early successional forest stages that have low precipitation levels for winter range. Other important components of winter range include mineral licks, migration corridors and the proximity to escape terrain from predators. Forests can also provide escape from deep snow. Winter foods include a relatively higher proportion of grasses but also include forbs, shrubs and some conifers.

There can be up to 70 or more kilometres between summer and winter ranges. Livestock ranching is the primary threat to Bighorns through disease transmission, range depletion, and resource competition. There have been local disease die-offs resulting from disease transmission from domestic sheep; as a result considerable distance (16 km) should be maintained between sheep used in vegetation management and wild Bighorn Sheep. Noise disturbance from harvesting (including heli-logging), road construction, and silviculture can be a problem. Bighorn Sheep occur in the Central Cariboo and Chilcotin Forest Districts. There is also a small population in the Quesnel Forest District, along the West Fraser Road near Marguerite, which is not recorded by the Conservation Data Centre.

Bighorn Sheep are protected against harassment, capture or killing under the *BC Wildlife Act*. 
**Species of Management Concern BCTS Cariboo Region**

![Photo © Gabor Halasz](image)

**Known BGC Unit | Forest District | Global Rank | BC Rank | BC List | Identified Wildlife | COSEWIC | SARA Schedule**
--- | --- | --- | --- | --- | --- | --- | ---
Central Cariboo; Chilcotin; Quesnel | G4 | S2S3 | Blue | Jun 2006

*Not listed by the CDC for Quesnel FD, but there is a small herd along West Fraser Rd near Marguerite.*

### 23.2 Management Direction

Management direction is provided by the CCLUP, with specific reference to the Marble Range, Taseko Lake, Gaspard, and South Chilcotin. The Identified Wildlife Management Strategy (2004) provides more detailed direction. Regional MoE is in the process of developing “Orders” for key habitat in the CCBA.

### 23.3 Forest Management Issues and Risk Assessment

Forest industry related threats to Bighorn Sheep include disease transmission from domestic sheep used for vegetation management, disturbance resulting from access roads, disruption/disturbance of movement corridors and critical areas (mineral licks, lambing areas, wintering areas, resting and security areas, etc.), and forest encroachment or ingress due to wildfire control and restocking of harvested areas at “standard” densities.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
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</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
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<td>MAINT</td>
<td>DEACT</td>
<td>INSTALL</td>
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Relative Risk of Activities (Risk Ranking = A * (B + C))

<table>
<thead>
<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning, HAR, MAINT, DEACT, INSTALL, REMOVAL, FAILING, YARDING, SKIDING, FORWARDING, LOADING, PROCESSING, HANDLING, PLANTING, VEG MGMT, DENSITY</td>
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</tr>
</tbody>
</table>

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23.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Bighorn Sheep.

Overall Objective

Retain 100% of actively used habitat of this species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen the conservation status.

Implement the Identified Wildlife (2004) strategy at both the stand and landscape level.

Stand Level

Strategies to address known occurrences of this species are:
- Address critical winter habitats by managing to meet the objectives of Identified Wildlife (2004). For the forest industry this primarily involves access and disturbance management. Draft winter and extent of use data are available at http://ilmbwww.gov.bc.ca/slrp/lrmp/williamslake/cariboo_chilcotin/docs/frpa.html#california.

Landscape Level

Strategies to address unrecorded occurrences of this species are:
- None – most critical winter habitat has been mapped; it should be managed as under “Stand Level”.

23.5 REFERENCES AND ADDITIONAL INFORMATION


24. BOBCAT

24.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Bobcat (*Lynx rufus*) has short, dense fur that is usually reddish in general tone, with lighter flanks and belly, and is marked with dark spots over most of the body. The bobcat has large, pointed ears with prominent white spots on a black background in back and usually with small but distinctive tufts of black hair at the tip. Its short tail is white on the underside, and tipped with black on top, and usually also has several less distinct black bands on top towards the rump. It has shorter fur, shorter legs, and smaller paws than Lynx, and hence are less well adapted to cold snowy climates.

They generally use lower-elevation mature, multi-layered forests on moderate slopes, often dominated by Douglas-fir, with moderate canopy closure and large tree diameter (i.e., MDWR habitat). They prefer snow depths under 15 cm, and prefer sites with south and west aspect slopes that minimize snow build-up. Openings of shrubby or brushy areas or patches of immature forest are used for hunting, generally during non-daylight hours. Rocky outcrops, hillsides or ledges appear to be important habitat for resting, security, and social interactions. Caves, crevices between boulders, hollow trees, stumps and logs, dense vegetation and abandoned beaver lodges are utilized as maternal den sites. They are generally solitary outside the breeding season. The diet of the bobcat is highly variable across its wide range, but staple items generally include hares, rabbits, squirrels, small mammals (such as mice and voles), birds (primarily grouse) and deer. Bobcats are also known to take ground squirrels, marmots, porcupines, snakes, and other reptiles.

Bobcats are at the northern limit of their geographic range in British Columbia; hence, although they occur throughout the CCBA, they are most abundant in the more southern warmer areas of the Region.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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<tbody>
<tr>
<td>Central Cariboo; Chilcotin; Quesnel</td>
<td>G5</td>
<td>S4</td>
<td>Yellow</td>
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24.2 MANAGEMENT DIRECTION

The management direction for Bobcat is provided in the CCLUP direction to manage for furbearers and biodiversity in general.

24.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Harvesting usually results in a good mix of mature conifer stands (for cover and travel) and regenerating stands (in which snowshoe hares abound), and may enhance habitat for Bobcat. Extensive clearcutting, such as is occurring with Mountain Pine Beetle salvage, may be harmful to Bobcat populations by not providing enough mature forest cover. Forestry roads provide ease of access to trappers, possibly putting too great a proportion of the population under trapping pressure.
### 24.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Bobcat.

**Overall Objective**

Retain viable populations of this species.

**Stand Level**

Strategies to address known occurrences of this species are:
- If a trapper identifies an area as important Bobcat habitat, pay particular attention to implementing the landscape level strategy.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:
- Retention of uncut patches during logging, and retention of cover and forage plants afterward.
- Silvicultural practices such as extensive thinning and the application of herbicides generally reduce the suitability of prey habitat and cover.
- The goal is to maintain forest patches that are multi-layered and structurally diverse, with adequate connectivity between them.

### 24.5 REFERENCES AND ADDITIONAL INFORMATION

25. CANADA LYNX

25.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Canada Lynx (*Lynx canadensis*) has a short tail, long legs, large feet, and prominent ear tufts. In the winter it is light grey and slightly mottled with long guard hairs; the ear tufts and tip of the tail is solid black. In the summer the colour has a definite reddish brown cast, and the hairs are much shorter. It has large feet, that in the winter are covered with a dense growth of coarse hair to help with travel over snow. The lynx, like the snowshoe hare, can spread its toes in soft snow, expanding its “snowshoes” still farther. The very similar Bobcat is slightly smaller, its feet are smaller, its tail tip has three or four narrow black bars; and its fur has more pronounced spotting.

Home ranges (8-783 km²) are often influenced by gender, prey availability, season and population density and may be defined by topographic features. Although some fidelity to home ranges has been documented, lynx are known to abandon areas when prey density is low and to make regular, large scale dispersal movements. Lynx are predominantly solitary animals, but female family groups with combined litters have been observed. Lynx habitat is largely determined by snowshoe hare habitat selection and usually includes early to mid-successional, dense, mixed-wood or coniferous stands. They commonly select open spruce forests and tend to avoid unforested areas, and prefer forests with a dense understory of thickets and windfalls. Regenerating forest ecosystems, such as after wildfire or logging, are often able to support denser populations of snowshoe hares, and therefore are good lynx habitat. Lynx may help to reduce local hare populations below the level at which they create damage to plantations. Hollow trees, CWD, rockslides, and dense cover are often selected as natal and maternal den sites, usually occurring at mid-slope on south and south-west aspects, in mature conifer stands with extensive blowdown or in burns with ample deadfall. Resting sites with varying degrees of cover appear to be used dependent on weather conditions. In the winter they almost entirely feed on snowshoe hares; which remain the primary prey even in summer. They also eat grouse, voles, mice, squirrels, foxes and carrion.

They occur throughout the boreal forests of interior B.C., with distribution and density closely mirroring its primary prey species, the snowshoe hare. Populations are documented to follow an approximate 10 year cycle, lagging 1 year behind the peaks and troughs of the snowshoe hare cycle.

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<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
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<th>COSEWIC</th>
<th>SARA WILDLIFE</th>
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<td>G5</td>
<td>S4</td>
<td>Yellow</td>
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25.2 MANAGEMENT DIRECTION

The management direction for Canada Lynx is provided in the CCLUP direction to manage for furbearers and biodiversity in general.

25.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Harvesting usually results in a good mix of mature conifer stands (for cover and travel) and regenerating stands (in which snowshoe hares abound), and may enhance habitat for lynx. Extensive clearcutting, such as is occurring with Mountain Pine Beetle salvage, may be harmful to lynx populations by not providing enough mature forest cover. Forestry roads provide ease of access to trappers, possibly putting too great a proportion of the population under trapping pressure.
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<tr>
<th>Total Risk Ranking</th>
<th>Relative Risk of Activities</th>
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<td>Harvest Area Layout</td>
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### 25.4 MANAGEMENT DIRECTION

The management direction for Canada Lynx is provided in the CCLUP direction to manage for furbearers and biodiversity in general.

### 25.5 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Canada Lynx.

**Overall Objective**

Maintain viable populations of this species.

**Stand Level**

Strategies to address known occurrences of this species are:
- If a trapper identifies an area as important Lynx habitat, pay particular attention to implementing the landscape level strategy and consider the trapper’s site-specific suggestions.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:
- Retention of uncut patches during logging, and retention of cover and forage plants afterward.
- Silvicultural practices such as extensive thinning and the application of herbicides generally reduce the suitability of prey habitat and cover.
- The goal is to maintain forest patches that are multi-layered and structurally diverse, with adequate connectivity between them.

### 25.6 REFERENCES AND ADDITIONAL INFORMATION


26. CARIBOU (NORTHERN MOUNTAIN POPULATION)

26.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Caribou, or Woodland Caribou, (northern mountain population) (Rangifer tarandus caribou pop. 15) are a large, dark subspecies with short, heavy antlers. Caribou are dark to medium brown colour with short white tails and a white rump patch. Males have a paler contrasting neck. Both sexes have antlers which are large and flattened in cross-section; male antlers are larger and more robust. Caribou are presently considered to have three “ecotypes” in British Columbia – that is, subspecies caribou has three different groups of populations with distinct patterns of habitat use and feeding behaviour. The ecotype of the Northern Mountain populations is generally called “Northern Caribou”. Northern Caribou live in the mountainous and adjacent plateau areas with relatively low snowpacks in west-central and northern Interior BC. The populations of concern for the Caribou Region are those associated with the Itcha-Ilgachuz Mountains and adjacent Coast Range. In winter Northern Caribou feed mostly on terrestrial (ground) lichens with use of arboreal (tree) lichens dependent on snow conditions. Seasonal migrations involve considerable movements in both horizontal distance and elevation.

The critical habitat requirements of Northern Caribou are large tracts of winter range where they can exist at low densities, as an anti-predator strategy and to rotate their winter range use; access to an adequate supply of terrestrial and arboreal lichens for food; snow interception by forest canopy to allow movements within the winter range; and relatively undisturbed high elevation calving habitat where they can calve in isolation away from predators. Mineral licks are an important habitat component. The distribution of both the summer and winter habitats on the landscape, and the ability of caribou to become spatially separated from predators, particularly during the summer months, are the most important factors to the long-term persistence of Northern Caribou. The mountain pine beetle epidemic has significantly impacted their habitat through the high loss of pine forest habitat.

Northern Caribou in British Columbia are protected from wilful killing, wounding, and taking, and legal harvesting is regulated under the provincial Wildlife Act. Under FRPA, specific regulations address winter range and mineral licks. The Cariboo-Chilcotin Land Use Plan defines a regional level Northern Caribou Strategy, which provides specific direction on all aspects of caribou management including mountain pine beetle infestations. The Identified Wildlife Management Strategy (2004) provides further direction.

Caribou are protected against harassment, capture and from unrestricted hunting under the BC Wildlife Act. They are listed as Endangered under the Species at Risk Act, and are Identified Wildlife.
### Species of Management Concern BCTS Cariboo Region

**KNOWN BGC UNIT**
- Chilcotin; Quesnel<br>
**GLOBAL RANK BC RANK**
- TS4S4 Blue<br>
**BC LIST IDENTIFIED**
- May 2004<br>
**CONEWIC SARA**
- T/SC (May 2002)*

* T (May 2002); SC (May 2002). Provincial and COSEWIC borders differ, therefore two listings for this ecotype.

#### 26.2 MANAGEMENT DIRECTION

The CCLUP requires that Northern Caribou be given special management consideration. There are three designated Northern Caribou Wildlife Habitat Areas. There are three orders for the WHAs, which provide management direction in conjunction with the CCLUP Northern Caribou Strategy.

#### 26.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management adversely affects Northern Caribou habitat through a complex set of interacting mechanisms. There is little or no evidence that Northern Caribou can be maintained over the long term in areas having high levels of forestry, predation, and recreation activity. The current mountain pine beetle epidemic, with high levels of salvage harvesting, may result in loss of habitat over large areas in much of the range of the species through:

- reduced space available for caribou, thereby limiting ecological carrying capacity.
- reduced terrestrial and arboreal lichen supply, which may limit long-term food supply.
- altered movement patterns.
- fragmented habitat, decreasing caribou use of some portions of the remaining smaller and discontinuous patches of habitat, or increasing the energy required to travel between patches.
- increased susceptibility to predation, with increasingly compressed and fragmented habitat.

Forest harvesting affects Northern Caribou winter habitat at both the stand and landscape levels. At the stand level, harvesting and silvicultural may reduce lichen abundance; slow lichen regeneration will have long-term implications for caribou winter habitat at both the stand and landscape level. Parts of the winter range with too little lichens may be abandoned, forcing caribou to concentrate in a smaller area, which may lead to increased predator efficiency. A patchwork of early seral and mature forests may also enhance habitat for other prey species such as moose that prefer early seral forests, leading to increased predator numbers and increased predation on caribou.

#### Total Risk Ranking

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
</tr>
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<tbody>
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<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
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</table>
| 12 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1

#### Relative Risk of Activities

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<td>Planning</td>
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<tr>
<td>Harvesting</td>
<td>2</td>
</tr>
<tr>
<td>Silviculture</td>
<td>2</td>
</tr>
</tbody>
</table>

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26.4 MANAGEMENT STRATEGY

Overall Objective
Retain 100% of actively used habitat, or potential habitat, of this species in healthy condition. Each loss of suitable habitat for this species will significantly worsen the conservation status.

A national recovery strategy and national recovery plan will be eventually developed. The “Orders” (numbers 1 to 3) for each WHA, augmented by the CCLUP Mountain Cariboo Strategy, should be followed until the national direction is available.

26.5 REFERENCES AND ADDITIONAL INFORMATION


27. CARIBOU (SOUTHERN POPULATION)

27.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Caribou (Southern Population) have been called "Woodland Caribou (southern population) (Rangifer tarandus caribou pop. 15)". This implied that they are genetically very similar or identical to Woodland Caribou found elsewhere, such as the Northern Cariboo populations in the western part of the CCBA. However, a paper published by McDevitt et al. in February 2009 (reference below) demonstrates through DNA analysis that at least some of the populations are genetically distinctive, and derived from hybridization of tundra caribou and woodland caribou. They are therefore genetically distinct from Woodland Caribou, and hence more unique than previously thought.

The caribou populations of the Cariboo Mountains are generally called "Mountain Caribou". Mountain Caribou are large and dark with short, heavy antlers. They are dark to medium brown colour with short white tails and a white rump patch. Males have a paler contrasting neck. Both sexes have antlers which are large and flattened in cross-section; male antlers are larger and more robust. Mountain Caribou live in the mountainous deep-snowpack portion of east central and southeastern "Interior Wet Belt" BC. The populations of concern for this report are those associated with the Cariboo Mountains. In winter Mountain Caribou feed almost entirely on arboreal hair lichen, with use of terrestrial lichen and other ground-based foods only in early winter. Seasonal migrations involve little movement in horizontal distance, but considerable elevational shifts. The critical habitat requirements of Mountain Caribou are large tracts of winter range where they can exist at low densities, as an anti-predator strategy and to rotate their winter ranges; access to an adequate supply of arboreal lichens for food; snow conditions that allow travel on top of the snow and with low avalanche hazard to allow movements within the winter range; and relatively undisturbed high elevation calving habitat where they can calve in isolation away from predators. Mineral licks are an important habitat component. The distribution of both the summer and winter habitats on the landscape, and the ability of caribou to become spatially separated from predators, are the most important factors in the long-term persistence of Mountain Caribou.

Mountain Caribou in British Columbia are protected from wilful killing, wounding, and taking, and legal harvesting is regulated under the provincial Wildlife Act. Under the Forest and Range Practices Act, specific regulations address winter range and mineral licks. The Cariboo-Chilcotin Land Use Plan defined a regional level Mountain Caribou Strategy, which provides specific direction on all aspects of caribou management including mountain pine beetle infestations. A national Recovery Strategy has been developed, with Wildlife Habitat Area "Order 4" and "Order 5" of February 2009 defining the boundaries of no-harvest and modified harvest areas, and providing the “rules” for their management.
27.2 MANAGEMENT DIRECTION

The CCLUP requires that Mountain Caribou be given special management consideration. There are 29 designated Mountain Caribou Wildlife Habitat Areas; they have five associated “Orders”. Orders 4 and 5 of February 2009 define no-harvest and modified harvest areas, and their management. The CCLUP Caribou Strategy provides details on forest operations in modified harvest areas.

27.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management adversely affects Mountain Caribou habitat through a complex set of interacting mechanisms. There is little or no evidence that Mountain Caribou can be maintained over the long term in areas having high levels of forestry, predation, and recreation activity. The current mountain pine beetle epidemic should cause relatively little loss of habitat, because pine is a minor component of the critical habitat.

Forest harvesting affects Mountain Caribou winter habitat at both the stand and landscape levels. At the stand level, harvesting and silvicultural may reduce lichen abundance; slow lichen regeneration will have long-term implications for caribou winter habitat at both the stand and landscape level. Parts of the winter range with too little lichens may be abandoned, forcing caribou to concentrate in a smaller area, which may lead to increased predator efficiency. A patchwork of early seral and mature forests may also enhance habitat for other prey species such as moose that prefer early seral forests, leading to increased predator numbers and increased predation on caribou.

27.4 MANAGEMENT STRATEGY

Overall Objective

Retain 100% of actively used habitat, and potential habitat, of this species in healthy condition. Each loss of suitable habitat for this species will significantly worsen the conservation status.

A National Recovery Strategy has been developed, although the bulk of the text is not yet available. The “Orders” (numbers 4 and 5) for each WHA, augmented by the CCLUP Mountain Cariboo Strategy, should be followed.
27.5 REFERENCES AND ADDITIONAL INFORMATION


28. COMMON MUSKRAT

28.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Common Muskrat (Ondatra zibethicus) is a semi-aquatic rodent about the size of a cottontail rabbit. The shape is chunky, suggestive of a small beaver, but with a long, narrow, scaly tail that is flattened from side to side rather than in the "paddle" shape of the beaver. The head is relatively large and broad, the eyes are small, and the rounded ears are short and generally inconspicuous. Muskrat pelage consists of a dense layer of underfur that is often greyish, overlaid by thick, glossy brown guard hairs that cause most animals to be some shade of brown in general appearance.

Muskrats live in marshes, lakes, ponds (especially beaver ponds) or slow-moving sloughs, rivers, and drainage ditches. The most productive habitats are permanent marshes and lake or pond margins that are shallow enough to support thick growths of plants such as cattails, bulrushes, sedges or horsetails, but deep enough to not freeze to the bottom in winter. Moderate numbers of muskrats also occur in lakes or ponds or along rivers with little or no marsh growth and subsist by feeding on submerged plants such as pondweeds. They build lodges from mud and aquatic vegetation, or dig bank dens, for summer and winter residences. Dens in stumps, hollow logs, debris piles, and beaver lodges (both active and abandoned) also occur. Foraging and lodge construction reduces aquatic vegetation build up and maintains open water in beaver impoundments to provide habitat for various wetland species. Stream-bank burrows or reconstructed winter houses are often used as maternal dens. Muskrats also build support and cover structures for feeding, including vegetation platforms and mini-lodges termed "feeding huts" in summer and "push-ups" in areas where ice forms in winter. Push-ups are so-named because they are constructed by the animals pushing up piles of vegetation through a natural crack or a hole gnawed in the ice. Like lodges, they are hollowed out from below and are used as protective sites for feeding, enabling the animals to use vegetation that is remote from the home lodge. If push-ups are present throughout the surface area of a frozen lake, it is an indicator that there is insufficient winter dissolved oxygen to support game fish. Cattail is a primary food for muskrats; however they also eat the shoots, roots, bulbs, and leaves of a variety of other aquatic plants including bulrushes, horsetails, sedges, smartweeds, water lilies, duckweeds, and pondweeds and, especially in summer, upland plants such as grasses, clovers, various forbs, and cultivated crops such as alfalfa and corn. They occasionally eat animals such as clams, snails, bird nestlings, fish and carrion.

Muskrats occur in all biogeoclimatic zones with the exception of alpine tundra.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Chilcotin; Quesnel</td>
<td>G5</td>
<td>S5</td>
<td>Yellow</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

28.2 MANAGEMENT DIRECTION

The CCLUP requires management for furbearers, and biodiversity in general.

28.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Harvesting and road construction has little direct effect on muskrat habitat. Indirect effects result from changes in beaver and beaver pond abundance.
### Management Direction

The CCLUP requires management for furbearers, and biodiversity in general.

### Management Strategy
- Manage Common Muskrat habitat indirectly, by managing for American Beaver habitat.

### References and Additional Information

29. COYOTE

29.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Coyote (Canis latrans) is a medium-sized member of the dog family with the general appearance of a German shepherd dog, but about half the size and slimmer. It has a narrow, pointed muzzle, prominent pointed ears, long slender legs, relatively small feet, and a long, bushy, black-tipped tail. The texture and colour of its fur varies, but is generally a buffy, grizzled grey with a mixture of cinnamon-coloured forelegs and feet, white throat and belly, and often a dark line down the back.

They use most habitats, including forests, subalpine meadows, open prairie and agricultural fields. The primarily eat small mammals, (including hares, rabbits, ground squirrels, tree squirrels, voles and mice) and carrion (including road and railroad kills and remains from livestock butchering). They also eat the young of large ungulates, deer, birds, insects, fish and vegetation, particularly berries in the fall. Scavenging at ungulate kills made by larger predators, notably wolves and cougars, may be an important component of the diet of coyotes in some areas, especially during winter. Snowshoe hares may comprise the bulk of the diet during periods of intermediate to high hare density. Livestock and domestic pets can sometimes contribute significantly to their diets. Once occurring in Canada only in the southern portions of the prairie provinces, the coyote has expanded its range into almost all habitats that support prey populations, from remote boreal forests and alpine tundra to rural and urban areas. This expansion, which has occurred throughout North America, is likely related to new habitat opportunities created by human activities that have opened up the forest landscape and reduced wolf populations, and possibly also to a warming climate. They are extremely adaptable, with habitat alteration apparently having little impact on population densities; timber harvesting practices appear to be irrelevant.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Chilcotin; Quesnel</td>
<td>G5</td>
<td>S5</td>
<td>Yellow</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

29.2 MANAGEMENT DIRECTION

The CCLUP requires management for furbearers, and biodiversity in general.

29.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest harvesting benefits coyotes by providing a variety of open and partly open habitats that support a wide variety of prey species.
<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning Area Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
<td>Bridge Installation</td>
</tr>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

29.4 MANAGEMENT STRATEGY

None.

29.5 REFERENCES AND ADDITIONAL INFORMATION

30. FISHER

30.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Fisher (*Martes pennanti*) is a medium-sized carnivore of the weasel family that occurs in the temperate and boreal forests of North America. Fishers have long, thin bodies, dense coats and long well-furred tails, pointed faces, rounded ears, and short legs. Their fur is long, luxurious, and chocolate-brown in colour, with considerable grizzly patterns around the shoulders and back. Males are much larger than females. Fishers are two to three times the size of the similar American Martens, and have darker colouring, and shorter ears.

Fishers prefer lower elevation mixed or coniferous forests and riparian habitats with large coniferous and deciduous “wildlife trees” and abundant course woody debris. Food consists of small mammals, birds, ungulate carrion, and any other meat source. Fisher’s long thin bodies make them susceptible to heat loss and fisher use subnivean (“below snow”) spaces almost exclusively when temperatures drop below -10°C. In the Chilcotin they occur in everything from a single hollow log to cull piles 25 m wide by 200 m long by 5 m high. Fishers occur throughout most of mainland BC, east of the Coast Range, but are uncommon to rare in most of the area. Northeast BC and the central interior are the parts of BC with the highest habitat capability for Fishers. A “high density” population has about 1 fisher per 100 km², and there is a total BC population of under 3,800 individuals. Fishers were formerly provincially red-listed, but are presently blue-listed (contrary to Identified Wildlife 2004). They were established as Identified Wildlife under the June 2006 Order – Category Species at Risk. They are not COSEWIC or SARA-listed, because they occur across Canada. Fisher may revert back to the red-list in the near future, because the mountain pine beetle epidemic is destroying much of the best habitat in BC.

Maintaining structurally diverse and productive fisher habitat in logged areas is a function of the method and extent of timber harvesting, and also the type of site preparation and subsequent stand tending. The harvesting associated with the mountain pine beetle epidemic, and less so the epidemic itself, is degrading very large areas of Fisher habitat in the Central Interior. Ministry of Environment reviews of recent harvesting practices in the Cariboo Region have determined that, of the CWD that is retained on blocks “for furbearers”, very little has winter habitat value because it is scattered flat on the ground and is not elevated as single pieces or piles (Geoff Price, pers. comm.).

Fisher is protected, in that it cannot be killed, collected or held in captivity without special permits, under the provincial *Wildlife Act*. Fisher is a furbearer, and hence there are CCLUP management requirements.
**Fisher Potential Habitat Quality**

Adapted from Identified Wildlife Management Strategy, with "Low", "Very Low", and "Nil" habitat values omitted. Larry Davis (pers. comm.) considers that the “High” and “Medium” categories should be reversed in the Chilcotin, because the value of the higher elevations is limited by greater snow depth. The management strategies given below are not affected by this difference.

**Broad Ecosystem Units of high value** are mesic to wet conifer and mixed forest types: Interior Western Hemlock - Douglas-fir (IH), Spruce - Douglas-fir (SD), Western Red-cedar - Black Cottonwood Riparian (RR), White Spruce - Subalpine Fir (SF), Hybrid White Spruce - Black Cottonwood Riparian (WR), Boreal White Spruce - Trembling Aspen (BA), and Boreal White Spruce - Lodgepole Pine (BP).

Those of medium value are Interior Douglas-fir Forest (DF), Douglas-fir - Lodgepole Pine (DL), Engelmann Spruce Riparian (ER), and Interior Western Hemlock - White Spruce (IS).

From IWMS, modified by Larry Davis (pers. comm.) based on experience in the Chilcotin.
30.2 MANAGEMENT DIRECTION

The management direction for the Fisher is provided by CCLUP direction to manage for species at risk and for furbearers, and by the Identified Wildlife Management Strategy (2004). There are no Wildlife Habitat Areas in the CCBA, but some are under consideration for the Chilcotin.

30.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

The forest management issues for the Fisher are habitat loss and fragmentation. These occur through harvesting that removes the key large standing and downed tree components of their habitat. Timber harvesting removes pine, large spruce trees, and to a lesser extent large cottonwoods. Forest harvesting may negatively affect the distribution of the remaining habitat, so that fishers have to search more widely for sufficient resources.

Wildlife tree retention areas, elevated coarse woody debris retention, old forest retention, landscape level planning, and riparian management, have the potential to partially address fisher habitat requirements through the retention of large trees, dense canopy closure, and abundant levels of CWD.

<table>
<thead>
<tr>
<th>Relative Risk of Activities</th>
<th>Planning &amp; Roads, Bridges and Harv. &amp; Silviculture</th>
<th>Total Risk Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning &amp; Road Layout</td>
<td>Harvesting</td>
<td>Risk Ranking</td>
</tr>
<tr>
<td>Road Construction</td>
<td>Felling</td>
<td>A = Probability of Interaction</td>
</tr>
<tr>
<td>Road Maintenance</td>
<td>Yarding</td>
<td>B = Legal Consequence</td>
</tr>
<tr>
<td>Road Dercalivation</td>
<td>Skidding</td>
<td>C = Biological Consequence</td>
</tr>
<tr>
<td>Bridge Installation</td>
<td>Forwarding</td>
<td></td>
</tr>
<tr>
<td>Bridge Removal</td>
<td>Loading</td>
<td></td>
</tr>
<tr>
<td>Site Preparation</td>
<td>Processing</td>
<td></td>
</tr>
<tr>
<td>Planting</td>
<td>Handling</td>
<td></td>
</tr>
<tr>
<td>Vegetation Management</td>
<td>Density Management</td>
<td></td>
</tr>
</tbody>
</table>

30.4 MANAGEMENT STRATEGY

The following forest management strategy is designed to address both stand level (recorded sites) and landscape level (unrecorded sites) management of the Fisher, for moderate to high value Broad Ecosystem Units within the overall areas mapped (above) as having moderate to very high habitat potential for Fisher.

**Overall Objective**

Retain 70% of actively used habitat of this species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen the conservation status and reduce the economic value. Once the conservation status drops to red-listed, commercial exploitation of this species will no longer be possible.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

*BCTS considers that the recommended strategies cannot be fully implemented due to requirements to address other forest management issues. Hence the objective will probably not be met, and Fisher abundance will probably drop to red-listed (Threatened). Those implementing the strategies for this species should consult with BCTS foresters.*
Implement the Identified Wildlife Management Strategy (2004) at both stand and landscape level. The following summary is consistent with IWMS (2004), other than some omitted land use planning recommendations.

**Stand Level**

Strategies to address known occurrences of this species are:

- Manage Wildlife Habitat Areas (WHA), when established, according to the direction provided for each WHA.
- Outside established WHAs, where a fisher den site is verified the tree should be placed in a reserve to maintain its integrity. Quality den trees are uncommon on the landscape and fisher are known to reuse these trees.
  - Reserves should provide a 100+ m buffer (100 m radius = about 3 ha), although some den trees have been found closer to cut blocks. Shape the reserve to logical boundaries, and to include groups of nest trees that are in close proximity.
  - Where possible connect the den area to riparian habitats or other retention areas, to provide corridors with overhead cover for accessing the den site.
  - No machine operations should occur within 500 m of known fisher den sites in the critical breeding period of **March 1st and June 15th** to avoid disturbance of reproductive females. Roads with existing use that are within the 500 m should have heavy machinery use minimized in that period (however, road maintenance in particular may be required).

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Maintain **connectivity** of mature and old forest between riparian and upland habitats.
- Retain **patches** of forest that have high structural complexity including high amounts of coarse woody debris (CWD), through designation as WTPs, OGMAs, or temporary deferred harvest areas. Attributes of a high-value retention area include:
  - Black cottonwood trees ≥90 cm dbh.
  - Spruce trees ≥40 cm dbh with rust brooms.
  - Lodgepole pine trees ≥30 cm dbh, Douglas-fir trees ≥50 cm dbh, and/or aspen trees ≥50 cm dbh with obvious cavities, conks or blind conks (signs of internal decay).
  - Over 30% cover of high shrubs (2 - 10 m stratum).
  - Pieces of CWD >20 cm diameter, elevated off the ground.
- Maintain **individual** large diameter trees (as defined for WTPs), for current use and as a source of high-value CWD in the future, especially along riparian and riparian-associated habitats.
  - Target 5 such trees per ha, for future reproductive dens or rest sites.
  - Avoid falling as danger trees during post-harvest silviculture treatments.
- Maintain/protect **existing patches of structure**, such as shrubby areas, high CWD accumulations, or advanced regeneration.
  - CWD accumulations should be protected (using stubs or no-machine reserves) so that skidders do not run over logs, break them up, and flatten the pile.
  - Maintain advanced regeneration and shrub cover where feasible (especially in association with riparian areas, WTPs, stubs, and no-machine reserves) as foraging areas for fishers as the stand reaches the free-to-grow stage.
    - Retention of 25% shrub cover in the cutblock, if feasible, will increase the likelihood of fishers using the regenerating stand by about 21% compared to a block with no shrub cover.
- Retain **elevated** coarse woody debris as piles (preferred) and single pieces, during and after harvesting, for fishers and prey species.
  - Leave **small cull piles** of medium-sized coarse woody debris (CWD) with the cutblock, with a target of 5 piles per ha.
    - CWD is logs >20 cm diameter at ≥25 m³/ha, dispersed throughout the cutblock to maintain foraging areas and cold-weather rest sites in the regenerating stand. Stump piles from roads
Species of Management Concern BCTS Cariboo Region

- Elevated CWD is 0.5 – 2 m from the ground so that it will stick up through the snow and provide access to spaces below the snow for foraging and denning. This will increase the utility of the cutblock for fishers by about 35% compared to a block with no elevated large CWD.
- The preferred cull pile dimensions are 4m wide by 5m long by 2m high. However, the size should not be viewed as absolute. Smaller piles than this will also benefit smaller carnivores and prey, while larger piles will be used by all sizes of wildlife.
- These sites provide shelter for many species of fisher prey.
- Leave weasel huts scattered across blocks, as a partial substitute if small cull piles are not feasible.

- There should be > 10 per ha unless other forms of elevated CWD are retained in the block; roughly equate 2 weasel huts to 1 small cull pile in terms of furbearer value.10
- Weasel huts consist of 3 or more waste trees or existing CWD (including deciduous) laid down together by the feller-buncher, so that the trunks are criss-crossed but more or less parallel and oriented along the direction that disc-trenching will occur. This results in elevated CWD.
- Skidding needs to avoid weasel huts; this may require advance planning of skidder routes, or instruction to the skidder operator to avoid as many weasel huts as possible.
- Disc trenchers need to pass between the weasel huts; this requires advance planning of the orientation of disc trenching.
- These are used by the other weasel furbearers (which is important), but are generally smaller than the preferred size for the larger Fisher.
- Weasel huts were used on some blocks in 100 Mile Forest District in the late 1990s, and monitoring by Roger Packham showed winter use by weasels.

30.5 References and Additional Information


Davis, Larry. pers. comm. (Jan 2009).


10 These are an intuitively selected values; they are not based on data but provide a reasonable basis for planning CWD retention.

31. FRINGED MYOTIS

31.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Fringed Myotis (*Myotis thysanodes*) is a medium-size tan-brown “bat”. The colour on the back varies from a pale to dark brown, with the underbelly paler in colour. The flight membranes and ears are dark brown to black and the ears are pinkish at their base. The species is characterized by a distinct fringe of short stiff hairs on the outer edge of the tail membrane, which is visible to the naked eye.

Foraging and roosting habitats often are found in interior dry forests; they may roost under loose bark of dead ponderosa pine and Douglas-fir. Caves, rock crevices, mine tunnels, and buildings have been well documented as providing day, night, and maternity roosts. Site fidelity is high, although if Fringed Myotis use trees, fidelity will likely be to a roosting area containing multiple roost trees. They probably hibernate over winter, although no hibernation sites are known in BC. They feed on a diverse diet of beetles, moths, leafhoppers, harvestmen, crickets, lacewings and flies. Many of these insects are fully terrestrial, suggesting that gleaning is employed as a predatory technique, rather than just mid-air captures.

The Fringed Myotis is restricted to the dry interior, in a variety of habitats including mid-elevation grasslands, deserts, and woodlands, in the BGxh3/ xw2 and IDFdk3/dk4/xm). They are most closely associated with arid grassland and ponderosa pine and dry Douglas-fir forest, and are often caught near streams. Their distribution and biology is very poorly known. The Fringed Myotis is protected, in that it cannot be killed, collected, or held in captivity without special permits, under the provincial *Wildlife Act.*

Photo © Anna Roberts

The characteristic “fringe”. Photo © Anna Roberts
### 31.2 Management Direction

Management direction is from the CCLUP direction to manage for species at risk and general biodiversity, and by the Identified Wildlife Management Strategy (2004).

### 31.3 Forest Management Issues and Risk Assessment

Forest management may impact Fringed Myotis habitat through the removal of veteran trees and snags, although this cannot be determined for certain until it is known how dependent they are on tree roosts. Colonies in rock crevice roosts are susceptible to destruction through road construction.

#### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking</td>
<td>Planning</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>A = Probability of Interaction</td>
<td>Harvest Area Layout</td>
<td>Harvesting</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
</tr>
<tr>
<td>B = Legal Consequence of Interaction</td>
<td>Road Construction</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>C = Biological Consequence of Interaction</td>
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<td>Bridge Removal</td>
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<td></td>
<td>8</td>
<td>2</td>
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</tr>
</tbody>
</table>

### 31.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the Fringed Myotis.

#### Overall Objective

Retain 70% of actively used habitat of this species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Implement the Identified Wildlife Management Strategy (2004) at both stand and landscape level. The following summary is consistent with IWMS (2004).

#### Stand Level

Strategies to address known occurrences of this (roost or maternity sites) species are:

Manage known roost or maternity sites to meet the objectives of a WHA (Identified Wildlife 2004), whether or not a WHA has been designated:

- When harvesting or road construction is considered in the vicinity of a known roost site, provide a draft WHA boundary around it and manage according to Identified Wildlife (2004).
Landscape Level

Strategies to address unrecorded occurrences (roost or maternity sites) of this species are:

- In dry, open-growing Douglas-fir stands in the IDF, and all BG stands, emphasize the retention of large dead or alive Douglas-fir and ponderosa pine that are suitable (described above) as roost sites.

31.5 REFERENCES AND ADDITIONAL INFORMATION


http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr%5Ffringed%5Fbat%5Fe%2Epdf.


32. GREY WOLF

32.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Grey Wolf (Canis lupus) is the largest wild member of the dog family, and the largest known specimens have come from northwestern North America. Its general appearance is similar to that of a German shepherd dog, but with longer fur, a bushier tail, and proportionately longer legs and larger feet. Fur colour is highly variable, from nearly pure white to the more typical brindled mix of light grey or tan with brown, black or white, to uniformly dark individuals ranging from sooty grey to coal black. Paler individuals usually have lighter coloured legs and undersides. In comparison to the much smaller coyote, the wolf has a considerably heavier build, shorter and more rounded ears, and a wider muzzle and nosepad.

Wolves historically occurred in virtually every kind of terrestrial habitat available in the northern hemisphere, from coastal rain forest to open prairie to the high arctic. At a finer scale, habitat use is affected by snow depth and prey distribution. Wolves are heavy and although they have large feet, they readily sink in deep or powdery snow. During winter in areas with significant snowfall, wolves frequent the areas where ungulates concentrate, travelling and hunting along frozen lakes and rivers, but also using forests with closed canopies and open slopes that shed snow because of exposure to sun and wind. In deep snow areas, wolves leave distinct, narrow trails created both by packs travelling in single file and by individuals and packs re-using the same routes repeatedly. They readily travel on backroads and trails left by human developments and recreational activity, but generally avoid heavily-used roads and human settlements. Wolf is the dominant carnivore where it occurs, eating the full range of available local prey. During the snow-free season, wolves often travel alone and hunt a variety of smaller species ranging in size from voles and ground squirrels to young ungulates. In winter, the primary prey of wolves hunting cooperatively in packs are local large ungulates – moose, caribou, elk, or deer, but some packs specialize on other species such as mountain sheep and mountain goats. Wolves are highly social and very adaptable predators, usually operating in family groups or packs with rigid dominance based structure. Wolves typically dig underground maternal dens, but have been known to use hollow logs, crevices and abandoned beaver lodges.

Wolves are present throughout the CCBA, but generally avoid human habitat to avoid being shot.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Chilcotin; Quesnel</td>
<td>G4</td>
<td>S4</td>
<td>Yellow</td>
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<td></td>
<td>NAR (May 1999)</td>
<td></td>
</tr>
</tbody>
</table>

32.2 MANAGEMENT DIRECTION

The CCLUP requires management for furbearers, and biodiversity in general.

32.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations do not adversely affect wolves; wolves benefit by the creation of additional habitat for prey species such as moose and caribou.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Risk Ranking</th>
<th>Probability of Interaction</th>
<th>Legal Consequence of Interaction</th>
<th>Biological Consequence of Interaction</th>
</tr>
</thead>
<tbody>
<tr>
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<td>B</td>
<td>C</td>
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</tbody>
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Relative Risk of Activities

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<tr>
<th>Planning &amp; Harvest Area Layout</th>
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<th>Silviculture</th>
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<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

### 32.4 Management Strategy

None.

### 32.5 References and Additional Information


33. GRIZZLY BEAR

33.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Grizzly Bear (*Ursus arctos*) is the second largest member of the bear family, next only to the polar bear. The long, outer guard hairs of the Grizzly Bear are often tipped with white, silver, or cream giving the bear a grizzled appearance; coat colour is usually brown but ranges from black to almost white. Grizzly Bear facial profiles are usually “dished-in” and a hump of muscle is normally present on the shoulders. The front claws on a Grizzly Bear are longer than on Black Bears, as long as 10 cm. The long front claws and hump of muscle on the shoulders are adaptations for digging.

Grizzly Bears inhabit all elevations from sea level estuaries to high alpine meadows and talus slopes. They are creatures of habit and will usually return to the same seasonal food sources and areas throughout their lifetimes of 20-30 years. Hibernating habitats tend to be high elevation areas that are sloped, and have dry, stable soil conditions that remain frozen during the winter. Dens are usually on steep north-facing slopes that have soils suitable for digging, and where vegetation will stabilize the roof of the den and snow will accumulate for insulation. Grizzly Bears are omnivorous and opportunistic in their feeding habitats; hence a huge variety of plant, animal, fish, and insect food sources are regionally important. Throughout the active season, interior grizzlies prey on small mammals, especially ground squirrels. Cutworm moth summer congregations under boulders in high elevation alpine talus slopes and boulder fields may be locally important. Squirrel middens are an important source of seeds as food for Grizzly Bears. Moister BGC subzones generally have the highest summer/fall foraging habitat suitability – ESSFmW, ESSFmC, ESSFwK, SBSmC, ICHmC, ICHmK, ICHwK. Within these subzones, rich moist site series which contain devil’s club, skunk cabbage, lady fern, or salmon berry associations, usually correlate with highest Grizzly Bear forage value.

Grizzly Bears are essentially Extirpated from the Kamloops FD and most of 100 Mile House FD, and the central areas of Central Cariboo and Quesnel FDs (stray individuals wander through some of these areas). The Blackwater-West Chilcotin (approximately, the area west of the Nazko River) population unit is Threatened, as is the South Chilcotin Ranges population unit (southwest Chilcotin FD). The Cariboo Mountains, the Coast Range, and all of BC north of TFL 5 (Quesnel) have population units that are presently healthy. Grizzly Bears have large home ranges; hence planning must include both landscape and stand level requirements of Grizzly Bears.

Grizzly Bears are protected against harassment, capture and from unrestricted hunting under the *BC Wildlife Act*. 

![Photo © Fred Lang](image)
33.2 MANAGEMENT DIRECTION

The CCLUP provides objectives for Grizzly Bear management, but not management strategies. The CCLUP objectives are probably not sufficient to maintain Grizzly Bear populations, or to Recover the populations that are already at risk. CCLUP Species at Risk Notice for Central Cariboo, Chilcotin, and Quesnel Forest Districts. Grizzly are included in the Identified Wildlife Management Strategy (2004). There are 7 Wildlife Habitat Areas in the CCBA, with an "Order" providing management direction for each.
33.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Site preparation and soil disturbance by heavy machinery reduce berry productivity in clearcuts, and conifer stands are planted, managed, and tended so they close in and lose any berry foraging values within much shorter time frames than they might have had under natural wildfire regimes. Herbicide applications can also reduce berry and herbaceous plant productivity. Natural post-fire habitats may remain high productivity foraging sites (particularly for berries) for 35–70 years, and Grizzly Bears learn to rely heavily on these sites.

Grizzly Bears use forested habitats adjacent to open foraging habitats such as avalanche chutes, wet meadows, marshes, swamps, and subalpine meadows as security habitat and daytime bedding sites to avoid heat stress. Clearcutting the forests adjacent to these sites can significantly affect the suitability in these high value open sites.

Roads result in Grizzly Bear mortality both directly and indirectly, through collisions on major roads, hunting and poaching, habituation of bears to people when they come in close contact and the eventual loss of some of these bears involved in human-bear conflicts, and social disruption when bears change their home ranges to avoid habitat near newly created roads.

### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Road Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
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<td>2 2 2 1 1 1 0 0 0 0 0 0 0 0 2 2 2 2</td>
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</table>

33.4 **MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the Grizzly Bear, for operating areas where there is insufficient higher level plan direction (as in the CCBA). The landscape level management of grizzly bear is largely a strategic issue under the control of the government, rather than something that can be addressed by BCTS CCBA.

**Overall Objectives**

Retain 80% of habitat in good condition for this nationally Special Concern and blue-listed species in healthy condition. Each loss of part of the habitat of this species will incrementally worsen its conservation status. Maintain grizzly bear habitat in good condition throughout its range, sufficient to support or increase existing populations.

Populations in much of the area west of the Fraser River are Threatened, and there is little Very High and High Capability Habitat; these populations require extra consideration. The capability mapping is only at a relatively coarse scale of 1:250,000; hence consultation with a biologist may be advisable to further refine management recommendations, as noted below.
Stand Level

Strategies to address known occurrences of this species are:

- Manage designated Wildlife Habitat Areas according to the associated “Orders”.
- If an active Grizzly Bear den is found, avoid all disturbance during the winter hibernation period (while there is snow present). Place a minimum 250 m no-machine “winter-only” reserve around the den if there will be low machine activity; at higher levels of machine activity a reserve up to 500 metres may be required. A bear that is forced to abandon its winter den will almost certainly die.
- WTPs should be “anchored” at existing Grizzly Bear dens; this is proven suitable denning habitat. The WTP should be at least 1 ha in size.
- Plan road construction and harvesting that is proposed within 500 m of known important Grizzly Bear foraging sites (for fish, major berry crops, herbaceous meadows) or den sites in consultation with a biologist, to minimize potential disturbance to the bears and human-grizzly interactions.
  - Request locations of Grizzly Bear important foraging sites and den sites from Regional MoE (Williams Lake).

Landscape Level

Strategies to address unrecorded occurrences (habitat quality not field-determined) of this species are:

- Grizzly Bear habitat capabilities determined during TEM projects should be added to the 1:250,000 scale data used in the map above.
- When operations are proposed within 300 m of areas mapped as having Very High Capability (entire CCBA) or High Capability (west of the Fraser River), a biologist should determine in the field whether habitat of that value actually occurs, GPS/ribbon the actual boundary, and recommend site-specific management. In general terms
  - Avoid building roads, landings, and trails within the area, or within 250 m of the area, except if there is no other option.
  - Deactivate, including re-contouring and seeding, as soon as possible any road that must be built in the area or near the area.
  - Establish timing restrictions on operations within the area, to minimize disturbance during critical denning or feeding periods.
  - Develop a Grizzly Bear habitat management plan in conjunction with the site plan.
  - Avoid broadcast herbiciding within the area.
- When operations are proposed in High Capability (east of the Fraser River) or Moderate Capability habitat (entire CCBA):
  - Plan forest development to occur on one side of a watershed at a time where practical to allow Grizzly Bears to avoid operational areas during daily movements.
  - Minimize road access in both the number of km and length of time active.
  - Maintain seasonal foraging areas by maintaining a variety of structural stages of forest throughout a watershed, particularly near mature and old forest structural stages that provide thermal and security cover.
  - Maintain mature/old forest connectivity within and between watershed to allow for large home ranges and dispersal among areas by juveniles and males; do not establish permanent roads through connectivity corridors.
  - Riparian areas in valley bottoms dominated by older forests are important movement corridors.
  - Corridors where contiguous forest exists across a valley without any roads would be considered among the highest value habitats for grizzly.
  - Leave buffer strips of forested habitat adjacent to known important foraging areas (e.g., avalanche chutes, wet meadows, estuaries, streams/wetlands, skunk cabbage swamps, seeps and alder swales), to provide security cover and bedding areas. These areas will often provide additional habitat elements such as mark trees and mark trails, as well as connectivity and escape cover.
  - Retain 80% of the mature forest cover within 100 m of herb-dominated avalanche chutes.
Do not use seed mixtures that include clover when near all-season roads (<500 m) so that these areas are less attractive to grizzlies for foraging.

Where feasible, provide windfirm visual screening along all-season permanent roads to provide security cover; the best security areas are >1 km away from active roads.

If roads have been previously located near areas important for bear foraging, then permanently deactivate these roads when they are no longer required for access.

Avoid intensive silviculture treatments to address low stocked sites. This will result in a “patchy” stocking density that facilitates production of berry producing shrub species.

Complete brushing activities within 5 years of initial establishment. If brushing is required after that time, use crop-tree centered brush treatments to maintain important forage species.

- When operations are proposed in **Low, Very Low, and Nil Capability** habitats, manage only specific sites that have been identified as important habitat for Grizzly Bear.

These strategies will probably not be sufficient to meet the objectives; government land-use planning is required to achieve them.

### 33.5 REFERENCES AND ADDITIONAL INFORMATION


34. MOOSE

34.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Moose (*Alces americanus*, formerly *Alces alces*) are the largest ungulates in BC, weighing up to 600 kg. They have long legs, a shoulder hump, and a dark brown to blackish coat. They have a bell of skin and hair under the throat and a large, overhanging upper lip. Their long legs allow them travel through fallen timber, wetlands, and deep snow. Their winter pelage of long guard hairs and undercoat of fine wool allows them to survive in the coldest climates on earth. Only male Moose have antlers.

Moose are essentially solitary animals that move about within familiar summer and winter home ranges. In a given season, their home range seldom exceeds 5 to 10 km². Their annual home range is much larger, particularly for migratory Moose. In expansive northern shrublands, Moose commonly form groups of up to eight to ten during the rutting period; this less often occurs in forested habitats. Moose habitats usually have significant amounts of snow in winter. Moose are well adapted to snowy regions because of their long legs; they have little or no difficulty moving around in snow up to 40 cm deep and only slight difficulty in snow depths of 40 to 70 cm deep. Moose commonly winter in areas with 50 cm or more of snow cover, which usually excludes other ungulates except Caribou. Winter is the most critical season for the health of moose populations. During this season, the most important habitat for moose in most of the CCBA is wetlands and adjacent coniferous stands. Wetlands provide a high density of forage shrubs during the winter when energy requirements are the most demanding. Moose foraging in wetlands are able to obtain the maximum amount of energy (food) while limiting energetic costs of exposure to the elements, minimizing the effort required to search for food, and reducing the risk of mortality through predation. Stands of conifers such as pine, spruce, and fir provide winter shelter (thermal, security, and snow) and travel corridors for moose. Coniferous stands provide thermal shelter for moose by providing protection from cold resulting from wind and heat radiation to the sky during cold weather, and excess heat from the sun on warm days. Conifers increase security cover by providing visual screening from predators, and snow interception provides lower snow depths for living and travel. All these factors reduce energy demands and improve survivability of moose. In the IDF, SBS, SBPS, and ICH high quality moose winter foraging areas are widespread at lower elevations in riparian areas. In the IDF, SBPS, and MS high quality moose winter foraging areas occur in wetlands, especially large wetlands.

Moose is protected, in that it cannot be killed, collected or held in captivity without special permits, under the provincial *Wildlife Act.*

Photo © Gabor Halasz
Moose High Value Wetlands
The Cariboo-Chilcotin Land Use Plan (CCLUP, p. 155-156) specifies that moose habitat should receive specific management. In particular, “Additional buffering of wetlands (up to 200 meters) may be required adjacent to key wetlands or riparian habitats, particularly on the Chilcotin Plateau.” “High value” wetlands for moose have been identified for much of the CCBA, although there are some gaps due to lack of inventory. These “high value” wetlands approximate the intent of the CCLUP “key” wetlands, while avoiding confusion with whatever key wetlands government chooses to designate at a later date.

34.2 MANAGEMENT DIRECTION
Management direction for Moose is provided through CCLUP direction to protect key wetlands and riparian areas. Intrepid Biological Contracting (2004) has mapped “high value” wetlands, and provided management recommendations made by MoE staff. Keystone Wildlife Research Ltd. (2006) has provided a methodology to identify important moose riparian winter foraging areas, but it has not been implemented. The management strategy given below addresses only wetlands; moose riparian winter habitat will be partially achieved by default through normal riparian management.

34.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT
The forest management issues for Moose are removal, from critical winter habitat, of cover to hide from predators and hunters, for shade in hot weather, and for shelter during blizzards. Harvesting benefits Moose through growth of willows and other shrubs in cutblocks, but removing too much forest cover can be detrimental. Vegetation management through site preparation and broadcast herbiciding can significantly reduce browse availability. Roads may increase vehicle and hunter/poacher mortality.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
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</tbody>
</table>
34.4 **Management Strategy**

This management strategy is of necessity incomplete, because not all the moose high value wetlands, and none of the moose high value non-wetland habitats, have been identified. However it will achieve much of the CCLUP moose objective.

**Overall Objective**

Manage high value winter wetland habitat, mapped by Intrepid Biological Contracting (2004), to maintain its use by moose, and to minimize moose mortality.

**Stand Level**

Strategies to address known occurrences (high value winter habitat) of this species are:

- Establish a 1 km wide “access management zone” around each moose high value wetland or complex.
  - Adjust the width to a logical boundary, in response to constraints such as large parcels of private land, existing roads that are regularly snowplowed in the winter, and major topographic features that are likely to impede moose winter movements (S1 rivers, cliffs, etc.).
  - Close roads within the area upon completion of forest harvesting activities.
  - Avoid constructing roads between moose high value wetlands that are within 1 km of each other.
  - Maintain visual screening along roads to provide security.
- Establish a 200 m wide “timber management zone” of mature/old coniferous forest entirely around each moose high value wetland or complex.
  - Adjust the width to a logical boundary, in response to constraints such as large parcels of private land, existing roads that are regularly snowplowed in the winter, and major topographic features that are likely to impede moose winter movements (S1 rivers, etc.).
  - Harvest to maintain a target of a 40/30/30 ratio of forage/hiding/thermal cover, where forage is < 3 m live conifer, hiding cover is ≥ 3 m live conifer, and thermal cover is ≥ 19 m live conifer. Less than 40% forage is acceptable, but it may limit harvesting opportunities in the next pass.
    - Dead conifers are of little value; extensive mortality may result in less than the desired amount of hiding and thermal cover.
    - Well stocked advanced natural regeneration may contribute towards hiding and thermal cover; protection of such regeneration during harvesting may assist in achieving the target amounts.
  - Minimize broadcast herbicide treatments where high moose browsing is present.

**Landscape Level**

Strategies to address unrecorded occurrences (high value winter habitat) of this species are:

- Manage wetland or riparian sites that have not been identified as moose high value habitat, but that have obvious signs of heavy moose browsing on shrubs (most new growth on shrubs eaten each winter) to minimize (as above) permanent road access, and maintain hiding and thermal cover.
- Consider implementation of the mapping of moose high value riparian habitat, using the methods developed by Keystone Wildlife Ltd, (2006).
- Consider mapping additional areas of moose high value wetland habitat, if MoE has sufficient additional inventory data.

34.5 **References and Additional Information**

http://www.env.gov.bc.ca/wld/documents/moose.pdf,

35. MOUNTAIN GOAT

35.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Mountain Goat (*Oreamnos americanus*) is a muscular, snowy white “goat” (which it technically is not) that is well adapted to escape detection in snowy landscapes. They weigh up to 120 kg, have long, thick shaggy coats, and have beards all year. Coat colour stays the same all year with fur length longer in the winter. The nose, eyes, hooves and horns are black. Male and female goats both have thin, black stiletto-like permanent horns up to 30 cm long, but their horns are slightly different. They are built to live in steep, rocky terrain, with disproportionately massive forequarters relative to a compact rear end. A deep chest and tremendously developed shoulder muscles give the Mountain Goat great strength for climbing and for pawing through snow for food. The goats seek out cool, shady spots in hot weather; heat stress may determine the southern limit of the Mountain Goat’s distribution.

Fifty to sixty percent of kids die in their first winter, and many yearlings also die in their second winter, probably from starvation. Mortality rates are highest in severe winters; deep and persistent snow that covers forage, saps energy reserves, and delays spring green-up is the major cause of death. Some may migrate a few kilometres between winter-spring and summer ranges, but many seasonal migrations are just local shifts in elevation. Most winter ranges are steep sites that shed snow and have a warm south to west exposure. Goats eat a wide variety of plants, including lichens, ferns, grasses, herbs, shrubs, and deciduous or coniferous trees, and are strongly attracted to mineral licks in summer. They often travel several kilometres downslope through forest to reach them. Many licks are on cliffs along incised river valleys, but some are simple clay pits where the goats may linger for up to three weeks, apparently to satisfy their craving for sodium and other minerals that are in short supply in lush spring vegetation. Females give birth in late May or early June on secluded, precipitous rock ledges or steep cliffs. Established trails are reused yearly by goats when moving between summer and winter ranges. Winter ranges must provide cover, forage and escape terrain from predators. Forested areas (typically spruce or hemlock) in close proximity to rocky outcrops can provide these habitat features. Unintended harassment of goats by helicopters is a concern, particularly during the kidding season and in winter when the animals are in the poorest condition. Snowmobiles are also a concern in some areas. Timber harvesting near winter ranges can cause stress or displace goats due to noise disturbance. Mountain Goats are mostly found in the Central Cariboo and Chilcotin FDs. Strays are occasionally seen in the Quesnel FD, with records from the Baker Creek canyon cliffs, but they do not need management in that District.

The Mountain Goat is protected, in that it cannot be killed, collected or held in captivity without special permits, under the provincial *Wildlife Act*.

Photo © Gabor Halasz
35.2 MANAGEMENT DIRECTION

Management direction for Mountain Goat is provided through CCLUP direction to manage for the species. Winter habitat that requires management has been mapped, and is available to BCTS internally but not to the public.

35.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

The forest management issues for Mountain Goat are harvesting removing key forest stands adjacent to the favoured steep terrain, roads close to goat habitat resulting in disturbance, roads crossing migration corridors, and increased access resulting in increased recreational disturbance (snowmobiles, etc.).

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
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<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
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<td>Road Maintenance</td>
<td>Road Deactivation</td>
<td>Bridge Installation</td>
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</tbody>
</table>

35.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Mountain Goats.

Overall Objective

Manage 100% of Mountain Goat Winter Range areas that have been identified and mapped.

Stand Level

Strategies to address known occurrences of this species are:

- Minimize road and aircraft disturbance of Mountain Goats.
  - Minimize road developments that provide access to mountain goat habitat.
  - Avoid development of roads near escape terrain or mineral licks.
  - Avoid development of roads that cross regularly used Mountain Goat trails, especially those between mineral licks and summer forage areas.
  - Position roads such that they do not provide direct lines of sight onto goat habitats.
  - Mitigate aircraft disturbance to mountain goat winter range or natal areas by following established avoidance procedures.
- Maintain forest cover for hiding cover, thermal cover, and snow interception adjacent to escape terrain.
  - Escape terrain is steep, rocky slopes and cliffs with adjacent forest cover.
Species of Management Concern BCTS Cariboo Region

- Harvest such that no more than 33% of the forested habitat within the 200 m escape terrain buffer is in an early seral stage.
- Harvest such that at least 50% of the basal area of forested habitat consists of mature and old stems at all times.
- Maintain forested buffers around mineral licks to provide screening and thermal cover.
- Maintain wind-firm forested buffers on both sides of major trails to ensure connectivity for goats between summer and winter ranges.
- Avoid machine and human disturbance during critical times at critical habitats
  - Mineral licks – May to August
  - Winter range – November to April
  - Natal/Rearing areas - May to July

Landscape Level

Strategies to address unrecorded occurrences (natal and winter habitat) of this species are:
- When operations are proposed within 1 km of natal or winter habitat, determine the locations of mineral licks and major trails. This may require a biologist.

35.5 REFERENCES AND ADDITIONAL INFORMATION


36. MULE DEER

36.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Mule Deer (Odocoileus hemionus) are relatively large animals weighing up to 180 kg; they have a reddish brown coat that changes from tawny brown in summer to dark or grizzled brown in winter. They have a dark brown forehead, a whitish face with a black muzzle, and a white throat patch. Their ears are large (about 2/3 the length of the head) with black borders and white hair on the inside, and they have a large white rump patch with a narrow black-tipped tail. White Tail Deer (Odocoileus virginianus) also occur in the more open areas of the CCBA, but are not managed for. They have smaller ears with a longer, fuller tail that lacks a black tip.

Mule Deer have difficulty moving through snow deeper than 30 cm, so they can only survive winters in sites with a shallow snowpack. In summer, most deer migrate to higher elevations to take advantage of nutritious new growth, but some remain at low elevations all year. Old Douglas-fir forests, or uneven age forests with a high component of old trees, form a key part of the winter range; they provide shelter, intercept snow so that it is shallower, and provide forage in the form of broken branches and the lichens that grow on them. Steep, south- to west-facing sites provide the best winter range. Key winter foods include shrubs such as big sagebrush, pasture sage, rabbitbrush, snowberry, saskatoon, and rose, as well as the foliage of Douglas-fir trees and a variety of grasses and herbs. In spring and summer, Mule Deer prefer various grasses, along with herbs like balsamroot, clover, wild strawberry, fireweed, and the leaves of many kinds of shrubs.

Mule Deer are protected, in that they cannot be killed, collected or held in captivity without special permits or a hunting license, under the provincial Wildlife Act.
36.2 MANAGEMENT DIRECTION

Management direction for Mule Deer Winter Range management is provided by the CCLUP, the CCLUP Regional Mule Deer Winter Range Strategy, the Management Strategy for Mule Deer Winter Ranges in the Cariboo-Chilcotin – Parts 1a and 1b, and five specific winter ranges of Part 3 (Alkali-Dog Creek, Borland Valley, Chimney-Alkali, Knife Creek, and Williams Lake-Chimney), and the “Mule Deer Handbook”. Ungulate winter ranges have been declared for Mule Deer, with associated “Orders”.

36.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

The forest management issue for the Mule Deer is maintenance of sufficient mature/old forest winter habitat. This has been done through the CCLUP.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Relative Risk of Activities</th>
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<td>Planning &amp; Harvest Area Layout</td>
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<td>Relative Risk of Activities</td>
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</table>

36.4 MANAGEMENT STRATEGY

Follow the CCLUP Mule Deer Winter Range Strategy.

36.5 REFERENCES AND ADDITIONAL INFORMATION


Dawson, R.J., H.M. Armleder, B.A. Bings, and D.E. Peel. 2006. Management strategy for mule deer winter ranges in the Cariboo-Chilcotin – part 1b: management plan for transition and deep snowpack


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37. NORTHERN FLYING SQUIRREL

37.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Northern Flying Squirrel (*Glaucomys sabrinus*) is various shades of grey or brown above and lighter below. A sharp line of demarcation separates the darker upper color from the lighter belly. The most distinctive characteristics of flying squirrels are the broad webs of skin connecting the fore and hind legs at the wrists, and the distinctly flattened tail. They jump from trees and can glide a considerable distance to land on another tree.

Flying squirrels primarily eat fungi and lichens, plus plant and animal material (insects, nuts, buds, seeds, fruit). They can apparently can subsist on lichens and fungi for extended periods, and may depend on having these food items available. They spend considerable time foraging on the ground. They are more carnivorous than Red Squirrels. They primarily inhabit cool, moist, mature forest with abundant standing and down snags, but will utilize deciduous woods and riparian woods. Younger second growth stands are also used. Due to the present high mortality of mature Lodgepole pine, combined with harvesting, in the CCBA, their habitat is likely rapidly declining. They quickly repopulate harvested areas if sufficient food is available in residual tree patches. Nests are constructed in the branches of conifer trees, including in witches’ broom, cavities in the trunks, leaf nests, and underground burrows; uses a large number of alternate den sites.

The species is found throughout the CCBA. They are common, but are seldom noticed because they are active at night.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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</thead>
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<tr>
<td>Central Cariboo; Chilcotin; Quesnel</td>
<td>G5</td>
<td>S5</td>
<td>Yellow</td>
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</tbody>
</table>

37.2 MANAGEMENT DIRECTION

Management direction is provided by the CCLUP direction to manage for furbearers and biodiversity in general.

37.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest harvesting removes the primary sources of food for Northern Flying Squirrel – the cones from mature conifer trees and the birds living in and around the trees. The present Mountain Pine Beetle epidemic will be severely impacting the food supply for squirrels, and the removal of remnant live conifers of all species will further impact the squirrel population. Harvesting and mistletoe control permanently removes mistletoe-caused witches’ brooms from the stand.
37.4 MANAGEMENT STRATEGY

The following forest management strategy is designed to address both stand level (recorded sites) and landscape level (unrecorded sites) management of the Northern Flying Squirrel.

**Overall Objective**

Retain most of the actively used habitat of this species in healthy condition.

**Stand and Landscape Level**

- Maintain mature and old conifers of all species while harvesting, both as single trees and in patches, to provide cones as squirrel food.
- Maintain and protect squirrel middens where possible, by focussing WTPs on them.

### 37.5 REFERENCES AND ADDITIONAL INFORMATION


38. NORTHERN MYOTIS

38.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Northern Myotis (*Myotis septentrionalis*) is a medium sized bat with dark brown fur on the back and a paler tawny to pale brown underbelly. Ears and flight membrane are a dark brown (not black) and the ears are long. The facial skin is pinkish around the eyes, the base of the inner ears and the lower lip. Females are generally larger than males. The Northern Myotis is rarely seen because it is nocturnal and secretive. Western Long-eared Myotis is similar in size and colour and the two overlap in range in British Columbia. Generally the Northern Myotis has smaller brown (not black) ears and the facial skin is pinkish whereas the Western Long-eared Myotis has black facial skin. Only an expert can reliably distinguish the species.

Northern Myotis is an opportunistic insectivore capturing locally abundant prey aerially and by gleaning insects off of vegetation. Bats forage in close association with forests, typically in small forest clearings, above ephemeral pools, along forest edges or paths and above lower order streams contained within the forest. They hunt prey just above the understory but under the forest canopy. Foraging habitat is typically within an hour’s flight of the riparian habitats and may be situated in close proximity to roosting areas. They normally roost solitarily or in small groups (<10) in both deciduous and coniferous trees in cracks and under exfoliating bark. Reproductive females use cracks, or sometimes previously excavated cavities, primarily in mature deciduous “wildlife trees” where they form maternity colonies of 1 to 100 individuals. Females switch roost trees frequently and remain faithful to a network of roost trees typically separated by < 400m. Breeding habitat is likely occupied from May to September. Northern Myotis is occurs in spruce and hemlock mixedwood forests in Central Cariboo FD in the ICH, MH, and SBS; there are currently no local winter hibernation records. Elsewhere there is evidence for a short localized migration from summer areas to winter hibernation sites (caves, mines).

Northern Myotis are protected against harassment, capture or killing under the *BC Wildlife Act*. 

![Photo © Joseph Poissant](Photo%20%20Joseph%20Poissant)
38.2 MANAGEMENT DIRECTION

Management direction is provided by the CCLUP direction to manage for species at risk and biodiversity in general.

38.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Harvesting and hazard tree removal removes old decadent trees that are used for roosting and breeding, removes mature and old forest stands, disrupts connectivity between suitable forest stands, and reduces the amount of forest interior habitat. Timber harvesting and road construction or significant traffic (such as log hauling) disturbances in the immediate proximity of a roost may lead to roost abandonment, or, when at night, may interrupt foraging behaviour.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
<td>Risk Ranking = A * (B + C)</td>
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38.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the Northern Myotis.

**Overall Objective**

Retain ≥ 70% of actively used habitat of this species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

The objective is unlikely to be achieved in the long-term, given the long-term planned harvest of most mature/old forest of all tree species.

**Stand Level**

Strategies to address known occurrences (roost or maternity sites) of this species are:

- Establish a Wildlife Tree Patch (WTP) or other retention patch centred on the site, preferably with a 100 m buffer around the site.
- Avoid disturbance to females and young during the breeding season (May to September).
- If a hibernaculum is found, avoid disturbance during the hibernation season (October – April), and establish a 100 m reserve around it.
Landscape Level

Strategies to address unrecorded occurrences (roost or maternity sites) of this species are:

- In the ICH, MH, and SBS, emphasize the retention (WTPs, etc.) of:
  - mature/old spruce or hemlock mixed stands in association with riparian areas
  - individual large diameter conifer or deciduous trees with exfoliating bark
  - large diameter trembling aspen, with long vertical cracks.

- Shape retention areas to maximize interior forest conditions.

38.5 REFERENCES AND ADDITIONAL INFORMATION


39. NORTHERN RIVER OTTER

39.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Northern River Otter (*Lontra canadensis*) is a semi-aquatic mammal, with a long, streamlined body, thick tapered tail, and short legs. They have wide, rounded heads, small ears, and nostrils that can be closed underwater. The fur is dark brown to almost black above and a lighter color beneath. The throat and cheeks are usually a golden brown. The fur is dense and soft, effectively insulating these animals in water. The feet have claws and are completely webbed. Body length is up to 1.3 m and tail length up to 0.5 m.

River Otters occur anywhere there is a permanent food supply and easy access to clean water, including rivers, lakes, marshes, swamps, and estuaries. Distribution is closely associated with fish availability. They eat mainly aquatic organisms such as amphibians, fish, turtles, crayfish, crabs, and other invertebrates. Birds, bird eggs, small terrestrial mammals, and aquatic plants are also sometimes eaten. In coastal waters they eat marine species, and may prey on nesting seabirds. They build dens in the burrows of other mammals such as beavers, in natural hollows, such as under a log, or in river banks. Dens have underwater entrances and a tunnel leading to a nest chamber that is lined with leaves, grass, moss, bark, and hair. They use traditional haul-out sites along the banks of aquatic habitats. Although they remain active under the ice, during winter months, populations tend to be concentrated where there is access to open water (rapids, beaver lodges, muskrat pushups and air holes). They select large logs for use as latrine sites, beaver bank-dens and lodges for access to open water during winter and as denning and resting sites. Large conifers provide year round thermal and escape cover, and with the added benefit of snow interception cover and needle litter build up, the areas beneath them provide opportunities for resting and grooming areas. A home range is typically linear; 20-30 miles along a river or ocean shoreline for a pair or male; less for females with young. They hunt over as much as 80-100 km of stream during the course of one year. They may travel long distances overland, especially in snow; they can forage for terrestrial prey for 1-2 km away from water.

The River Otter is protected, in that it cannot be killed, collected or held in captivity without special permits, under the provincial *Wildlife Act*.

Photo © Fred Lang
39.2 **MANAGEMENT DIRECTION**

Management direction is provided by the CCLUP direction to manage for furbearers and biodiversity in general.

39.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

The forest management issues for the River Otter are habitat loss and fragmentation. These occur through harvesting that removes the large standing and downed tree components of their habitat within and near the riparian areas of fish-bearing streams and lakes – this is largely minimized by riparian and lakeshore reserve and management zones. Forest harvesting may negatively affect the distribution of nearby terrestrial habitat, so that River Otters have limited opportunities for terrestrial foraging.

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<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Silviculture</th>
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<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
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<td>Density Management</td>
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<td>2 2 2 1</td>
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### Relative Risk of Activities

- **Harvesting**
  - Falling: 0
  - Yarding: 0
  - Skidding: 0
  - Forwarding: 0
  - Loading: 0
  - Processing: 0
  - Handling: 0
- **Site Preparation**
  - Planning: 0
  - Vegetation Management: 0
  - Planting: 0

39.4 **MANAGEMENT STRATEGY**

The following forest management strategy is designed to address both stand level (recorded sites) and landscape level (unrecorded sites) management of the River Otter.

**Overall Objective**

Retain most of the actively used habitat of this species in healthy condition.

**Stand Level**

Strategies to address known occurrences (den sites) of this species are:
- Focus WTPs and other retention areas along the riparian habitat used by the otters.

**Landscape Level**

Strategies to address unrecorded occurrences (den sites) of this species are:
- Maintain mature and old trees and large diameter CWD along riparian and riparian-associated habitats.
- Maintain connectivity of mature and old forest between riparian and upland habitats.
- Retain old forest patches that have high structural complexity including high amounts of CWD, through designation as WTPs, OGMAs, or temporary deferred harvest areas.
- Harvest patch size distribution should be as recommended by the Biodiversity Guidebook.
39.5 REFERENCES AND ADDITIONAL INFORMATION


40. RED FOX

40.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Red Fox (Vulpes vulpes) is a small member of the dog family with a slender, pointed muzzle, prominent erect ears, long bushy tail, long slender legs, and relatively small feet. Colour varies considerably, but is usually categorized in three colour phases. Red phase individuals vary from a pale, coppery golden colour to a rich, dark cherry red on the back and sides, usually with paler underparts (white to grey), and most have contrasting black muzzles, ears, and paws. Cross phase is generally grey to brownish in basic body colour, with darker face and legs, and a “cross”-pattern formed by black hairs down the upper back and across the shoulders. The cross pattern is usually set off by lighter, yellowish to pale red patches on the neck and shoulders. Silver phase is generally black all over, but takes on a silvery appearance on the back and upper sides as a result of light-tipped guard hairs in those areas.

They use a variety of woodland, shrub land and grassland habitats and often select open areas with mixed conifer stands in early winter, moving to mixed-wood stands if snow conditions allow later in the season. Foxes prefer early to mid-successional stands. They excavate a den or use abandoned burrows, crevices or caves with multiple entrances; they may use several dens in close proximity. They are omnivorous, eating small mammals, invertebrates, birds, carrion, reptiles, amphibians, plant material and fruit. Important habitat requirements are cover and forage plants for prey species (voles, hares, rabbits, squirrels).

Red Foxes are found throughout the province in forested parkland and subalpine areas with a large degree of edge habitat, often in agricultural and riparian zones.

Photo © John Cooper

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<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
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40.2 MANAGEMENT DIRECTION

Management direction is provided by the CCLUP direction to manage for furbearers and biodiversity in general.
### 40.3 Forest Management Issues and Risk Assessment

Forest operations generally benefit Red Fox, by providing abundant early and mid-seral habitats. Extensive thinning and herbicide applications may eliminate too many patches of dense cover. However, given the high costs associated with vegetation management, excessive vegetation management is unlikely to occur on a landscape level. Habitat for prey species, particularly hares and rabbits, can be improved by mechanical brush cutting that stimulates new growth.

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<th>Total Risk Ranking</th>
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<th>Roads, Bridges and Culverts</th>
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<td>Density Management</td>
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### 40.4 Management Strategy

The following forest management strategy is designed to address both stand level (recorded sites) and landscape level (unrecorded sites) management of the Red Fox.

**Overall Objective**

Retain most of the actively used habitat of this species in healthy condition.

**Stand and Landscape Level**

- Maintain patches of dense brush during vegetation management, especially in moist habitats that are favoured by rodent prey.

### 40.5 References and Additional Information

41. RED SQUIRREL

41.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Red Squirrel (*Tamiasciurus hudsonicus*) is brownish red to rust red on its upper half, a dark stripe along its side, and a white underside. There is an obvious light eye ring, and its tail is bushy. The outer edge of the tail has a black band edged with white. Its movements are quick and energetic, with jerky and very busy movements.

They inhabit mature conifer stands with abundant cones and seeds. Mature and old spruce habitats are preferred by Red Squirrel in the Chilcotin, and, because of the present high mortality of Lodgepole pine in the CCBA, may be the primary habitat available for use. They quickly repopulate harvested areas if sufficient foraging for seeds, fruit, nuts, fungi, insects, and sometimes small mammals and fledgling birds can be supported by residual tree patches. They commonly eat seeds of conifer cones, nuts, fungi, and fruits. Their feeding on conifer seeds greatly influences forest ecosystems. They also feed on invertebrates, bird eggs, young birds and new born snowshoe hares. Nests are most commonly constructed of grass in the branches of spruce trees. Nests are also excavated from witches’ broom or cavities in the trunks of spruce or poplar trees. Winter nests tend to be subterranean, located in middens or at the base of large trees and stumps. Red squirrels cut cones from conifer trees and cache them in middens, which are often quite large, are formed over numerous years by continuous storage and feeding activity. As the squirrel feeds by rapidly extracting the numerous seeds from each cone with its teeth, the cone bracts are stripped off and fall onto the midden. Many middens have a 12 inch layer of cone bracts on top of moist soil, which provides an ideal location for the storage of many cones in holes and depressions dug into the midden. They commonly cache more food than can be consumed in a winter, which leaves cones for the next year in case of a cone crop failure. Juvenile red squirrels must acquire a territory and midden prior to their first winter; without a midden they do not survive their first winter. Squirrels are a critical prey species for many other furbearers, such as marten, fisher, and lynx, as well as predatory birds such as hawks, goshawks, and owls. Squirrel middens are an important source of shelter for species such as Marten and Weasels, and can be an important source of food for Grizzly Bears.

Red Squirrels occur throughout the CCBA.

Photo © Fred Lang

Active Squirrel midden Photo © John Cooper

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<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
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</table>
41.2 MANAGEMENT DIRECTION

Management direction is provided by the CCLUP direction to manage for furbearers and biodiversity in general.

41.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest harvesting removes the primary source of food for Red Squirrel – the cones from mature conifer trees. The present Mountain Pine Beetle epidemic will be severely impacting the food supply for squirrels, and the removal of remnant live conifers of all species will further impact the squirrel population.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Relative Risk of Activities</th>
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</table>

41.4 MANAGEMENT STRATEGY

The following forest management strategy is designed to address both stand level (recorded sites) and landscape level (unrecorded sites) management of the Red Squirrel.

**Overall Objective**
Retain most of the actively used habitat of this species in healthy condition.

**Stand and Landscape Level**
- Maintain mature and old conifers of all species while harvesting, both as single trees and in patches, to provide cones as squirrel food.
- Maintain and protect squirrel middens where possible, by focussing WTPs on them.
- Maintain mistletoe in retention areas.

41.5 REFERENCES AND ADDITIONAL INFORMATION


42. STRIPED SKUNK

42.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Striped Skunk (*Mephitis mephitis*) is about the size of a cat with a stout body, a small head, short legs, and a bushy tail. It has thick, glossy black fur with a thin white stripe down the centre of the face, and a white stripe along each side of the back. The tail is mostly black, but the stripes may extend down it, usually to a tuft of white at the tip. The skunk has long, straight claws for digging out the burrows of mice and ripping apart old logs for grubs and larvae. It moves slowly and deliberately and depends on its scent glands for safety.

The skunk prefers semi-open country with woodland and meadows interspersed, brushy areas, and riparian forest. Skunks generally live in the abandoned dens of other mammals of similar or larger size, stumps, rock piles, or debris piles. They only occasionally excavate their own dens. If a skunk excavates its own den it is usually simple, but one taken over from another animal may be quite elaborate. There may be from one to five well-hidden openings that lead to a system of tunnels and chambers. One of the chambers is lined with leaves and used for a nest. The leaves may also be used to plug the openings to the den in cold weather. Skunks may leave their den to forage, or search for food, at any hour of the day, but are usually abroad from late afternoon or evening through the night. They forage within about 800 m of the den, but may venture as far away as 2 km in a night. They are omnivorous and feed insects, mice, shrews, ground squirrels, young rabbits, birds’ eggs, and various plants. They are mostly crepuscular or nocturnal, but are sometimes active during daytime. They may be dormant during extended periods of cold snowy weather, with males more likely to be active in winter. They use winter dens communally.

Striped Skunks occur throughout the CCBA.

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<th>BC RANK</th>
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42.2 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations generally benefit Striped Skunk, by providing abundant early and mid-seral habitats. Extensive thinning and herbicide applications may eliminate too many patches of dense cover. However, given the high costs associated with vegetation management, excessive vegetation management is unlikely to occur on a landscape level.
### Total Risk Ranking

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<tr>
<th>Activity</th>
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<tr>
<td>Site Preparation</td>
<td></td>
<td>Site Preparation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planting</td>
<td></td>
<td>Vegetation Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetation Management</td>
<td></td>
<td>Density Management</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Risk Ranking**

- **A**: Probability of Interaction
- **B**: Legal Consequence of Interaction
- **C**: Biological Consequence of Interaction
- **Risk Ranking**: 

### 42.3 MANAGEMENT DIRECTION

Management direction is provided by the CCLUP direction to manage for furbearers and biodiversity in general.

### 42.4 MANAGEMENT STRATEGY

The following forest management strategy is designed to address both stand level (recorded sites) and landscape level (unrecorded sites) management of the Striped Skunk.

**Overall Objective**

Retain most of the actively used habitat of this species in healthy condition.

**Stand and Landscape Level**

- Maintain patches of dense brush during vegetation management, especially in moist habitats that are favoured by insects and other food species.

### 42.5 REFERENCES AND ADDITIONAL INFORMATION


43. SPOTTED BAT

43.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Spotted Bat (*Euderma maculatum*) is a large bat that is very distinct from other bat species. They have enormous, pink ears and three white spots on a black back – one on each shoulder and one on the rump. Underbelly fur is whitish with black underfur. The Spotted bat is rarely seen as it is nocturnal and secretive; but its large ears and colouration pattern may allow identification if observed in flight. Spotted bat is also the only species in British Columbia that has audible echolocation calls – high-pitched metallic clicks.

Spotted Bats exhibit strong fidelity to roost cliffs and foraging circuits for much of the active season, although several roosts may be used during the active season. Day roosts are in crevices or cracks of rocky outcrops or high cliff faces with warm southerly aspects. Females in particular exhibit a high degree of site fidelity to a particular day roost from May through July corresponding with the likely reproductive period (pregnancy and juvenile rearing). Spotted bats are solitary and do not form maternity colonies like other bat species in the province, although several bats may use individual roosts within a single cliff face. Breeding habitat is likely occupied from early-May to October. Hibernacula (caves, mines) are unknown but Spotted Bats probably exhibit an even stronger fidelity to these sites as thermal and security requirements are critical and unlikely to be widely available. Spotted Bat is an aerial insectivore and feeds almost exclusively on moths. Individuals maintain exclusive foraging areas when more than one individual is present in an area. They forage over hay fields, marshes adjacent to lakes, riparian habitats and above ponderosa pine forest or upland Douglas-fir forest. They seem to be one of the bats most affected by disturbances, and have abandoned roost sites when disturbed. Spotted Bat is associated with grassland, shrub-steppe and open ponderosa pine or Douglas-fir forests, with the most northern and western occurring at Macalister (Fraser River) and Bull Canyon (Chilcotin River). In the CCBA they occur in the BCxh3, BGxw2, IDFxm and IDFdk.

The Spotted Bat is protected, in that it cannot be killed, collected, or held in captivity without special permits, under the provincial *Wildlife Act*.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED</th>
<th>COSEWIC WILDLIFE</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Chilcotin</td>
<td>G4</td>
<td>S3S4</td>
<td>Blue</td>
<td>May 2004</td>
<td>SC (May 2004)</td>
<td>1</td>
</tr>
</tbody>
</table>
### 43.2 Management Direction

Management direction is provided by the CCLUP Species at Risk Notice for Central Cariboo and Chilcotin FDs, and by the Identified Wildlife Management Strategy (2004).

### 43.3 Forest Management Issues and Risk Assessment

Harvesting removes old decadent trees that are used for roosting and breeding, removes mature and old forest stands, disrupts connectivity between suitable forest stands, and reduces the amount of forest interior habitat. Timber harvesting disturbances in the immediate proximity of a roost may lead to roost abandonment. Road construction or significant traffic (such as log hauling), especially at night, may interrupt foraging behaviour.

<table>
<thead>
<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Priority            8</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### 43.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Spotted Bat.

Implement the Identified Wildlife (2004) strategy at both the stand and landscape level.

**Overall Objectives**

Retain ≥ 80% of occurrences of this nationally Special Concern and blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

**Stand Level**

Strategies to address known occurrences (roosting, foraging, and maternity sites) of this species are:

- When harvesting or road construction is considered in the vicinity of a known Spotted Bat roosting and foraging site, provide a draft WHF boundary around it and manage according to the Identified Wildlife strategy for a WHF.
- Avoid disturbance to females and young during the breeding season (April to October),
- Avoid use of insecticides, especially Btk, around roosts and potential foraging areas to maintain moths for Spotted Bat prey.
- If a hibernaculum is found, avoid disturbance during the hibernation season (October – April), and establish a 100 m reserve around it.
Landscape Level

Strategies to address unrecorded occurrences (roosting, foraging, and maternity sites) of this species are:

In the BGxh3, BGxw2, and IDFdk

- Retain mature/old trees in riparian and other wet areas to maintain natural insect populations, especially if in close proximity to rock cliff or outcrops potential roosting habitat.
- Focus WTPs on cliff or crevice potential roost sites.
- Avoid road construction and the use of talus slopes for building materials from cliff or crevice potential roost sites.

43.5 REFERENCES AND ADDITIONAL INFORMATION


http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr%5Fspotted%5Fbat%5Fe%2Epdf.


44. TOWNSEND'S BIG-EARED BAT

44.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Townsend's Big-eared Bat (Corynorhinus townsendii) is a medium size bat with distinctive large ears that are joined across the forehead. Two large fleshy lumps are on the snout, behind the nostrils. The bat is overall pale grey/brown to dark brown in colour on the back. The ventral fur is generally lighter, a grey/brown with brownish or buff tips, and the species has short sparse hairs on the toes that do not project past the toenails. It is rarely seen as it is nocturnal and secretive; but its large ears may facilitate identification if observed in flight.

Townsend's Big-eared Bat uses a wide array of habitats in the summer breeding period from coastal forests to arid grasslands of the interior. It roosts in buildings, and can potentially use warm caves or large tree cavities where bats can fly in directly, in trees with a moderate decay stage (similar to other forest dwelling bats). Females form maternity colonies (12 to >100 individuals) in the summer to rear young. Individuals typically return to the same maternity roosts in successive years. Males roost solitarily, separate from females. Breeding habitat is occupied from early-May to October. The species is particularly sensitive to human disturbance, which can cause females to abandon a traditional summer roost with adverse impacts on breeding success. Townsend's Big-eared Bat is insectivorous, capturing prey aerially near the foliage of trees and shrubs. While foraging, it typically selects open woodlands or edges of woodland/forests primarily along riparian vegetation which provides an abundance of prey, access to water and facilitates ease of flight. They may also forage between mid-canopy and the canopy top, and primarily feed on moths. Bats may use night roosts as resting places between foraging bouts or to escape from predators. They hibernate in winter hibernacula within their summer range. Known hibernacula in the BC interior are caves and mines. Bats may change position within the hibernaculum or move to other nearby hibernacula during periodic winter arousals. Distribution is likely discontinuous and localized, however, it is not well documented in the province because nocturnal capture or acoustic surveys are required to document presence. It occurs in all three forest districts, in the BG and IDF.

Townsend's Big-eared Bats are protected against harassment, capture or killing under the BC Wildlife Act.
44.2 MANAGEMENT DIRECTION

Management direction is provided by CCLUP direction to manage for species at risk, and biodiversity in general.

44.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Harvesting removes old decadent trees that are used for roosting and breeding, removes mature and old forest stands, disrupts connectivity between suitable forest stands, and reduces the amount of forest interior habitat. Timber harvesting disturbances in the immediate proximity of a roost may lead to roost abandonment. Road construction or significant traffic (such as log hauling), especially at night, may interrupt foraging behaviour.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Probability of Interaction</td>
<td>B Legal Consequence</td>
<td>C Biological Consequence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 2 2 2</td>
<td>2 2 2 0</td>
<td>0 0 0 0</td>
<td>0 0 0 0</td>
<td></td>
</tr>
</tbody>
</table>

44.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Townsend’s Big-eared Bat.

Overall Objectives

Retain ≥ 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences (roosting, foraging, and maternity sites) of this species are:
- Establish a 100 m reserve (WTP) around the site.
  - Incorporate sites with rocks or cliffs with openings (especially those with sunny aspects) into the WTP to preserve the integrity of cliff/outcrop sites
- Avoid disturbance to females and young during the breeding season (April to October),
- Avoid use of insecticides, especially Btk, around roosts and potential foraging areas to maintain moths for Townsend’s Big-eared Bat prey.
- If harvesting in adjacent areas encourage a relatively open residual stand structure using partial harvesting systems to maintain > 50% basal area.
  - Retain large diameter (> 70 cm dbh) trees displaying defects such as broken tops, loose bark, hollows and stem cracks.
  - Retain veteran trees; especially those extending above the main canopy.
If a hibernaculum is found, avoid disturbance during the hibernation season (October – April), and establish a 100 m reserve around it.

**Landscape Level**

Strategies to address unrecorded occurrences (roosting, foraging, and maternity sites) of this species are:

- In the BGxh3, BGxw2, and IDF
- Retain mature/old trees in riparian and other wet areas to maintain natural insect populations, especially if in close proximity to rock cliff or outcrops potential roosting habitat.
- Focus WTPs on cliff or crevice potential roost sites.
- Avoid road construction and the use of talus slopes for building materials from cliff or crevice potential roost sites.

**44.5 REFERENCES AND ADDITIONAL INFORMATION**


45. WESTERN SMALL-FOOTED MYOTIS

45.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Western Small-footed Myotis (*Myotis ciliolabrum*) is the smallest bat in British Columbia (72-90 mm in length). Fur colour varies on the back from a pale tan to orange/yellow lacking a distinct sheen and the underbelly is a paler buff to almost white. The wing membranes and ears are a contrasting black and the bat also has a black facial mask (snout, cheek and chin hair). The species has short hind feet (< 9 mm) and it has a keeled calcar (long spur off the ankle has a small protrusion extending out). The Western Small-footed Myotis is rarely seen as it is nocturnal and secretive. California Myotis is similar in overall colouration and size but differs from the Western Small-footed in having a less striking facial mask, larger hind foot and less area on the snout free of fur.

Western Small-footed Myotis occurs in semiarid habitats, grassland, shrub-steppe and open ponderosa pine or Douglas-fir forests. Day roosts likely include crevices or cracks of rocky outcrops, under loose pine bark and also in buildings. Females likely form small maternity colonies in the summer to rear young from May through to July and males likely roost solitarily. Breeding habitat is likely occupied from April to October when bats may move to local hibernacula.

They are insectivorous, capturing flying insect prey. Foraging occurs at heights from 1 m above ground to the canopy level over natural water courses, man-made water holes and rocky cliffs; feeding occurs along margins of trees. Night roosts allow bats to rest between foraging bouts or escape from predators and include buildings, caves and mines. They hibernate in winter hibernacula within their summer distributional range. Hibernation in BC occurs in caves and mines in the Williams Lake and Fraser River regions where bats have been found in low numbers (1-3).

Western Small-footed Myotis occurs in the Central Cariboo and Chilcotin Forest Districts, north to near Williams Lake. They occur in the BGxh3, BGxw2, IDFxm and IDFdk. Western Small-footed Myotis are protected against harassment, capture or killing under the *BC Wildlife Act*.
45.2 MANAGEMENT DIRECTION

Management direction is provided by CCLUP direction to manage for species at risk, and biodiversity in general.

45.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Harvesting removes old decadent trees that are used for roosting and breeding and removes mature and old trees. Timber harvesting disturbances in the immediate proximity of a roost may lead to roost abandonment. Road construction or significant traffic (such as log hauling), especially at night, may interrupt foraging behaviour.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning Layout</td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
</tr>
<tr>
<td>8 2 2 2 2 2 2 0 0 0 0 0 2 0 0 0 0 0 1 1 1 1</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

45.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Western Small-footed Myotis.

Overall Objectives

Retain ≥ 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences (roosting, foraging, and maternity sites) of this species are:

- Provide a 100 m reserve (WTP) around the site.
  - Incorporate sites with rocks or cliffs with openings (especially those with sunny aspects) into the WTP to preserve the integrity of cliff/outcrop sites
- Avoid disturbance to females and young during the breeding season (April to October),
- Avoid use of insecticides, especially Btk, around roosts and potential foraging areas to maintain moths for Western Small-footed Myotis prey.
- If harvesting in adjacent areas encourage a relatively open residual stand structure using partial harvesting systems to maintain > 50% basal area.
  - Retain large diameter (> 70 cm dbh) trees displaying defects such as broken tops, loose bark, hollows and stem cracks.
  - Retain veteran trees; especially those extending above the main canopy.
- If a hibernaculum is found, avoid disturbance during the hibernation season (October – April), and
establish a 100 m reserve around it.

**Landscape Level**

Strategies to address unrecorded occurrences (roosting, foraging, and maternity sites) of this species are:

- Retain mature/old trees in riparian and other wet areas to maintain natural insect populations, especially if in close proximity to rock cliff or outcrops potential roosting habitat.
- Focus WTPs on cliff or crevice potential roost sites.
- Avoid road construction and the use of talus slopes for building materials from cliff or crevice potential roost sites.

### 45.5 REFERENCES AND ADDITIONAL INFORMATION


46. WEASELS – ERMINE

47. WEASELS – LEAST WEASEL

48. WEASELS – LONG-TAILED WEASEL

48.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Ermine (*Mustela erminea*) is one of three small (20 to 40 cm body length) weasels in the CCBA. All have the typical long, thin mustelid (weasel family) shape, with short legs, long neck, and short, dense fur, and most change colour from brown back and white or yellowish belly in summer to predominately white in winter. Ermine is the most common weasel, and is distinguished by a black-tipped tail that is less than half the combined length of the head and body.

Long-tailed Weasel is the largest weasel, and is distinguished by a black-tipped tail that is more than half the length of the head and body.

Least Weasel is the smallest weasel, and is distinguished by a very short tail that is less than one-quarter the combined head and body length and lacks a black tip.

Weasels are generally adaptable, utilizing a variety of habitats at all elevations including coniferous and deciduous forests, riparian shrublands, natural meadows, and man-made openings such as forest cutblocks and agricultural clearings. The least weasel is the most specialized, favouring sparsely treed habitats such as the Cariboo parklands, open pastures, and even alpine tundra. It is commonplace not to differentiate between weasel species.

The primary prey for all three species are small rodents, especially voles and mice, but they are highly opportunistic and regularly consume a variety of other animals and carrion. The main differences in diet between the species reflect their differences in size: least weasels subsist primarily on small rodents and small birds; ermines take those plus other animals up to the size of small hares and grouse; long-tailed weasels take the largest range of prey, ranging from small mammals to adult ground squirrels, hares, grouse, and occasionally eating both of the other weasel species. Their high metabolic rates require them to eat small, frequent meals and they often cache excess food for future use. Weasels use a variety of habitats but are more abundant in disturbed areas (recent clearcuts, clearcut and burnt sites) than in mature stands. Home ranges vary in size (0.1-0.25 km²), with males typically using larger areas than females. They often use burrows, roots and hollow logs as den sites and habitat selection may be influenced by available niches for food caches and CWD for denning, foraging and cover. Squirrel middens are an important source of shelter for species such as Marten and Weasels. The most important consideration is maintenance of overhead cover in the form of coarse woody debris and/or multiple vegetation layers.

In the CCBA they occur in all BGC zones.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo;</td>
<td>G5</td>
<td>S5</td>
<td>Yellow</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chilcotin; Quesnel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

48.2 MANAGEMENT DIRECTION

Management direction is provided by CCLUP direction to manage for furbearers, and biodiversity in general.
48.3 Forest Management Issues and Risk Assessment

Forest operations adversely affect the small weasels through harvesting and silviculture removal of forest and other vegetation cover and course woody debris. A healthy weasel population can be effective defence against damage to tree crops by small rodents.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Relative Risk of Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planning &amp; Layout</td>
</tr>
<tr>
<td></td>
<td>Planning Area Layout</td>
</tr>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

48.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of weasels.

**Overall Objective**

Retain 70% of actively used habitat of this species in healthy condition. Each loss of habitat suitable for this species will incrementally reduce the economic value.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:
- None – individual sites are less important than general management over the landscape.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:
- Implement the landscape level recommendations for Fisher; weasels have similar requirements, although they will be better able to make use of "weasel huts" than are Fisher.

48.5 References and Additional Information


49. **WOLVERINE, *LUSCUS* SUBSPECIES**

49.1 **Species Summary: Identification and Habitat**

Wolverine, *luscus* subspecies (*Gulo gulo luscus*) are the largest members of the weasel family. They have stout bodies up to one metre in length with moderately bushy tails. They are dark chocolate brown over most of the body with lighter coloured hair around the forehead and along a lateral stripe extending from the ears or shoulder to the lower back. Some individuals have a white patch on the neck and chest. The large head has a pale facial mask with a brown muzzle and a yellowish forehead and ears.

Wolverines occur in all except the driest biogeoclimatic zones, with the highest concentrations generally occurring in mountainous areas. They primarily use mature and old forests, with little use of mid-seral stands. There are few easily defined habitats or small-scale habitat features for which they select; they require a suite of habitat variables that occur at landscape or regional scales. Natal and maternal dens are the only small-scale structures for which wolverines exhibit selection. Females typically situate dens in snow tunnels leading to masses of fallen trees (accumulations of classes 1–3 coarse woody debris) or broken rock slopes. Natal dens can often be underground. Wolverines can use up to four different maternal dens in a season after abandoning the original natal den which is used for 20-60 days. Females select natal/maternal dens within areas that provide a good prey/carrion resource base and security cover for kits. Natal and maternal dens are generally associated with small forest openings (<100 m across) in the ESSF/ESSFp boundary. Wolverines consume a variety of food items, but large ungulates such as moose, elk, caribou and mountain goats (primarily obtained as carrion) form a large component of their diet. Wolverines also eat snowshoe hares, porcupines, marmots, ground squirrels, mice and voles, birds, fish, and vegetation. Wolverines are active in the winter and rely more on large mammal carrion than actively hunting large prey. Riparian areas are may be important habitat in the winter. Human activity (e.g., log hauling, logging, mining) may displace or alter movement paths of wolverines in highly modified landscapes, and wolverines will often avoid entering young (<25 years) cutblocks while travelling. Roads can interrupt or alter daily movements and can be a source of mortality within the population. Parks, caribou habitat, and various no-harvest and restricted harvest areas at mid- to high elevations are the areas most likely to be maintained as suitable habitat for wolverine. Areas where most of the forest is available for forest harvesting are unlikely to maintain significant wolverine populations in the long term.

Wolverine occur in all three forest districts in the ESSF, ICH, IDF (except IDFxm and IDFxw), IMA, MH, MS, SBPS, and SBS. Under the provincial *Wildlife Act*, wolverines are protected from killing, wounding, and taking, and legal harvest for their pelts is regulated.
49.2 MANAGEMENT DIRECTION

The management direction for Wolverine is provided by CCLUP direction for management of species at risk and general biodiversity, and by Identified Wildlife Management Strategy (2004).

49.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management adversely affects Wolverine through the conversion of mature and old forest to early structural stage. Harvesting high elevation (ESSF) forests may reduce rearing success. Wolverines are also sensitive to disturbance, especially disturbance from roads and recreational activities.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking</td>
<td>Planning</td>
<td>Road Layout</td>
<td>Road</td>
<td>Bridge Removal</td>
</tr>
<tr>
<td>A = Probability of Interaction</td>
<td>Harvest Area Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>B = Legal Consequence of Interaction</td>
<td></td>
<td></td>
<td></td>
<td>Bridge Removal</td>
</tr>
<tr>
<td>C = Biological Consequence of Interaction</td>
<td></td>
<td></td>
<td>Falling</td>
<td></td>
</tr>
<tr>
<td>Total Risk Ranking = A * (B + C)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>177</td>
</tr>
</tbody>
</table>

49.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Wolverine. The abundance will decline, but the major populations and the species as a whole will be maintained in no-harvest and restricted harvest areas. Landscape level management of wolverine is generally outside the control of BCTS CCBA.

Implement the Identified Wildlife (2004) strategy at both the stand and (where feasible) landscape level.

**Overall Objectives**

Retain 80% of habitat in good condition for this COSEWIC Special Concern and blue-listed species in healthy condition. Each loss of part of the habitat of this species will incrementally worsen its conservation status. Maintain wolverine habitat in good condition throughout its range, sufficient to support or increase existing populations.

**Stand Level**

Strategies to address known occurrences (maternity den site) of this species are:

- Draft a management zone around it (100+ m radius, modified to a logical boundary), and treat as a no-harvest area.
**Landscape Level**

Strategies to address the general habitat of this species are:

- When operating in the ESSF, plan forest development to occur on one side of a watershed at a time where practical to allow wolverines to avoid operational areas during daily movements.
- Minimize road access in both the number of km and length of time active.
- Maintain seasonal foraging areas by maintaining a variety of structural stages of forest throughout a watershed, particularly near mature and old forest structural stages that provide thermal and security cover.
- Maintain connectivity within and between watershed to allow for large home ranges and dispersal among areas by juveniles and males. Riparian areas in valley bottoms dominated by older forests are important movement corridors.

These strategies will probably not be sufficient to meet the objectives; government land-use planning is required to achieve them.

### 49.5 REFERENCES AND ADDITIONAL INFORMATION


9. BIRDS
50. AMERICAN AVOCET

50.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

American Avocet (*Recurvirostra americana*) is a distinctive large shorebird (46 cm long), with a long, slender, upturned bill, long spindly legs, and a long neck; wings and back are boldly patterned with black and white; belly and flanks are white; head and neck and are rusty in breeding plumage, grey in basic plumage; juveniles have a cinnamon wash on the head and neck. Feeding occurs on invertebrates that live along the margins of lakes. They nest on open flats or areas with scattered tufts of grass on islands or along lakes (especially alkaline) and marshes. They strongly prefer to breed on islands surrounded by water, and are sensitive to disturbance. Nest site use varies from year to year, depending on whether the water level in an alkaline lake is sufficient to isolate an island from the mainland. The breeding season is from early May to July.

Approximately one-half of the provincial population of American Avocets breeds in the 100 Mile House and Central Cariboo FDs.

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<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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<tbody>
<tr>
<td>Central Cariboo</td>
<td>G5</td>
<td>S2B</td>
<td>Red</td>
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50.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

50.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations can interact with American Avocet habitat, through disturbance during the nesting season from field layout, road construction, road maintenance, road use, harvesting, and silviculture. Nest sites are not likely to be directly physically affected by forestry operations.
### 50.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of American Avocets.

**Overall Objective**

Retain 100% of nesting sites of this red-listed species in healthy condition. Each loss of part or all of a nesting site of this species will significantly worsen its conservation status.

**Stand Level**

Strategies to address known occurrences of this species are:

- No operations, including field layout or cruising, should occur near a nest site (within sight or hearing) during breeding season (April to July). Permanent roads should not be constructed near (within sight or hearing) an avocet breeding lake, to avoid long-term disturbance; if a temporary road will still be present during a breeding season it should be closed to traffic for that period.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Treat all islands in alkaline lakes as being American Avocet nest sites. The existence of an island should be based on maximum high water level for a lake, since some are connected to land at lower water levels.
  - If restrictions on operational timing or road location are unduly constraining for a specific lake, inventory the lake in May to determine actual avocet presence during the proposed year of operations. A skilled “birder” should conduct the inventory using a spotting scope, to avoid disturbing nesting avocets, if present. A qualified biologist may also be able to provide an estimate of the probability of avocets using the lake as a nesting site, without inventory.

### 50.5 References and Additional Information


51. AMERICAN BITTERN

51.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

American Bittern (*Botaurus lentiginosus*) is a stocky, medium-size heron with a straight pointed bill, relatively short neck and legs, and somewhat pointed wings. The wing span is just over 1 m. The colour is brown with darker flight feathers; the bill is dull yellow with a dusky tip on the upper mandible, and the legs and feet are greenish yellow. An elongated black patch extends from below the eye down the side of the neck, and the throat is white. Walking is slow and stealthy; flight is rapid and usually low. When disturbed, they often freeze in an upright, concealing posture, with head and bill upturned. Bittern plumage matches the vertical pattern of its preferred bulrush and cattail marsh habitat. This bird is most easily identified by its low, booming call, “pump-er-lunk, pump-er-lunk," that can be heard hundreds of meters away.

They are secretive birds inhabiting tall emergent vegetation along the borders of lakes, marshes rivers, and occasionally tidal marshes. Nests are well concealed and built over water up to 30 cm deep. Extensive stands of emergent vegetation and stable waters are important for successful breeding. The American Bittern inhabits wetlands of all sizes, but tends to be more abundant in larger wetlands. They are predators that eat fish, amphibians, mice and shrews, insects, and other animals.

The American Bittern is provincially blue-listed, because of their restriction to wetland habitats for breeding and their sensitivity to disturbance. They were formerly Identified Wildlife (1999) but were dropped from that list in 2004 as being “lower priority”.

The American Bittern is protected, in that it cannot be killed, collected or held in captivity without special permits, under the provincial *Wildlife Act*.

In the CCBA this species is known from breeding sites from the north end of Cariboo Lake and the north end of Alkali Lake; several sites just south of the CCBA are shown on the map for context.
51.2 MANAGEMENT DIRECTION

The management direction for the American Bittern is provided through land use plan objectives for maintenance of species at risk and biodiversity in general.

51.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations can interact with American Bittern habitat, through disturbance during the nesting season from road construction, road maintenance, road use, harvesting, and silviculture. Nest sites are not likely to be directly physically affected by forestry operations.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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<tbody>
<tr>
<td>Risk Ranking A</td>
<td>Probability of Interaction</td>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence</td>
<td>C = Biological Consequence</td>
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<td>of Interaction</td>
<td>Planning, Harvest Area Layout</td>
<td>Planning, Road Construction</td>
<td>Road Maintenance, Road Deactivation</td>
<td>Bridge Installation, Bridge Removal</td>
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<td>Road Layout</td>
<td>Road Construction</td>
<td>Road Maintenance, Road Deactivation</td>
<td>Bridge Installation, Bridge Removal</td>
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<td>Falling, Forwarding</td>
<td>Loading, Processing</td>
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<td>Yarding, Skidding</td>
<td>Handling, Site Preparation</td>
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<td>Planning, Vegetation Management</td>
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<td>Density, Management</td>
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</tbody>
</table>

51.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of American Bittern.

Overall Objective

Retain 70% of nesting sites of this blue-listed species in healthy condition. Each loss of part or all of a nesting site of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- No machine operations should occur near (within hearing) a nest site during breeding season (April to July). Roads should not be constructed near (within hearing of truck noise) a bittern breeding site, to avoid long-term disturbance.

Landscape Level

None.

51.5 REFERENCES AND ADDITIONAL INFORMATION


52. AMERICAN WHITE PELICAN

52.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

American White Pelican (*Pelecanus erythrorhynchos*) are huge, mostly white waterbirds with partly black wings; the black is only visible when in flight. The wingspan can be over 3 meters. Their bill is grey to somewhat orangish, and their legs are bright orange during the breeding season. Feet are webbed, and they have a large throat pouch for scooping up fish.

The western North American population (west of the Rocky Mountains) does not mix with the populations east of the Rocky Mountains. The only known breeding site in BC is on islands in Stum Lake, 70 km northwest of Williams Lake. They are highly sensitive to disturbance during nesting, and an entire year’s reproduction can be lost from a single incidence of disturbance. American White Pelicans catch fish by scooping them up in the pouch while swimming; hence their preferred feeding areas are lakes or stream mouths where fish are abundant and shallow (< 1m) water forces the fish to remain near the surface. Feeding is therefore restricted to a small number of lakes within flying distance of the breeding site. The critical feeding lakes are well known, and have been identified by government. Many other lakes and streams are also used for feeding and loafing, by both breeding and non-breeding individuals. All significant Western White Pelican feeding lakes are west of the Fraser River in the CCBA, although they are sometimes seen on the east side near Williams Lake. The use of any given lake by pelicans varies considerably both within a given year, and between years.

Existing management strategies do not address disturbance associated with feeding and loafing lakes and streams that have not been designated WHAs. A number of significant feeding lakes are, and will continue to be, subject to high levels of human disturbance. Globally American White Pelicans are assessed as being “G3”, the equivalent of “Special Concern”. BC’s population occupies a significant part of the range of the species; therefore there is an extra importance to managing the species in BC. COSEWIC has listed the BC populations as being “Not at Risk” on the basis of lumping all populations in Western Canada into one assessment unit. If they had looked only at the single BC population, they likely would have listed it as Endangered.

The American White Pelican, its nests, and eggs are protected against direct persecution and harassment under the *BC Wildlife Act*. American White Pelicans are designated as *Endangered* under the *BC Wildlife Act*.
Species of Management Concern BCTS Cariboo Region

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<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED</th>
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<td>Central Cariboo; Chilcotin; Quesnel</td>
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<td>Red</td>
<td>Jun 2006 NAR (May 1987)</td>
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52.2 MANAGEMENT DIRECTION

CCLUP Species at Risk Notice for Central Cariboo, Chilcotin, and Quesnel Forest Districts. Nineteen WHAs have been approved by government for pelican feeding lakes in the CCBA. Each WHA has been mapped and has a prescribed management strategy.

52.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations can interact with American White Pelican feeding habitat, through disturbance of feeding pelicans during the breeding season; disturbance while feeding will reduce feeding success, and therefore reproductive success.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning, Harvest Area Layout, Road Layout, Road Construction, Road Maintenance, Road Deactivation, Bridge Installation, Bridge Removal, Falling, Yarding, Skidding, Forwarding, Loading, Processing, Hauling, Site Preparation, Planting, Vegetation Management, Density Management</td>
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52.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of American White Pelican.

Overall Objective

Retain 100% of significant feeding lakes for this red-listed species in usable condition. Each loss of part or all of a feeding lake for this species will significantly worsen its conservation status.

Stand Level

Strategies to address known occurrences (feeding lakes) of this species are:

- In the Cariboo Forest Region west of the Fraser River, avoid establishing new permanent access within 1 km of any waterbody that MoE has identified as having significant use. Avoid vehicle and machinery use during the breeding season within 1 km of such waterbodies (1 April to 15 September). Should this not be possible, consult a biologist regarding mitigation measures to minimize disturbance.
- The key issue in access management is closure of public access. Actual road deactivation is not required if public access can be prevented without deactivation/rehabilitation.
Species of Management Concern BCTS Cariboo Region

Landscape Level
Strategies to address unrecorded occurrences (feeding lakes) of this species are:
• Field crews should watch for and report to BCTS the use of waterbodies by American White Pelicans.
• BCTS CCBA should request from the Ministry of Environment (Williams Lake) information regarding waterbodies in the CCBA that are not WHAs but that have significant use by pelicans.

52.5 REFERENCES AND ADDITIONAL INFORMATION


53. BALD EAGLE

53.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Bald Eagle (*Haliaeetus leucocephalus*) adults have a white head, white tail, and a large bright yellow bill; elsewhere the plumage is dark. Immatures are dark with variable amounts of light splotching on the body, underwing coverts, flight feathers, and tail base. Most eagles that breed in the Cariboo migrate south for the winter; however some are resident all year. The number of resident eagles in the CCBA has increased in the last 50 years due to road kills providing a reliable winter food supply.

Breeding habitat most commonly includes areas close to (within 4 km) rivers or lakes supporting the primary food sources including fish and waterfowl. They perch and nest in dominant or co-dominant trees – often gnarled and very old trees. The same nest may be used year after year, or they may alternate between two nest sites in successive years. Nests with an overhead canopy of foliage are most successful. Eagles usually nest within the tree canopy at the base of a large side branch; ospreys usually nest on the very top of a tree or snag. Bald Eagles are relatively tolerant of land use changes surrounding their nest sites, but, of course, cannot adapt to a complete loss of old-growth trees. Nests occur in extensive old-growth stands, fragmented oldgrowth parcels, and lone veteran trees in second growth or slash. The nest tree environments vary from remote wilderness to urban landscapes.

The Bald Eagle is protected, in that it cannot be killed, collected or held in captivity without special permits, under the provincial *Wildlife Act*. The actual nest trees are also protected under the *Wildlife Act*, whether or not they are occupied.

In the CCBA this species is widespread and reasonably common; in general nest sites have not been systematically recorded and there is no available mapping.
53.2 MANAGEMENT DIRECTION

The management direction for the Bald Eagle is provided through land use plan objectives to maintain biodiversity in general, and the Best Management Practices for Raptors.

53.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

The forest management issues for the Bald Eagle are disturbance during nesting, and loss of existing and future large trees used for nesting due to removal during road construction, harvesting, and silviculture. Removal of high quality nest trees occurs because they are frequently hazard trees.

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<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
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53.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the Bald Eagle.

Overall Objective

Retain 100% of nesting sites of this species in healthy condition. There is a legal requirement (Wildlife Act) to not destroy a Bald Eagle nest. There is an ethical obligation to take reasonable measures to ensure that the nest is managed so that it can continue to be used – protected from windthrow and high disturbance.

Stand Level

Strategies to address known occurrences (nest, roosting, perching or feeding site) of this species are:

- Preserve all trees used by eagles as nesting sites, including presently unoccupied trees that have been used in the past.
- Maintain any trees that eagles regularly use for roosting, perching or feeding.
- Maintain a 200 m no-harvest and no-road reserve around eagle nest trees; maintain an additional 100 m free of loud noises and other human disturbances around occupied nests in the period February through August.
- Locate new roads away from eagle nesting, roosting, feeding and foraging areas.

Landscape Level

Strategies to address unrecorded occurrences (nest, roosting, perching or feeding site) of this species are:

- Maintain existing and potential nest sites (large veteran trees), within 200 m of a fish-bearing lake or a
S1 or S2 river, to serve as nest sites and perching sites.

53.5 REFERENCES AND ADDITIONAL INFORMATION


54. BARN SWALLOW

54.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Barn Swallow (Hirundo rustica) is a medium-sized swallow, with a relatively long forked tail. Adults have metallic-blue upperparts, a dark rusty orange throat and forehead, and a paler orange chest and underside. Adult plumages are similar throughout the year. Juveniles are similar to adults but have paler underparts and less forked tails. Barn Swallow is distinguished from all other swallows by its deeply forked tail, and the extensive orangish underparts. The similar Cliff Swallow has a pale orangish rump and square tail.

They inhabit open or partly open areas, especially near water. They nest in barns or other buildings, under bridges, or in caves or cliff crevices, usually on vertical surface close to ceiling. They usually return to same nesting area in successive years and commonly reuse old nests; yearlings often return to within 30 km or closer to their natal site. They fly over open land and water and forage on a wide variety of flying insects; they forage closer to the ground than other swallows. They usually forage within a few hundred meters of the nest.

Barn Swallow is protected, in that it cannot be killed, collected or held in captivity without special permits, under the provincial Wildlife Act and the federal Migratory Birds Convention Act. Barn Swallow occurs throughout the CCBA in the summer, in urban and agricultural as well as forested areas, up to 3,000 m elevation. The CDC does not have map data for breeding locations.
54.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

The forest management issues for the Barn Swallow are permanent disturbance of nest sites through road construction location, or disturbance by adjacent harvesting during the breeding season.

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<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
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<td>A = Probability of Interaction</td>
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<td>B = Legal Consequence of Interaction</td>
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<td>C = Biological Consequence of Interaction</td>
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<tr>
<td>Risk Ranking = A * (B + C)</td>
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</table>

54.4 **MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the Barn Swallow.

**Overall Objective**

Retain 70% of nesting sites of this blue-listed species in healthy condition. Each loss of part or all of a nesting site of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences (nest site) of this species are:
- Avoid constructing roads within 100 m of cliffs or other sites with swallow nests present, to minimize interactions (disturbance, mortality) between the nesting swallows and traffic.
- Avoid harvesting and large machine use within 100 m during the nesting season (April to August).

**Landscape Level**

Strategies to address unrecorded occurrences (nest site) of this species are:
- Field crews should report the presence of swallow nest sites when noted during field work.

54.5 **REFERENCES AND ADDITIONAL INFORMATION**


Species of Management Concern BCTS Cariboo Region

55. BOBOLINK

55.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Bobolink (*Dolichonyx oryzivorus*) is a visually striking, medium-sized, sparrow-like bird with sharply pointed rectrices (a type of tail feather). The male in breeding plumage is unique in being entirely black below and lighter above. The front of the head, the underparts, tail, and wings are black while the shoulders, lower back, rump, and uppertail-coverts are white to pale grey. The neck is a buff yellow. The female is less conspicuous with buffy dark streaking on the back, rump, and sides and a striped crown. By mid-August, before departing from the breeding range, males moult into plumage that resembles females. The overall appearance of female is similar to other female sparrows, but is distinguished by its larger size and distinctively stiff rectrices.

Bobolinks prefer to breed in tall grass areas, flooded meadows, prairie, deep cultivated grains, and hayfields. The nest is built on the ground in a small hollow in an area with concealing herbaceous vegetation. They tend to breed in the same area in successive years, especially if that site has had good productivity. They migrate south in August, to South America. They feed on weed seeds, a variety of larval and adult insects, and spiders. Young are fed exclusively invertebrates. Preferred foraging technique is to walk slowly on the ground. Bobolink breeding in the CCBA is limited to the Cariboo Plateau and Cariboo Basin ecossections, in the BG, ICH, IDF, and SBS below 800 m elevation. In the CCBA this species is known from near Fox Mountain Road 5-6 km east of Williams Lake, in a weedy field along Hwy 97 at 150 Mile House, northeast of Alkali Lake, and just north of Hwy 97 crossing of Knife Creek (141 Mile House).

The Bobolink, its nests, and eggs are protected against direct persecution and harassment under the federal *Migratory Birds Convention Act* and the provincial *Wildlife Act*.

![Map of Bobolink distribution in the Cariboo Region](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Quesnel</td>
<td>G5</td>
<td>S3B</td>
<td>Blue</td>
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</table>

55.2 MANAGEMENT DIRECTION

The management direction for the Bobolink is provided by land use plan objectives to maintain species at risk and biodiversity in general.
55.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

The forest management issues for the Bobolink are permanent disturbance of nest sites through road construction location, or disturbance by adjacent harvesting or silviculture during the breeding season.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
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<th>Silviculture</th>
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<td>Road</td>
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55.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the Bobolink.

**Overall Objective**

Retain 70% of nesting sites of this blue-listed species in healthy condition. Each loss of part or all of a nesting site of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences (nest site) of this species are:
- Avoid disturbance to known nest sites during the breeding season (May through July).
- Avoid road construction through known habitat.

**Landscape Level**

Strategies to address unrecorded occurrences (nest site) of this species are:
- None.

55.5 REFERENCES AND ADDITIONAL INFORMATION


56. BREWER’S SPARROW, BREWERI SUBSPECIES

56.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Brewer’s Sparrow, *breweri* subspecies (*Spizella breweri breweri*) is a small, inconspicuous brown sparrow, with the elaborate male song being the most distinctive characteristic. It has a brown crown with fine black streaks and lacks the clear pale central strip of the Clay-colored Sparrow. The Brewer’s Sparrow has a whitish eye ring and greyish-white eyebrow. The ear patch is pale brown with darker borders and the bill is dusky above and slightly paler below. Upperparts are buffy brown and streaked with black, and the rump is buffy brown and may be lightly streaked. Underparts are dull white with the breast and sides lightly washed with greyish buff. The tail is dark brown and narrowly edged with grey, and lacks the whiter outer tail coverts of the Vesper Sparrow.

Brewer’s Sparrows are semi-colonial, with territories of breeding pairs usually immediately adjacent to other territories, forming an aggregate. They often use the same breeding areas in subsequent years. They are opportunistic, open-ground foragers, feeding on seeds, other vegetable matter, and insects; the relative proportion of the foods depends on seasonal availability. They live and nests in large areas of sagebrush grassland, with a fairly high density of sagebrush. However, >30% foliar cover of sagebrush may interfere with the establishment and protection of territories, as well as reduce effective foraging areas. They have been known to nest in half their former numbers during the breeding season following sagebrush destruction by herbicides. Fire destroys sagebrush or decreases nesting opportunities by defoliating the shrub. Warm, southeast to west aspects are primarily used, in the BG and IDF. They migrate into BC in late April to early May, and depart on fall migration in late August and early September.

Brewer’s Sparrows are protected under the federal *Migratory Birds Convention Act* and the provincial *Wildlife Act*.

In the CCBA this species is known from Cow Flats on the road to the Junction Sheep Range and Wycott Flats Road near Dog Creek.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo</td>
<td>G5T4</td>
<td>S2B</td>
<td>Red</td>
<td>Jun 2006</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
56.2 MANAGEMENT DIRECTION

The management direction for Brewer’s Sparrow is provided by land use plan objectives to maintain species at risk and biodiversity in general, and by the Identified Wildlife Strategy (2004). There no established Wildlife Habitat Areas in the CCBA area.

56.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may interact with Brewer’s Sparrow habitat through road construction.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>A</strong> = Probability of Interaction</td>
<td><strong>B</strong> = Legal Consequence</td>
<td><strong>C</strong> = Biological Consequence</td>
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</tbody>
</table>

56.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Brewer’s Sparrow.

**Overall Objective**

Retain 100% of nesting sites of this red-listed species in healthy condition. Each loss of part or all of a nesting site of this species will significantly worsen its conservation status.

**Stand Level**

Strategies to address known occurrences (nest site) of this species are:

- Manage a designated WHA as specified in the associated Order, or as specified in Identified Wildlife (2004) if no Order has been issued.
- When considering road construction near a known (past or present) Brewer’s Sparrow occurrence that is not a WHA, manage the site as if it is a WHA.

**Landscape Level**

Strategies to address unrecorded occurrences (nest site) of this species are:

- None.

56.5 REFERENCES AND ADDITIONAL INFORMATION


http://wlapwww.gov.bc.ca/sir/fwh/wld/atlas/species/species_index.html


57. BURROWING OWL

57.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Burrowing Owl (Athene cunicularia) is a small, brownish owl with bright yellow eyes, a rounded head (i.e., no ear tufts), a short tail, and noticeably long legs. Adults have white spots on their head and wings and a white abdomen with brown barring. In contrast, young of the year have no spots on their head and wings, their abdomens are solid beige with no barring, and they have a conspicuous beige stripe across the tops of their closed wings. During the day, owls perch on fence posts or atop the mounds of their burrows.

They inhabit abandoned burrows of small mammals (marmots, badgers, skunks, and ground squirrels), and sometimes excavate their own nests. They feed on small mammals (mice, voles), amphibians, birds, and ground-dwelling insects. Nesting starts in late March, and young may be present in the area of the nest through September. They are a very rare nesting resident in the dry, open, shrub-steppe plains and valley bottoms. Nest sites may be re-used for many years. The BC population is maintained mostly through captive breeding and reintroduction program, with constructed artificial nests.

In the CCBA there is no known nesting sites, but an occasional adult has been seen. There is nesting potential in the BG and IDF.

<table>
<thead>
<tr>
<th>Known BGC Unit</th>
<th>Forest District</th>
<th>Global Rank</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
<th>COSEWIC</th>
<th>SARA Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo;</td>
<td>G4</td>
<td>S1B</td>
<td>Red</td>
<td>May 2004</td>
<td>E (Apr 2006)</td>
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<tr>
<td>Chilcotin</td>
<td></td>
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</tbody>
</table>

57.2 MANAGEMENT DIRECTION

The management direction for Burrowing Owl is provided by land use plan objectives to maintain species at risk and biodiversity in general, and by the Identified Wildlife Strategy (2004). There are no established Wildlife Habitat Areas in the CCBA area.

57.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations could interact with Burrowing Owl habitat, if any nest sites are present, through disturbance and nest site destruction from road construction.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Relative Risk of Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning &amp; Harvest Area Layout</td>
<td>Planning</td>
</tr>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td></td>
</tr>
<tr>
<td>A = Probability of Interaction</td>
<td></td>
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<tr>
<td>B = Legal Consequence of Interaction</td>
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<tr>
<td>C = Biological Consequence of Interaction</td>
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<tr>
<td>12 2 3 3</td>
<td>2 2 2 2</td>
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<tr>
<td>Roads, Bridges and Culverts</td>
<td>Road Construction</td>
</tr>
<tr>
<td>2 0 0 0</td>
<td>0 0</td>
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<tr>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
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<td>0 0 0 0</td>
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<tr>
<td>Road Installation</td>
<td>Bridge Installation</td>
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<td>0 0 0 0</td>
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<tr>
<td>Bridge Removal</td>
<td>Falling</td>
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<td>0 0 0 0</td>
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<tr>
<td>Harvesting</td>
<td>Yarding</td>
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<tr>
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<td>Processing</td>
<td>Handling</td>
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<tr>
<td>Silviculture</td>
<td>Site Preparation</td>
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<tr>
<td>Density Management</td>
<td>Planning</td>
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<td>0 0 0 0</td>
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</tbody>
</table>
57.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Burrowing Owl.

Overall Objective
Retain 100% of nesting sites of this red-listed and nationally Endangered species in healthy condition. Each loss of part or all of a nesting site of this species will significantly worsen its conservation status.

Stand Level
Strategies to address known occurrences (nest site) of this species are:
- Manage a designated WHA as specified in the associated Order, or as specified in Identified Wildlife (2004) if no Order has been issued.
- For a Burrowing Owl nest site that is not a WHA, request management direction from MoE.

Landscape Level
Strategies to address unrecorded occurrences (nest site) of this species are:
- None.

57.5 REFERENCES AND ADDITIONAL INFORMATION


58. CALIFORNIA GULL

58.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

California Gull (*Larus californicus*) is a medium-sized white-headed gull. Mature plumage is a combination of a dark grey mantle, yellow green legs, and black and red spots on an enlarged part of the lower mandible. The California Gull is slightly smaller, with proportionally slimmer bill and proportionally longer wings, than Herring Gull, Glaucous-winged Gull, Western Gull, and Glaucous Gull. It is larger and proportionally shorter-winged and heavier-billed than Ring-billed Gull and Mew.

It is an opportunistic feeder with the main food types eaten depending on where colony is located. This will include small mammals, fish, birds, garbage, and variety of invertebrates (grasshoppers, mayflies, and damselflies, earthworms, and many others).

The California Gull, its nests, and eggs are protected against direct persecution and harassment under the federal *Migratory Birds Convention Act* and the provincial *BC Wildlife Act*. In the CCBA this species is known only to breed on “Gravel Island” in the Quesnel River, above the Johnson Bridge in Quesnel. The CDC did not list this species for the Quesnel Forest District, but the “Gravel Island” reference in Rare Birds of BC was to their attention during this project.

58.2 MANAGEMENT DIRECTION

The management direction for California Gull is provided by land use plan objectives to maintain species at risk and biodiversity in general.

58.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not interact with California Gull nesting habitat. If there are additional, unknown, nesting locations they will almost certainly be on islands in S1 streams or large lakes, where forest operations will not affect them.
### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Risk Ranking</th>
<th>Planning</th>
<th>Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Roads, Bridges and Culverts</td>
<td>Harvesting</td>
<td>Silviculture</td>
</tr>
<tr>
<td>B = Legal Consequence of Interaction</td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
<td>Bridge Installation</td>
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<tr>
<td>C = Biological Consequence of Interaction</td>
<td>Bridge Failing</td>
<td>Falling</td>
<td>Yarding</td>
<td>Skidding</td>
<td>Forwarding</td>
</tr>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Bridge Removal</td>
<td>Loading</td>
<td>Processing</td>
<td>Handling</td>
<td>Site Preparation</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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</tbody>
</table>

### 58.4 Management Strategy

None required.

### 58.5 References and Additional Information


59. COMMON NIGHTHAWK

59.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Common Nighthawk (*Chordeiles minor*) is a medium-sized bird with cryptic plumage. It is generally dark brown, with black, white and buff mottling on the wings and upper parts and fine buff bars on the under parts. It is characterized by long, slender, pointed wings and by a long, slightly notched tail. This species has a rather large, flattened head, large eyes, a small bill and a very large mouth. Females can be distinguished from males by their buff rather than white throat band. In flight, adults have a pronounced white patch at the base of the primaries, which are also dark brown. The white patches on the underpart of the primaries distinguish it from the similar Common Poorwill. Both males and females produce a nasal ‘peent’ or ‘beern’ during flight and while foraging. During mating displays, males produce a booming sound, which is produced by air rushing through primaries after a sudden downward flexing of wings during dive.

It is an aerial insectivore that feeds primarily at dusk and dawn, but never at night. It feeds among others, on mosquitoes, moths, beetles, flies, and caddis flies. Where insect densities are high, the species can feed in groups ranging from a few dozen to several hundred individuals. The breeding habitat includes open habitats, such as sand dunes, recently logged areas, recently burned-over areas, forest clearings, short-grass prairies, pastures, open forests, peatbogs, marshes, lakeshores, gravel roads, river banks, rocky outcrops, and rock barrens. The species is also present in mixed and coniferous forests, as well as in pine stands. The nests are built on the ground on a bare site in an open area; the species seems to prefer sandy soils. The nests are usually located in the open, also near logs, boulders, grass clumps, shrubs, or small patches of sandy gravel surrounded by scattered debris. Nesting starts in early June. Nest territory size is up to 28 ha.

The Common Nighthawk is listed as nationally Threatened because over the last 40 years the Canadian population has declined 50%, with a 6.6% decline over the last decade. There is no clear explanation for the decline, but it may be a combination of reduced breeding habitat, in part due to more rapid reforestation and wildfire control, and reduced aerial insect prey abundance due to widespread insecticide use in much of its range. Common Nighthawk, its nests, and eggs are protected against direct persecution and harassment under the federal *Migratory Birds Convention Act* and the provincial *BC Wildlife Act*. In the CCBA this species is widespread, in all three Forest Districts.

Better image at http://linnet.geog.ubc.ca/efauna/photoGallery/Gallery.axpx

Photo © John Cooper
59.2 MANAGEMENT DIRECTION

The management direction for Common Nighthawk is provided by land use plan objectives to maintain species at risk and biodiversity in general.

59.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations primarily interact with Common Nighthawk nesting habitat in ways that cannot be controlled by BCTS – there are legal requirements for rapid reforestation, and the province determines wildfire control policy. Actively used nest sites may be disturbed by road construction and maintenance, harvesting and silviculture.

59.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Common Nighthawk.

Overall Objective

Retain 100% of active nesting occurrences of this nationally Threatened species in healthy condition. Each loss of part or all of an active nesting occurrence of this species will incrementally worsen its conservation status.

Stand Level

Strategies to address known occurrences (nest site) of this species are:
- Protect a known Common Nighthawk occurrence from disturbance during the nesting season (June to August).

Landscape Level

Strategies to address unrecorded occurrences (nest site) of this species are:
- None.
59.5 REFERENCES AND ADDITIONAL INFORMATION


60. DOUBLE-CRESTED CORMORANT

60.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Double-crested Cormorant (*Phalacrocorax auritus*) is a medium-sized cormorant with a black or dark-brown body that has a dull greenish or bronze gloss. There is a white feather tuft over each eye in early summer. And the skin on the face and throat pouch is orange/yellow. It is the only cormorant in the CCBA.

Colonies are established at sites safe from ground predators and generally these sites have been used as roosts. They nest both on the ground and in trees. When nesting in trees, these trees are usually standing in or near water. Individuals are show high fidelity to colony site. Nest composition depends on materials available near the colony but the nests characteristically include finger-sized sticks and other bulky items. They are sensitive to disturbance while nesting.

They feed on small fish and aquatic invertebrates by diving, usually in water under 15 m deep. It will sometimes capture aquatic invertebrates and rarely small vertebrates other than fish. Individuals can forage upwards of 60 km from the colony or roost site. It is not known whether feeding lakes need to be managed to minimize disturbance; they may be able to use more lakes than can American White Pelicans because of the greater water depth at which cormorants can feed.

The BC breeding colonies are rapidly declining, for unknown reasons. They are highly vulnerable to human and eagle disturbance of nest sites. There is one isolated Central Interior breeding colony at Stum Lake, but non-breeding individuals are sometimes seen elsewhere such as Tzenzaicut Lake. It is possible that additional undiscovered breeding colonies exist in the CCBA.

Double-crested Cormorant is protected, in that it cannot be killed, collected or held in captivity without special permits, under the provincial *Wildlife Act*.

Need a higher resolution photo – this one is not on E-Fauna, so I cannot get a “fresh” copy.

![Photo © Fred Lang](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED</th>
<th>COSEWIC WILDLIFE</th>
<th>SARA Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Chilcotin</td>
<td>G5</td>
<td>S3B</td>
<td>Blue</td>
<td>NAR (May 1978)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

* Not recorded for the Quesnel FD by the CDC, however local residents report them from Tzenzaicut Lake.
60.2 MANAGEMENT DIRECTION

The management direction for the Double-crested Cormorant is provided by land use plan objectives to maintain biodiversity in general.

60.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations can interact with Double-crested Cormorant feeding habitat, through disturbance of feeding cormorants during the breeding season; disturbance while feeding will reduce feeding success, and therefore reproductive success.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planning, Area Layout</td>
<td>Road Construction</td>
<td>Bridge Installation</td>
<td>Falling</td>
</tr>
<tr>
<td></td>
<td>Planning, Layout</td>
<td>Planning, Road Construction</td>
<td>Planning, Road Construction</td>
<td>Planning, Road Construction</td>
</tr>
<tr>
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<td>3 1 1 2</td>
<td>2 2 2 2 1 1 1 1</td>
<td>1 1 1 1 1 1</td>
<td>1 1 1 1</td>
</tr>
</tbody>
</table>

60.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Double-crested Cormorant.

Overall Objective

Retain 70% of significant feeding lakes for this blue-listed species in usable condition. Each loss of part or all of a feeding lake for this species will significantly worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences (feeding or nesting lakes) of this species are:
- Manage in a manner similar to management for American White Pelicans.
  - Should a nesting lake be found, avoid disturbance to the site during the breeding season (1 April to 31 August).
    - Minimize heavy equipment, vehicle use and new road development from 1 April to 31 August.
    - Avoid constructing permanent roads within 1 km of the lake.
    - Consult a biologist regarding mitigation measures to minimize disturbance.
  - Should feeding lakes be found, manage them to avoid disturbance to the site during the breeding season (1 April to 31 August).
    - Consult a biologist regarding mitigation measures to minimize disturbance.
    - In the Cariboo Forest Region west of the Fraser River, avoid establishing new permanent access within 1 km of any waterbody that MoE has identified as having significant use. Avoid vehicle and machinery use during the breeding season within 1 km of such waterbodies (1 April to 15 September). Should this not be possible, consult a biologist regarding mitigation measures to
minimize disturbance.

- The key issue in access management is closure of public access. Actual road deactivation is not required if public access can be prevented without deactivation/rehabilitation.

**Landscape Level**

Strategies to address unrecorded occurrences (feeding or nesting lakes) of this species are:

- BCTS should request from the MoE information regarding waterbodies in the CCBA that have significant use by Cormorants.
- Field crews should watch for and report to BCTS the use of waterbodies by Cormorants.

### 60.5 REFERENCES AND ADDITIONAL INFORMATION


61. FLAMMULATED OWL

61.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Flammulated Owl (*Otus flammeolus*) is a tiny owl about 15 to 17 cm tall. It is mottled grey and red-brown, blending into tree bark. It has ear tufts, and has **distinct dark flame-like feather variegation above dark eyes and a flash of reddish on their wings**. The one or two note low-pitched hoot is a distinctive "boop" or "beboop". The similar-sized Northern Saw-whet Owl and Northern Pygmy-Owl lack ear tufts and have a yellow iris.

Flammulated Owls generally nest in old-growth Douglas-fir forest, using cavities originally excavated in dead (usually) or live (occasionally) Douglas-fir and trembling aspen trees by flickers or woodpeckers. The forest has a low to moderate canopy closure, thickets of Douglas-fir for security cover, open patches of grasslands and shrubs. There is strong fidelity to breeding areas – males typically return to territories, and alternative cavities have been used for nesting in the same tree in successive years and alternative trees have been used within the same foraging areas. The breeding season is May to August. They hunt at night, eating larger insects, including moths, katydids, crickets, and beetles, often taken on the wing from high grass or shrubs in forest openings, or gleaned from forest canopies. Distribution is difficult to determine as nocturnal acoustic surveys are required to document presence.

The Flammulated Owl, its eggs, and nests if occupied by a bird or egg are protected under Section 34 of the *BC Wildlife Act*. In the CCBA, the Flammulated Owl occurs almost entirely in Mule Deer Winter Range areas of the BG and IDF.

### Known BGC Unit
- **Forest District:** Central Cariboo, Chilcotin
- **Global Rank:** G4
- **BC Rank:** S3S4B
- **BC List:** Blue
- **Identified Wildlife:** May 2004
- **COSEWIC:** SC (Nov 2001)
- **SARA Schedule:** May 2004

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61.2 MANAGEMENT DIRECTION

The management direction for the Flammulated Owl is provided by land use plan objectives to maintain biodiversity in general, and by Identified Wildlife (2004).
61.3 **Forest Management Issues and Risk Assessment**

Forest management issues include loss of critical nesting, security, and foraging habitat features due to harvesting, spacing, thinning, road construction, and pest management. Snag removal for safety reasons is also a threat. Long-term major threats are a potential lack of recruitment and maintenance of old-growth habitat features, particularly large diameter Douglas-fir and ponderosa pine snags with cavities.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

61.4 **Management Strategy**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Flammulated Owls.

Implement the Identified Wildlife (2004) strategy at both the stand and landscape level.

**Overall Objective**

Retain ≥ 80% of nesting occurrences of this blue-listed and nationally Special Concern species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

**Stand Level**

Strategies to address known occurrences (nest site) of this species are:

- Manage designated WHAs according to the associated Order, or according to Identified Wildlife (2004) if there is no Order.
- Obtain a list/map on known nest sites from MoE Cariboo Region research staff, to supplement the CDC data.
- When harvesting is considered in the vicinity of a known nest site that is not a WHA, center a WTP on it and manage the WTP as if it is a WHA.
- Where a known Flammulated Owl nest tree is an isolated tree or in a small patch within an existing open area (i.e., meadow, clearing or cutblock), maintain as much vegetation cover as possible around the nest tree to provide additional security cover, perching and roosting sites.

**Landscape Level**

Strategies to address unrecorded occurrences (nest site) of this species are:

- Manage for Flammulated Owl nesting habitat within Mule Deer Winter Ranges; almost all known nesting occurs there. Mule Deer Winter Range management will address most of the habitat requirements of Flammulated Owl.
- Avoid felling of standing dead/dying Douglas-fir, aspen, and cottonwood ≥35 cm dbh in stands that are suitable as Flammulated Owl nesting habitat, except where required to prevent the spread of a
forest health agent. If necessary, install no work zones around such trees in order to buffer them as required to meet WCB safety requirements.

- Minimize application of insecticides (including Btk) to stands that are suitable habitat – the insecticides will reduce the total population of moths, on which the owls feed. If insecticides must be used, apply in a manner designed to leave numerous patches of forest with abundant insect (especially budworm) larvae.

- Avoid road construction, timber harvesting, and silviculture activities during the breeding season (late April through August).

- Consider placing a “Wildlife Tree Sign” (obtain from MoE) on nest trees in order to educate the public and others about their high ecological value.

### 61.5 REFERENCES AND ADDITIONAL INFORMATION


62. GREAT BLUE HERON, HERODIAS SUBSPECIES

62.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Great Blue heron, herodias subspecies (Ardea herodias herodias) is the largest and heaviest heron in North America. It stands about 1.6 m tall, and has a wingspan of 1.8 m, and weighs 2.1 to 2.5 kg. The wings are long and rounded, the bill is yellow, long and tapered, and the tail is short and barely extends beyond the flight feathers. Upperparts are grey; the foreneck is streaked with white, black, and rust-brown. The legs are brownish or greenish. In flight, it folds its neck in an S-shape and extends legs along the body axis. It flies with deep, slow wing beats. Both males and females have similar appearance.

Sandhill Crane is similar in size and shape but is mainly brownish in colour, has loud vocalizations, nests on the ground, and flies with its neck outstretched. American Bittern is brown with a heavily streaked breast, is ⅔ the size and usually remains well-hidden in wetland vegetation.

Great Blue Herons are prey generalists, although they primarily forage for fish. They stalk prey by walking or standing in shallow water along the shoreline of oceans, marshes, lakes, and rivers and in fields or other vegetated areas. In upland areas they stalk mostly small mammals such as rodents; other prey types include amphibians, reptiles, invertebrates, and birds.

They usually nest in trees on the banks of slow-moving rivers, sloughs or marshy lakes in mature or older second growth forests (hardwood, conifer, or mixedwood). Nest colonies usually have 5-20 nests, but can be greater. Large stick nests (0.5-1.0 m in diameter) are built in the largest available trees. Nesting colonies are usually located within 3 km of foraging areas and may be used for many years but not always in consecutive years. Typically, black cottonwood, balsam poplar, spruce and Douglas-fir tree species are favoured nest trees, however lodgepole pine is also used in the CCBA. Birds arrive on the breeding grounds in March and remain until late August. Nesting herons are sensitive to disturbance.

Breeding colonies have been found in the interior at elevations up to 1100 m. In the CCBA it is known to breed as far north as west of Quesnel. Breeding sites in the CCBA include Fire Lake, Beaver Valley, Dugan Lake, Chimney Lake, and the Punchezacut and Milburn areas. Non-breeding individuals could occur at low to mid elevations anywhere within the CCBA from spring through fall.

Great Blue Heron, its nests and eggs are protected year-round from direct persecution by the provincial Wildlife Act, as well as the Migratory Birds Convention Act. The nest, whether or not active, is protected under Section 34 of the Wildlife Act. Wildlife Habitat Areas and other known nest sites are “sensitive” information, and are available from MoE upon request.

This is the coastal subspecies (fannini).
62.2 MANAGEMENT DIRECTION

The management direction for the Great Blue Heron is provided by land use plan objectives to maintain biodiversity in general, and by Identified Wildlife (2004).

62.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may interact with Great Blue Heron habitat through the removal of active or potential nest trees, both directly (frequently as hazard trees) and through windthrow resulting from adjacent harvesting. Forest fragmentation may increase access to, or visibility of, breeding colonies for predators, such as Bald Eagles, thereby reducing the amount of suitable breeding habitat available to herons.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Road Layout</td>
<td>Road Construction</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

62.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Great Blue Heron.

Implement the Identified Wildlife (2004) strategy at both the stand and landscape level.

Overall Objective

Retain 100% of nesting occurrences of this blue-listed, but sensitive, species in healthy condition. Each loss of part or all of a nesting occurrence of this species will significantly worsen its conservation status.

Stand Level

Strategies to address known occurrences (nest site) of this species are:
- Obtain from Regional MoE the locations of known nest sites.
- When harvesting is considered in the vicinity (within 500 m) of a known nest site establish a WTP around it and manage according to the Identified Wildlife (2004) strategy for a WHA as modified by the Order for each.

Landscape Level

Strategies to address unrecorded occurrences (nest site) of this species are:
Field crews should watch for large stick nests that may be Great Blue Heron nests.

62.5 REFERENCES AND ADDITIONAL INFORMATION


63. HORNY LARK, MERRILLI SUBSPECIES

63.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Horned Lark, *merrilli* subspecies (*Eremophilia alpestris merrilli*) is a small songbird with a pale brown back, black chest patch, black sides to the head, a yellow streak over the eye, yellow or pale throat, pale underside, and small black ‘horns’ on top of the head. Immatures have pale spots on the back and streaks on the chest; the face pattern is a faint version of the adult pattern. They walk, rather than hop, when on the ground. This subspecies is known as the Dusky Horned Lark.

They primarily feed on insects during the breeding season, with seeds used when available. They primarily forage on the ground. They are sensitive to insecticide spraying, which reduces insect food availability. They nest in grassland, sandy regions, areas with scattered low shrubs, grazed pastures, stubble fields, open cultivated areas, and rarely open areas in forest. Nests in hollow on ground often next to grass tuft or clod of earth or manure. Nesting starts in May, and southward migration starts in September. Breeding territories vary from 0.3 – 3.5 ha, and may depend on food abundance and density. A photograph of a nesting Horned Lark, in its habitat in Bechers Prairie, is on p. 127 of *Birds of BC*.

In the CCBA the species nests in the BG and adjacent IDFxm. The CDC does not have any location data, however *Birds of BC* shows nesting records in along the Fraser and Chilcotin Rivers.

Horned Lark, its nests and eggs are protected year-round from direct persecution by the provincial *Wildlife Act*, as well as the *Migratory Birds Convention Act*.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK BC</th>
<th>RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Chilcotin; Quesnel</td>
<td>GSTU</td>
<td></td>
<td></td>
<td>S3S4B</td>
<td>Blue</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Birds of BC shows one nesting record east of Quesnel.

63.2 MANAGEMENT DIRECTION

The management direction for Horned Lark is provided by CCLUP objectives to manage for species at risk, and to maintain biodiversity in general.

63.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may interact with Horned Lark habitat through road construction disturbing or destroying nests and nesting habitat.

<table>
<thead>
<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
<td>D = Density Management</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Relative Risk of Activities
63.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Horned Lark.

Overall Objective

Retain 70% of nesting occurrences of this blue-listed species in healthy condition. Each loss of part or all of a nesting occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences (nest site) of this species are:
• Obtain from Regional MoE the locations of known nest sites.
• Avoid road construction near a known Horned Lark nesting occurrence, protect the site from disturbance. If necessary, consult a biologist regarding mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences (nest site) of this species are:
• Minimize road construction in dry grassland, sandy regions, areas with scattered low shrubs, and open areas in dry forest.
• The probability of interaction with this species is sufficiently low that the objective can be met without a rare bird inventory of affected dry grassland, sandy regions, areas with scattered low shrubs, and open areas in dry forest in the BG prior to road construction.

63.5 References and Additional Information


64. LARK SPARROW

64.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Lark Sparrow (Chondestes grammacus) is a relatively large sparrow with a long, rounded tail with white corners. It has plain whitish under parts with a large dark spot in the center of the breast, a striking face pattern, chestnut ear patches, chestnut crown stripe divided by central white stripe, black malar stripes, with a white stripe above, a buffy and white stripe above eye, a black line through the eye and a white ring around the eye, the flanks and wingbars are buffy, and there are black stripes on back.

Lark Sparrows breed in dry, open shrub-steppe (BG, IDF), including stands of big sagebrush. Nests are constructed on the ground of grass and forb stems, and are usually concealed under a shrub, forb, or tuft of grass. Lark Sparrows eat insects and seeds.

Lark Sparrow, its nests, and its eggs are protected under the federal Migratory Birds Convention Act and the provincial Wildlife Act. It is not clear if this species nests in the CCBA. Birds of BC indicates that the species is present throughout the area, but does not record breeding north of the Okanagan Valley.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo</td>
<td>G5</td>
<td>G5</td>
<td>S2B</td>
<td>Red</td>
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</tr>
</tbody>
</table>

64.2 MANAGEMENT DIRECTION

The management direction for Lark Sparrow is provided by land use plan objectives to maintain biodiversity in general.

64.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may interact with Lark Sparrow habitat through road construction disturbing or destroying nests and nesting habitat.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Bridge Installation</td>
<td>Bridge Removal</td>
</tr>
<tr>
<td>B = Legal Consequence of Interaction</td>
<td>Falling</td>
<td>Yarding</td>
<td>Skidding</td>
<td>Forwarding</td>
</tr>
<tr>
<td>C = Biological Consequence of Interaction</td>
<td>Loading</td>
<td>Processing</td>
<td>Handling</td>
<td>Site Preparation</td>
</tr>
</tbody>
</table>

| Risk Ranking | 10 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Relative Risk of Activities |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
64.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Lark Sparrow.

Overall Objective

Retain 100% of nesting occurrences of this red-listed species in healthy condition. Each loss of part or all of a nesting occurrence of this species will significantly worsen its conservation status.

Stand Level

Strategies to address known occurrences (nest site) of this species are:

- Obtain from Regional MoE the locations of known nest sites.
- Avoid construction of permanent roads within 500 m of a known Lark Sparrow nesting occurrence, protect the site from disturbance. A shorter distance may be appropriate in some sites, depending on topography and the presence of forest vegetation. If necessary, consult a biologist regarding mitigation measures.
- Avoid machinery use within 500 m during the breeding season (May to July).

Landscape Level

Strategies to address unrecorded occurrences (nest site) of this species are:

- Minimize road construction in dry grassland, sandy regions, areas with scattered low shrubs, and open areas in dry forest.
- If road construction is required and scheduled for the breeding season (May to July), conduct a rare bird inventory of affected dry grassland, sandy regions, areas with scattered low shrubs, and open areas in dry forest in the BG and IDF prior to road construction.

64.5 REFERENCES AND ADDITIONAL INFORMATION


65. LEWIS’S WOODPECKER

65.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Lewis’s Woodpecker (*Melanerpes lewis*) is a medium-size woodpecker with a greenish black head, back, wings, and tail. It has a prominent silvery grey collar and upper breast, a dark red face, and pinkish or salmon red lower breast and belly. The face is a dark red and the breast is grey, shading into rose on the abdomen, flanks, and sides. Young are distinct from adults by having an overall dark and more brownish back, and generally lack extensive grey, red, and pink coloration of adults. In flight, the overall dark appearance, large size, and slow, steady wing beats give it a crow-like appearance. Flight is not undulating like that of most other woodpeckers. The distinctive plumage of Lewis’s Woodpecker easily distinguishes this species from other woodpeckers.

Lewis’s Woodpeckers feed on a wide variety of free-living (i.e., not wood-boring) insects, acorns and other nuts, seed and berries, and wild and agricultural fruit. The same nest cavities are often used in successive years; where cavities had been destroyed or removed between breeding seasons, they often nest nearby. It is important for the habitat to include an open canopy, a brushy understory offering ground cover, dead or downed woody material, available perches, and abundant insects. In the Cariboo-Chilcotin, Lewis’s Woodpecker use wide-spaced large diameter Douglas-fir and Ponderosa pine in the grassland/forest ecotone and mature cottonwood groves. This species tends to be semi-colonial, with up to 3 nests in a single tree. Cooperative behaviour between neighbouring pairs has been observed. Nesting occurs from late May through July.

Lewis’s Woodpecker, its nests, and eggs are protected from direct persecution under the federal *Migratory Birds Convention Act* and the provincial *BC Wildlife Act*. Lewis’s Woodpecker is listed as a species of Special Concern under Schedule 1 of the federal *Species at Risk Act.*, and is Identified Wildlife. In the CCBA this species nests in the BG, IDF, and SBP. The map below includes only the limited number of locations in the CDC database; see Birds of BC for a better overview of nesting occurrence.
The management direction for Lewis’s Woodpecker is provided by land use plan objectives to maintain biodiversity in general and species at risk, and by the Identified Wildlife Management Strategy.

65.3 Forest Management Issues and Risk Assessment

Forest operations interact with this species through loss of critical nesting, security, and foraging habitat features due to road construction, harvesting, hazard tree removal, spacing, thinning, and pest management. Long-term major threats are a potential lack of recruitment and maintenance of old-growth habitat features, particularly large diameter cottonwood and Douglas-fir snags with cavities. Fire suppression has resulted in dense understories in Douglas-fir stands, making them unsuitable habitat.

<table>
<thead>
<tr>
<th>Relative Risk of Activities</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
<th>Vegetation Management</th>
<th>Site Preparation</th>
<th>Processing</th>
<th>Handing</th>
<th>Forwarding</th>
<th>Skidding</th>
<th>Yarding</th>
<th>Falling</th>
<th>Bridge Removal</th>
<th>Bridge Installation</th>
<th>Road Deactivation</th>
<th>Road Maintenance</th>
<th>Road Construction</th>
<th>Harvest Area Layout</th>
<th>Planning Area Layout</th>
<th>Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Risk Ranking</td>
<td>Risk Ranking = A * (B + C)</td>
<td>10</td>
<td>2</td>
<td>2</td>
<td>3</td>
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<td>0</td>
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<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

65.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Lewis’s Woodpecker.

Implement the Identified Wildlife (2004) strategy at both the stand and landscape level.

Overall Objective

Retain 100% of nesting occurrences of this red-listed and nationally Special Concern species in healthy condition. Each loss of part or all of a nesting occurrence of this species will significantly worsen its conservation status.

Stand Level

Strategies to address known occurrences (nest site) of this species are:

- Manage designated WHAs according to the associated Order, or according to Identified Wildlife (2004) if there is no Order.
- When harvesting is considered in the vicinity of a known nest site that is not a WHA, focus a WTP on it and manage according to the Identified Wildlife strategy for a WHA.
Landscape Level

Strategies to address unrecorded occurrences (nest site) of this species are:

- Assess proposed harvest areas within the range of Lewis's Woodpecker (mapped in Identified Wildlife 2004) as potential habitat. A GIS computer analysis should be sufficient to identify stands that are potentially suitable (see Identified Wildlife 2004 for details). Within areas with potential habitat:
  - Maintain a component of medium to large diameter trees, especially decadent deciduous and Douglas-fir, for nesting sites through the forest rotation by including them in wildlife tree patches and other retention areas.
  - Maintain at least 6 standing dead trees per hectare; ideally these should be trees >45 cm dbh. Where this size class is not available, use the largest available on site. The highest practical density of snags is preferred (i.e., considering operability and worker safety). In most situations, snags considered for retention should be included within a safe buffer area (i.e., a WTP).
  - Where possible, use partial cutting similar to Mule Deer Winter Range management strategies.
  - Minimize the use of insecticides, to maintain food abundance.

- Consider prescribed burning (ground-fires) to create semi-open parkland habitats in coniferous habitats to keep regenerating Douglas-fir in check, while also maintaining sufficient grassland understory.

65.5 REFERENCES AND ADDITIONAL INFORMATION

B.C. Ministry of Water, Land and Air Protection. Species Profiles: Lewis’s Woodpecker. Habitat Atlas for Wildlife at Risk, South Okanagan & Lower Similkameen. [Link]


66. LONG-BILLED CURLEW

66.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Long-billed Curlew (*Numenius americanus*) is a large, long-legged shorebird found primarily in grassland habitats during the breeding season. They have mottled, light brown plumage, a buff-coloured breast, and cinnamon underwing linings. The upperparts are streaked and barred with dark brown. The bill is long and curves downwards, reaching a length of up to 20 cm in females and 14 cm in males. The somewhat similar Whimbrel is smaller with a much shorter bill, lacks buffy-cinnamon colour, and does not breed in the CCBA.

Non-breeding birds are widely distributed through the south-central Interior, north to the Nechako Lowland. Breeding areas include Lillooet to north of Quesnel (Chubb Lake), the Chilcotin west to Alexis Creek, and the Thompson-Nicola. They nest in dry, open grasslands with low profile vegetation. They need large contiguous openings of grassland and prefer areas that are gently sloping. Both male and female Long-billed Curlews show strong site fidelity, returning each year to previous nesting territories.

Long-billed Curlews eat ground-dwelling invertebrates such as ground beetles, grasshoppers, earthworms, caterpillars and spiders. The nest is shallow depression in ground and can be lined with various materials including small pebbles, bark, livestock droppings, grass, small stems, twigs, and seeds. They are sensitive to disturbance during the breeding season (April to July).

The breeding range in the CCBA is in the BG and IDF along the Fraser River north to Chubb Lake, and the Chilcotin Valley west to Alexis Creek, perhaps to Redstone or even Chilanko Forks. The highest densities are around Dog Creek, Alkali Lake, Riske Creek, Hanceville and Alexis Creek. Only the few nesting records that the CDC has are mapped; see Birds of BC for a more complete map.

The Long-billed Curlew, its nests, and eggs are protected from direct persecution under the federal *Migratory Birds Convention Act* and provincially under the *BC Wildlife Act*. The Long-billed Curlew is listed as a species of Special Concern under Schedule 1 of the federal *Species at Risk Act*.
66.2 MANAGEMENT DIRECTION

The management direction for Long-billed Curlew is provided by land use plan objectives to maintain biodiversity in general and species at risk, and by the Identified Wildlife Management Strategy.

66.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may interact with Long-billed Curlew habitat through forest encroachment due to fire suppression, noxious weeds, road construction and disturbance. Harvesting at the edge of a grassland may also disturb the nest site.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Road Layout</td>
<td>Road Construction</td>
</tr>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
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<td>8</td>
<td>2</td>
<td>2</td>
<td>2</td>
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</tr>
</tbody>
</table>

66.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the Long-billed Curlew.

Implement the Identified Wildlife (2004) strategy at both the stand and landscape level.

**Overall Objective**

Retain ≥ 80% of nesting occurrences of this blue-listed and nationally Special Concern species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

**Stand Level**

Strategies to address known occurrences (nest site) of this species are:

- Manage designated WHAs according to the associated Order, or according to Identified Wildlife (2004) if there is no Order.
- Avoid constructing permanent roads within 500 m of a known nest site.
- When road construction, significant road use (for log hauling, etc. – occasional vehicles should not be a significant disturbance), or harvesting is considered in the vicinity of a known nest site that is not a WHA, focus a WTP on it and manage according to the Identified Wildlife strategy for a WHA.
- Management of nest sites does not apply to roads that are already heavily travelled (main haul roads,
public highways, etc.) because in that case the Curlews have accepted the disturbance level.

**Landscape Level**

Strategies to address unrecorded occurrences (nest site) of this species are:

- Minimize road construction through grasslands.
- The probability of interaction with this species is sufficiently low that the objective can be met without a rare bird inventory of affected grasslands in the BG and IDF prior to road construction.

### 66.5 REFERENCES AND ADDITIONAL INFORMATION


[http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr%5Flong%5Fbilled%5Fcurlew%5Fe%2Epdf](http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr%5Flong%5Fbilled%5Fcurlew%5Fe%2Epdf)


67. OLIVE-SIDED FLYCATCHER

67.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Olive-sided Flycatcher (Contopus cooperi) is a relatively large flycatcher. It is large-headed, with a proportionately short tail. Plumage is brownish-olive above (browner on juveniles) with a dull white to yellowish throat, breast, and belly. Dark patches on either side of white breast and belly are distinctive. A white tuft above the wing along side the rump is also distinctive, but not always visible. The male will generally sing from the top of an upright dead snag or living tree. The song recalls the mnemonic "quick-three-beers". The similar Western Wood-pewee is smaller, has different plumage, has a proportionately smaller head and bill, and different vocalization.

They breed in forest and woodland, especially in burned-over areas with standing dead trees, in taiga, subalpine coniferous forest and mixed coniferous-deciduous forest, along the forested edges of beaver ponds and rivers, and on the edge of cutblocks. Birds also use small mountaintop ponds. Forests surrounding these sites are usually coniferous or mixed with deciduous trees. The nest is a loosely formed cup of twigs and grasses, sometimes comprised of lichens and lined with finer plant materials and hair. Nests are placed most often in conifers, on horizontal limbs from two to 15 m from the ground. They are usually territorial in nonbreeding areas and display strong year-to-year site fidelity on the breeding and wintering grounds. The breeding season is May to July.

They forage primarily by hovering or sallying forth from a high, exposed perch atop a tree or snag, attacking prey in flight. The diet is made up almost entirely of flying insects, and this bird has a special fondness for wild honeybees and other Hymenoptera. Other insects include beetles, flies, true bugs, grasshoppers, moths, and dragonflies.

The Olive-sided Flycatcher is protected, in that it cannot be killed, collected or held in captivity without special permits, under the provincial Wildlife Act. The Olive-sided flycatcher occurs in the summer throughout the lower and mid-elevation areas of the CCBA.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Chilcotin; Quesnel</td>
<td>G4</td>
<td>S4B</td>
<td>Yellow</td>
<td>T (Nov 2007)</td>
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</tbody>
</table>

67.2 MANAGEMENT DIRECTION

The management direction for the Olive-sided Flycatcher is provided through land use plan direction to maintain biodiversity in general.

67.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

The forest management issue for the Olive-sided Flycatcher is maintenance of dead and dying trees on the landscape; such trees are removed from harvest areas, and also are removed adjacent to operational areas due to being hazard trees.
### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Layout</td>
<td>Road</td>
<td>Road Construction</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### 67.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the Olive-sided Flycatcher.

**Overall Objective**

Retain 100% of occurrences of suitable nesting habitat of this nationally Threatened species in healthy condition. Each loss of suitable nesting habitat for this species will incrementally worsen its conservation status.

**Stand Level**

Strategies to address known occurrences (nest site) of this species are:
- Establish a 500 m radius management zone (78 ha) around the nest site.\(^{11}\)
  - Establish a large (≥ 5 ha) WTP around the nest site, sized and shaped to maximize the amount of old (preferred) and mature forest included in the WTP.
  - Harvest in the remaining area of the management zone using patch or very small clearcuts to maintain a high component of snags, older trees, and small openings throughout the area.
  - Avoid constructing new permanent roads within the management zone.
  - Avoid disturbance during the breeding season.

**Landscape Level**

Strategies to address unrecorded occurrences (nest site) of this species are:
- Retain snags, older trees, and small openings where possible.
- When salvaging windthrow, insect damaged, or fire damaged trees, include some damaged but standing trees in retention areas.
- This species is so rare, and its potential occurrence encompasses so many habitats, that it is not feasible to consider inventory of most forest prior to road construction and harvesting.

These strategies will probably not be sufficient to meet the objectives; government land-use planning is required to achieve them.

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\(^{11}\) There is no guidance for management of nest sites of this species; hence this has been developed as being a reasonable management strategy for nest sites based on the biology of the bird. It is possible that other forest licensees will not honour the management zone.
67.5 REFERENCES AND ADDITIONAL INFORMATION


68. OSPREY

68.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Osprey (*Pandion haliaetus*) is a large diurnal raptor with long narrow wings, dark brown upperparts, white underparts, a white head with a prominent dark eye streak, and dark wrist patches (visible in flight) on the underside of the wings; immatures have pale buff edging on the dark feathers of the upper surface; females are more likely than males to have a necklace of dark streaking.

Ospreys typically build large stick nests both on living and dead trees, but also will use numerous man-made structures including telephone poles, wharf pilings, windmills, microwave towers, chimneys, and channel markers. Breeding occurs March to August. They almost exclusively eat fish (usually live) caught by a feet-first plunge into shallow water, usually by flight hunting, sometimes from a perch. Species composition of their diet may vary greatly from one area to another. They sometimes eat rodents, birds, other small vertebrates, or crustaceans.

The Osprey is protected, in that it cannot be killed, collected or held in captivity without special permits, under the provincial *Wildlife Act*. They occur throughout the CCBA.

![Photo © Crispin Guppy](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Central Cariboo; Chilcotin; Quesnel</td>
<td>G5</td>
<td>S5B</td>
<td>Yellow</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

68.2 MANAGEMENT DIRECTION

The management direction for the Osprey is provided through land use plan objectives to maintain biodiversity in general, and the *Best Management Practices for Raptors*. 
68.3 Forest Management Issues and Risk Assessment

The forest management issues for the Osprey are disturbance during nesting, and loss of existing and future large trees used for nesting due to removal during road construction, harvesting, and silviculture. Removal of high quality nest trees frequently occurs because they are hazard trees.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
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</tr>
</tbody>
</table>

68.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Osprey.

Overall Objective

Retain 100% of nesting sites of this species in healthy condition. There is a legal requirement (Wildlife Act) to not destroy an Osprey nest. There is an ethical obligation to take reasonable measures to ensure that the nest is managed so that it can continue to be used – protected from windthrow and high disturbance.

Stand Level

Strategies to address known occurrences (nest site) of this species are:
- Preserve all trees used by raptors as nesting sites, including presently unoccupied trees that have been used in the past.
- Maintain any trees that eagles regularly use for roosting, perching or feeding.
- Maintain a 200 m no-harvest and no-road reserve around Osprey nest trees; maintain an additional 100 m free of loud noises and other human disturbances around occupied nests (in the period February through August).
- Locate new roads away from Osprey nesting, roosting and foraging areas.
- Use integrated pest/weed management and avoid use of chemical pesticides.

Landscape Level

Strategies to address unrecorded occurrences (nest site) of this species are:
- Maintain existing and potential nest sites (large veteran trees), especially those within 200 m of a lake or S1 or S2 river, to serve as nest sites and perching sites.

68.5 References and Additional Information


69. PEREGRINE FALCON, ANATUM SUBSPECIES

69.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Peregrine Falcon, *anatum* subspecies (*Falco peregrinus anatum*) is a medium to large falcon with long pointed wings, a dark crown and nape, and a dark wedge extending below the eye. Adults have bluish-grey upperparts and a characteristic blackish facial stripe forming a “moustache”. This stripe is usually contrasted by pale “cheeks”. The underparts are paler (whitish, grayish, or buffy) with variable amount of dark spotting and barring. Prairie Falcons are slightly smaller and lighter in colour, and have smaller facial markings, when in flight has a contrasting dark center of the under wing (broadest in axillaries), and a less deep, less fluid, and more stiff wing-beat.

Peregrine Falcons prefer extensive open areas such as grasslands and sagebrush steppe habitat, with an abundant prey base and suitable cliffs for nesting. It typically nests on rock cliffs above lakes or river valleys. The Central Interior populations are typically associated with wetland habitats, which have abundant prey. Traditionally nest on cliffs ranging from about 8 to 400 m high. The Prairie Falcons demonstrate a high degree of site fidelity at breeding areas and are often known to reuse the same site for several successive seasons and possibly for several generations. An overhang over the nest is required, and nests are almost always on rocky substrates, rarely on earthen banks. The nest consists of a bowl scraped in the substrate.

Peregrine Falcon’s main prey are shorebirds, waterfowl, pigeons and songbirds, although bats, rodents and insects are also captured. Most prey items are captured in flight, but may also scooped from the surface of water or ground. As a consequence, this species requires an ample supply of suitable prey species in areas that permit aerial hunting.

Peregrine Falcon breeds locally along the Fraser and Chilcotin rivers in the CCBA (BG, IDF, MS, and SBS). This is a sensitive species for which the location of known nest sites will only be released by MoE with special conditions, to minimize the risk of nest poaching. The Peregrine Falcon, its nests, and eggs are protected from direct persecution under the *BC Wildlife Act*. and the national *Migratory Birds Convention Act*. It is listed as Threatened under Schedule 1 of the federal *Species at Risk Act* and is protected under the *Convention on International Trade in Endangered Species* (CITES), which restricts the import and trade of birds or eggs in signatory countries.

![Photo © John Cooper](image)
Species of Management Concern BCTS Cariboo Region

Known BGC Unit

<table>
<thead>
<tr>
<th>Forest District</th>
<th>Global Rank</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
<th>COSEWIC</th>
<th>SARA Schedule</th>
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<tbody>
<tr>
<td>Central Cariboo; Chilcotin; Quesnel</td>
<td>G4T4</td>
<td>S2B</td>
<td>Red</td>
<td></td>
<td></td>
<td>SC (Apr 2007)</td>
</tr>
</tbody>
</table>

* Not listed as occurring in Quesnel FD by CDC, but the Birds of BC shows non-breeding records.

69.2 Management Direction

The management direction for the Peregrine Falcon is provided by land use plan objectives to maintain species at risk and biodiversity in general.

69.3 Forest Management Issues and Risk Assessment

Peregrine Falcons may be disturbed during nesting by heavy machinery operating near their nest site.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planning Road Area Layout Road Construction Road Maintenance Road Deactivation Bridge Installation Bridge Removal Falling Yarding Skidding Forwarding Loading Processing Handling Site Preparation Planning Vegetation Management Density Management</td>
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<tr>
<td>A = Probability of Interaction B = Legal Consequence C = Biological Consequence of Interaction BGD = Biological Consequence of Disruption</td>
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<td>10</td>
<td>2</td>
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</tbody>
</table>

69.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the Peregrine Falcon.

Overall Objective

Retain 100% of nesting occurrences of this red-listed and nationally Special Concern species in healthy condition. Each loss of part or all of a nesting occurrence of this species will significantly worsen its conservation status.

Stand Level

Strategies to address known occurrences (nest site) of this species are:
- Maintain a 200 m zone out from the base of the nest cliff, free of loud noises and other human disturbances during the breeding season (May through July).
- Locate permanent new roads at least 200 m from the cliff base.

Landscape Level

Strategies to address unrecorded occurrences (nest site) of this species are:
- Obtain the location of known Peregrine Falcon nest sites from MoE.
69.5 REFERENCES AND ADDITIONAL INFORMATION


Species of Management Concern BCTS Cariboo Region

70. PRAIRIE FALCON

70.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Prairie Falcon (*Falco mexicanus*) a pale brown, medium-sized falcon. It has pointed wings, a hooked bill, and conspicuous dark patches near the body on the underside of the wings when flying. It is whitish with heavy spotting below, and the face has a narrow dark streak extending downward from each eye. When perched, the wing-tips fall short of the tail-tip. The most common vocalization is an alarm or territorial call, described as a shrill yelping “kik-kik-kik”. The call is given mainly when one or both members of a pair aggressively confront an intruder on the breeding territory. The Prairie Falcon is distinguished from other falcons when in flight by dark, triangular patches on the inner core of the pale wings. The Peregrine Falcon is darker, has a thicker moustache mark, and a uniformly dark underwing pattern. The Merlin is smaller and has a faint moustache mark, uniform underwing, and distinct tail-bands.

The Prairie Falcon's diet is highly variable in terms of species captured, but consists mainly of small mammal and small- to medium-sized birds. If these prey items are temporarily unavailable, the Prairie falcon may capture reptiles and insects. In the Cariboo-Chilcotin, 90% of the Prairie falcon’s prey is Yellow-pine Chipmunks. In the CCBA, the Prairie Falcon inhabits valleys and river canyons with steep escarpments or rock-faces. These sites are usually near open grasslands or sagebrush steppes which are used for hunting. Most breeding sites are near water, and eyries are normally shaded and protected from inclement weather by rocky overhangs. This includes ledges, caves, crevices or potholes. Nests typically are placed on south-facing aspects, with overhangs offering some protection from solar radiation. In surveys conducted in the Cariboo-Chilcotin Region, Prairie Falcons nested on basalt rims and cliffs of glacial till. Nesting birds are sensitive to disturbance; hence active nests need to be protected from disturbance. Nest sites are repeatedly re-used.

The location of known nest sites will only be released by Regional MoE (Williams Lake) with special conditions, to minimize the risk of nest poaching. The Prairie Falcon, its nests, and its eggs are protected under the federal *Migratory Birds Convention Act* and the provincial *Wildlife Act*.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Chilcotin</td>
<td>G5</td>
<td>S2B</td>
<td>Red</td>
<td>Jun 2006 NAR (May 1996)</td>
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</tr>
</tbody>
</table>

70.2 MANAGEMENT DIRECTION

The management direction for the Prairie Falcon is provided by land use plan objectives to maintain species at risk and biodiversity in general, and by the Identified Wildlife Management Strategy (2004).

70.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Prairie Falcons may be disturbed during nesting by heavy machinery operating near their nest site.
### Total Risk Ranking

Risk Ranking = A * (B + C)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
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<tbody>
<tr>
<td>10</td>
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</table>

### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Planning &amp; Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Road Construction</td>
<td>Road Felling</td>
<td>Site Preparation</td>
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<tr>
<td>Road Layout</td>
<td>Road Maintenance</td>
<td>Road Yarding</td>
<td>Planting</td>
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<tr>
<td>Road Construction</td>
<td>Road Deactivation</td>
<td>Road Forwarding</td>
<td>Vegetation Management</td>
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<tr>
<td>Bridge Installation</td>
<td>Bridge Removal</td>
<td>Road Loading</td>
<td>Density Management</td>
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<td>Falling</td>
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### Risk Ranking

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<tr>
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<th>Harvesting</th>
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<tbody>
<tr>
<td>Planning</td>
<td>Road Construction</td>
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<td>Site Preparation</td>
</tr>
<tr>
<td>Road Layout</td>
<td>Road Maintenance</td>
<td>Road Yarding</td>
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<td>Site Preparation</td>
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</table>

#### 70.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Prairie Falcon.

Implement the Identified Wildlife (2004) strategy at both the stand and landscape level.

**Overall Objective**

Retain 100% of nesting occurrences of this red-listed species in healthy condition. Each loss of part or all of a nesting occurrence of this species will significantly worsen its conservation status.

**Stand Level**

Strategies to address known occurrences (nest site) of this species are:

- When considering operations near a known (past or present) Prairie Falcon nest site, manage the site as a WHA, whether or not it has been designated as a WHA.

**Landscape Level**

Strategies to address unrecorded occurrences (nest site) of this species are:

- None.

#### 70.5 REFERENCES AND ADDITIONAL INFORMATION


71. RUSTY BLACKBIRD

71.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Rusty Blackbird (*Euphagus carolinus*) is a medium-sized passerine. The wings appear long, narrow, and pointed, while the tail is nearly as long as the wing and is slightly rounded. During the breeding season, adult males are uniformly black, with the body reflecting a blue-green to greenish gloss and a violet gloss on the head and neck. Breeding adult females are slate grey, darker above with a bluish green gloss. Both sexes have pale yellow eyes and a black, slightly curved bill. In winter, the plumage of both sexes is more rust-coloured. Immature birds resemble adults except that the rusty and light brown tracks are wider, giving a browner appearance overall. Immatures also have brown irises until fall. Vocalization of the male resembles rusty hinges and is often considered “far from musical”. The similar Brewer’s Blackbird male has a more apparent purplish gloss on the head, and its bill is thicker at the base and straighter. In the fall male Brewer’s Blackbird can have some rust-coloured feather edgings. Female Brewer’s Blackbirds are grey-brown (not slate grey) and have dark eyes.

Rusty Blackbird feeds opportunistically year-round on both plant and animal matter. In the summer, this species diet is primarily aquatic insects and other animal. It feeds mostly on the ground, particularly along edges of ponds, streams, wetlands, open pasture, agricultural fields, and feedlots. The breeding habitat of Rusty Blackbird is strongly linked to the boreal forest, usually nesting in or adjacent to wetlands. They prefer moist woodland (primarily coniferous), bushy bogs, wooded edges of water courses, swamps, beaver ponds and pasture edges. Nests are built almost always close to water, in living and dead trees and shrubs, 0.5–6 m above the ground, or sometimes directly over water. It often nests against the trunk of a tree, usually amid thick layers of small branches. The nests are substantial and bulky. The outer cup is constructed with twigs and dried grasses. The inner cup, a bowl 5–6 cm deep and 8.5–9.5 cm across is formed out of wet, rotting vegetation. It is pressed into the surrounding stick framework and hardens when dry. The bowl is then lined with green leaves of grass, dried grass, and plant fibres.

The breeding season is March to July. During the breeding season, the Rusty Blackbird can be found throughout the CCBA. The CDC had a database error preventing the listing of the species for the CCBA until the error was brought to their attention during this project.

Rusty Blackbird, its nests, and eggs are not protected against direct persecution and harassment under the federal *Migratory Birds Convention Act*.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
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</thead>
<tbody>
<tr>
<td>Central Cariboo; Chilcotin; Quesnel</td>
<td>G4</td>
<td>S3S4B</td>
<td>Blue</td>
<td>SC (Apr 2006)</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

71.2 MANAGEMENT DIRECTION

The management direction for the Rusty Blackbird is provided by CCLUP objectives to maintain species at risk and biodiversity in general.

71.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations impact Rusty Blackbird by harvesting mature and old forest adjacent to or near wetlands.
### 71.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Rusty Blackbird.

#### Overall Objective

Retain ≥ 80% of nesting habitat of this blue-listed and nationally Special Concern species in healthy condition. Each loss of suitable nesting habitat for this species will incrementally worsen its conservation status.

#### Stand Level

Strategies to address known occurrences (nest site) of this species are:
- Do not harm or disturb the nest during the nesting season, in the year in which the nest site was found. Nests and nest sites are apparently not re-used in successive years.

#### Landscape Level

Strategies to address unrecorded occurrences (nest site) of this species are:
- Minimize the loss of mature and old forest suitable as nesting habitat, adjacent to wetlands. Maintain as much mature and old forest adjacent to wetlands as possible, not just the minimum relatively low-value 10 m reserve zone.

### 71.5 References and Additional Information


72. SANDHILL CRANE

72.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Sandhill Crane (Grus canadensis) is a very large bird with overall grey coloration (often stained with rusty coloration), with dull red skin on the crown and lores, whitish chin, cheek and upper throat, and black primaries. Young are more brownish and without a bare forehead patch. They have clumps of feathers that droop over the rump; they fly with neck and legs fully extended.

They feed in open non-forested grassy areas such as wetlands, stream and lake margins, and clearcuts. They primarily eat invertebrates (insects, etc.) and plant material, with small mammals and birds sometimes eaten. Grain crops may be consumed by large flocks of migrating Sandhill Cranes. Most breeding and non-breeding birds arrive in the area in late-April and migrate southward in mid- to late-September. Nest sites may be consistently used for many years, and are typically located in isolated sedge wetlands >1 ha in size, free from disturbance, and surrounded by forest; forested buffers are critical for relatively small wetlands. Forests are used for escape cover by young and provide a buffer against disturbance. Clearcuts are generally not suitable nesting habitat alternatives to wetlands, although they are occasionally used. In a survey in the Cariboo-Chilcotin, 13 of 15 breeding sites were sedge-dominated wetlands surrounded by coniferous forest. A nesting occurrence is likely to have been found when Sandhill Cranes remain in the area when disturbed. They may or may not fly up; if they fly up, they circle back and land again. They generally scream at the intruder, behave in an agitated manner; and may run on the ground to take cover in adjacent forest. In contrast, Sandhill Cranes disturbed away from nesting sites simply fly away, with or without calling.

The Sandhill Crane is protected, in that it cannot be killed, collected or held in captivity without special permits, under the federal Migratory Birds Convention Act and the provincial BC Wildlife Act. In the CCBA nesting is widespread, and occurs in the BG, ICH, IDF, MS, SBPS, and SBS. The relative lack of nesting records in the Quesnel FD is probably due to a lack of survey effort, not a lack of nesting.
72.2 MANAGEMENT DIRECTION

The management direction for the Sandhill Crane is provided by land use plan objectives to maintain species at risk and biodiversity in general, and by the Identified Wildlife Management Strategy.

72.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

The forest management issue for the Sandhill Crane is the disturbance of nest sites. This may occur through directly increased disturbance, or harvesting that opens a wetland up to disturbance, which causes the cranes to abandon the site. The risk is especially significant for small wetlands that do not have a riparian reserve zone, or where there is no retention in the riparian management zone adjacent to a reserve zone.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesing</th>
<th>Silviculture</th>
<th>Density Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking</td>
<td>Planning</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
<td>Bridge Instalation</td>
</tr>
<tr>
<td>A = Probability of Interaction</td>
<td>Harvest Area Layout</td>
<td>Road Layout</td>
<td>Bridge</td>
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<tr>
<td>B = Legal Consequence</td>
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<td>C = Biological Consequence of Interaction</td>
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<td>Relative Risk of Activities</td>
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</tbody>
</table>

72.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the Sandhill Crane.

Overall Objective

Retain 70% of nesting occurrences of this blue-listed species in healthy condition. Each loss of part or all of a nesting occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences (nest site) of this species are:

- Manage WHAs by following the Identified Wildlife Management Strategy, and the Order once issued.
- Where a Sandhill Crane nest site is identified and no WHA has been established
  - Establish a 50+ m management zone around the wetland.
  - If a topographic break or other logical feature is 40+ m from the wetland, consider establishing the boundary at the break, rather than exactly at 50 m.
  - Maintain ≥ 40% of the mature trees (live + dead, all species) within the management zone, through single tree and/or group selection harvest (not clearcut).
  - Where < 40% of the mature trees are alive, leave < 40% of trees if removal of additional dead trees can be done without removing additional live trees.
  - Keep roads as far away as possible.
  - Do not operate machinery within 200 m of the site April 1 to August 15.
Landscape Level
Strategies to address unrecorded occurrences (nest site) of this species are:

- Where planning and harvest timing permits, open wetlands (dominated by sedges or grasses, not shrubs or trees) within or adjacent to proposed blocks should be examined for the presence of nesting Sandhill Cranes (see species summary section) in the breeding season (1 April to 15 August), preferably in June or July (the peak nesting period).

72.5 REFERENCES AND ADDITIONAL INFORMATION


73. SHARP-TAILED GROUSE, COLUMBIANUS SUBSPECIES

73.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Sharp-tailed Grouse, *columbianus* subspecies (*Tympanuchus phasianellus columbianus*) is a medium-sized grouse. It is overall cryptically coloured, the breast is white with several V-shaped brown markings, and the head, neck, and back are heavily barred dark brown, black, and buff. The tail is wedge-shaped, with the two middle tail feathers extending past other tail features. During display, the male exposes and inflates a pinkish to pale violet air sac on each side of neck. It is the only grouse in the CCBA with a crescent-shaped, yellowish orange comb (eyebrow) over eyes.

Sharp-tailed Grouse eat forbs, grasses, and insects in the spring and summer. In the fall, berries become more important although green leaves are eaten until freeze up. Insects, chiefly grasshoppers, are a minor food item in fall. Sharp-tailed Grouse begin to eat leaves and twigs of deciduous trees with the approach of winter. In winter, they feed primarily on buds and catkins of deciduous trees and shrubs; of lesser importance are fruits and berries. Breeding males congregate at specific areas (leks) to display and attract females – the male calls can be heard up to 1.5 km away. Leks are traditional and may be used for many years if habitat remains unchanged and disturbance by humans is not too great. Males may tolerate most disturbances but females avoid disturbed leks. Openness (grasslands, clearcuts) is an important requirement of a lek because it enables the detection of predators and in attracting other grouse to the lek by seeing and/or hearing displaying males. Leks are often located on ridge tops or elevated ground but not necessarily the highest ground available. Seclusion is an important attribute of successful leks. Established leks may be used for many years, although their exact location may shift over time. Nests have been detected 50-1,600 meters from leks, with 75% located within 1 kilometre of lek sites. Cover (grass clumps, shrubs) to conceal nests is crucial. Extensive areas of nesting habitat are necessary to prevent nest predators concentrating their searches.

Subspecies *columbiensis* of the Sharp-tailed Grouse now occupies < 10% of its original North American range. It is provincially blue-listed and is Identified Wildlife. Within the CCBA, the Sharp-tailed Grouse occurs in all three Forest Districts (BG, IDF, SBS, SBPS). The Sharp-tailed Grouse, its nests, and eggs are protected from direct persecution under the BC Wildlife Act.
73.2 **Management Direction**

The management direction for the Sharp-tailed Grouse is provided by land use plan objectives to maintain species at risk and biodiversity in general, and Identified Wildlife Management Strategy (2004).

73.3 **Forest Management Issues and Risk Assessment**

Forest operations can adversely impact Sharp-tailed Grouse, primarily through silvicultural impacts on established lek sites and the associated nest sites that are within 1 km. Disc trenching may degrade lek sites and may impede movement of chicks, making it difficult for them to forage and increasing their vulnerability to predation in the first few days after leaving the nest. Vegetation management may remove deciduous species such as willow, aspen, and birch that are winter food sources. Use of insecticides (including Btk for budworm control) reduces the number of insects available to chicks during critical early stages of life. Planting treeless sites can reduce the openness required for lek sites – legal requirements for re-stocking may limit the ability to not plant. Road construction near leks may increase disturbance and increase road mortality.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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<tbody>
<tr>
<td>Risk Ranking</td>
<td>Planning</td>
<td>Road Construction</td>
<td>Bridge Removal</td>
<td>Harvesting</td>
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<tr>
<td>A = Probability of Interaction</td>
<td>Road Area Layout</td>
<td>Road Maintenance</td>
<td>Falling</td>
<td>Site Preparation</td>
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<td>B = Legal Consequence of Interaction</td>
<td>Road Deactivation</td>
<td>Road Installation</td>
<td>Yarding</td>
<td>Planting</td>
</tr>
<tr>
<td>C = Biological Consequence of Interaction</td>
<td>Bridges</td>
<td>Bridge Removal</td>
<td>Slugging</td>
<td>Vegetation Management</td>
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<td>Falling</td>
<td>Forwarding</td>
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<td>Handing</td>
<td>Site Preparation</td>
<td>Vegetation Management</td>
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<td>Density Management</td>
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</tbody>
</table>

73.4 **Management Strategy**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Sharp-tailed Grouse.

**Overall Objective**

Retain 70% of leks and associated nesting occurrences of this blue-listed species in healthy condition. Each loss of part or all of a nesting occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences (lek site) of this species are:

- Obtain the locations of known lek sites from Regional MoE.
- Manage WHAs by following the Identified Wildlife Management Strategy, and the associated Order.
- Where a lek site in *native* grassland is identified and no WHA has been established, establish a 1.5
km management zone around the site, and manage as a WHA.

- Minimize disturbance during April and May; permanently deactivate or rehabilitate roads after use. Close roads passing within 100 m of an active lek during April and May.
- Prohibit access to leks between 1 April and 31 May when females are present for breeding.
- Maintain deciduous shrub and tree components in riparian areas within the management zone.
- Avoid deep trenching (>20 cm) and other mechanical site preparations that result in depressions and loss of deciduous species within the management zone.
- Minimize use of pesticides within the management zone.

- Where a lek site in a clearcut is identified, manage so as to minimize disturbance (as above) but full WHA management is not required.

**Landscape Level**

Strategies to address unrecorded occurrences (lek site) of this species are:

- Where planning and harvest timing permits, *native* grasslands within or adjacent to proposed operations (harvesting, road construction or silviculture) should be examined for the presence of Sharp-tailed Grouse leks (see species summary section) in the “lekking” season (1 April to 31 May). Normal forestry field crews should be able to do this, because of the obvious nature of the displays.

### 73.5 REFERENCES AND ADDITIONAL INFORMATION


74. SHORT-EARED OWL

74.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Short-eared Owl (*Asio flammeus*) is a medium-sized owl with the back and upper wing surfaces tawny brown to buff-coloured with heavy but indistinct streaking. The ventral surfaces are much lighter, with bold, vertical brown streaking on the breast, and a pair of barely visible "ear" tufts close together at the top of the facial disk; belly is pale, lightly streaked; wings are long and have a buffy patch beyond the wrist above and a dark patch at the base of the primaries below. The facial disc is circular and whitish with dark areas around the bright yellow eyes. The owl gets its common name from the small ear-tufts over the eyes. These tufts are part of the facial disc and are erected when the bird is annoyed or alert. Its flight is moth-like, with erratic wing beats, typically carrying it low over the ground. When perched, it sits slantwise, rather than vertical, as do most other owls of its size. They are generally silent except during courtship. Males produce a low, repeated, hooting: "voo, hoo, hoo, hoo," together with "yaps" or "barks".

Short-eared Owls mostly prey on small rodents, which undergo regular population cycles. When populations of small rodents crash in one area, Short-eared Owl populations must move to find a new prey supply. They also regularly capture other small mammals, small birds, and insects. Short-eared Owl requires broad expanses of open land with low vegetation for nesting. It is always associated with open country supporting cyclic small mammals and habitat types frequented include freshwater marshes, bogs, dunes, prairies, grassy plains, old fields, river valleys, meadows, savanna, open woodland, and heathland. This bird will also nest in agricultural areas. In general, any area that is large enough, has low vegetation with some dry upland for nesting, and that supports suitable prey may be considered potential breeding habitat. Unlike many owls that nest in holes, Short-eared Owl builds a nest on the ground. The female makes a small scrape in the ground with her body and lines it with nearby material. Nests may be lined with grass, leaves, twigs or feathers. Many nests are near water but generally are on dry sites. Roosts may be used year after year, but nest site fidelity is not strong. The nesting cycle from nest initiation to fledging of young is mid-March to mid-September. They migrate south in the fall and spend the winter in southern BC and further south. Nesting is only known to occur in southern BC, north to Prince George in the Interior. In the CCBA nesting may occur in the BG, IDF, SBS, and SBPS.

The Short-eared Owl, its nests, and its eggs are protected from direct persecution in British Columbia under the provincial *Wildlife Act* and the federal *Migratory Birds Convention Act*.

Photo © Fred Lang

A higher resolution version of this image is needed; it is not on E-Fauna
74.2 MANAGEMENT DIRECTION

The management direction for the Short-eared Owl is provided by land use plan objectives to maintain species at risk and biodiversity in general, and by Identified Wildlife Management Strategy (2004).

74.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect Short-eared Owl habitat if roads run through traditional communal (>8 owls) roosting sites or traditional nest areas, by creating excessive disturbance or increase vehicle mortality.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence</td>
<td>C = Biological Consequence</td>
<td>D = Planning</td>
<td>E = Road Layout</td>
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</tbody>
</table>

74.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the Short-eared Owl.

Implement the Identified Wildlife (2004) strategy at both the stand and landscape level.

Overall Objective

Retain 80% of traditional communal (>8 owls) roosting sites or traditional nest areas of this blue-listed and nationally Special Concern species in healthy condition. Each loss of part or all of a nesting occurrence of this species will incrementally worsen its conservation status.

Stand Level

Strategies to address known occurrences (communal nesting or roosting site) of this species are:

- Obtain the locations of known communal nesting or roosting sites from Regional MoE.
- Manage WHAs by following the Identified Wildlife Management Strategy, and the associated Order.
- When road construction or road use (for log hauling, etc. – occasional vehicles will not be a significant disturbance) is considered in the vicinity of a known communal nesting or roosting site that is not a WHA, establish a management zone around it and manage according to the Identified Wildlife strategy for a WHA.
  - This does not apply to roads that are already heavily travelled – main haul roads, public highways, etc.

Landscape Level

Strategies to address unrecorded occurrences (communal nesting or roosting site) of this species are:

- This species will so rarely interact with forest operations, that it is not reasonable to consider inventory of non-forested areas of suitable habitat prior to road construction.
74.5 REFERENCES AND ADDITIONAL INFORMATION


75. UPLAND SANDPIPER

75.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Upland Sandpiper (*Bartramia longicauda*) is a medium-sized sandpiper of open grasslands, and is the most terrestrial of North American shorebirds. Breeding adults are overall scaly-brown in appearance. They possess a small, dovelike head combined with narrow neck of medium length, a short, yellowish bill, and medium-length, yellowish legs. The overall effect is a lanky, slightly ungainly appearance. The upper neck is buff-streaked brown with sharply defined V-shaped markings becoming more barred on the lower breast and flanks. The throat and abdomen are white. The eye is large with a dark iris. The tail feathers are barred, dark brown, tipped with white. In flight, the dark outer wing contrasts with a paler inner wing. Juveniles resemble adults, but the upperparts are darker and scalier with the buffy color of the neck, breast and wings much deeper and the streaks of the forehead and breast less distinct. The unique vocalizations include a rapid, liquid "quip-ip-ip-ip" series of alarm notes and a penetrating "whip-whee-ee-you" windy whistle. This call has also been described as a "wolf whistle" call.

They feed almost solely on insects. It specializes on capturing grasshoppers and crickets but will also eat weevils and other small, ground-dwelling invertebrates. It has been known to eat seeds from various weeds, grasses, and waste grain. Breeding sites are primarily restricted to extensive, open tracts of short grassland. They nest in native prairie, dry meadows, dry patches of wet meadows, pastures, domestic hayfields, short-grass savanna, plowed fields, airfields, peatlands, and scattered woodlands near timberline. Nesting starts in mid-April. The nest is a shallow depression in the ground approximately 10-13 cm in diameter and five cm deep, lined with pieces of dry grass. Nests are usually well hidden, frequently by vegetation that hangs over the nest hiding it from above. Adults with young can require a large home range, up to 3.2 km in diameter. Upland sandpipers breed on Becher's Prairie (CDC location on Thompson Ranch southeast of Riske Creek), and historical breeding locations include Alexis Creek on the Alkali Plateau, Gang Ranch, Dog Creek Plateau, and Empire Valley. All recent breeding adults have been located on private property. In the CCBA they nest in the BG and IDF.

The Upland Sandpiper, its nests, and eggs are protected against direct persecution and harassment under the federal *Migratory Birds Convention Act* and the provincial *BC Wildlife Act*. 

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<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST IDENTIFIED WILDLIFE</th>
<th>COSEWIC SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo</td>
<td>G5</td>
<td>S1S2B</td>
<td>Red</td>
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</table>
75.2 MANAGEMENT DIRECTION

The management direction for the Upland Sandpiper is provided by land use plan objectives to maintain species at risk and biodiversity in general.

75.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may interact with Upland Sandpiper nesting habitat, through road construction.

<table>
<thead>
<tr>
<th>Relative Risk of Activities</th>
<th>Harvesting</th>
<th>Silviculture</th>
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</thead>
<tbody>
<tr>
<td>Planning &amp; Layout</td>
<td>Planning</td>
<td>Harvest Area Layout</td>
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<tr>
<td>Roads, Bridges and Culverts</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
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<tr>
<td>Road Deactivation</td>
<td>Bridge Installation</td>
<td>Bridge Removal</td>
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<td>Road Filing</td>
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<td>Road Skidding</td>
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<td>Processing</td>
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<td>Road Forwarding</td>
<td>Handling</td>
<td>Site Preparation</td>
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<td>Road Loading</td>
<td>Silviculture</td>
<td>Vegetation Management</td>
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<td>Road Processing</td>
<td>Density Management</td>
<td>Planning</td>
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<td>Road Site Preparation</td>
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<td>Road Density Management</td>
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<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
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<td>10</td>
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</table>

75.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Upland Sandpiper.

**Overall Objective**

Retain 100% of nest sites of this red-listed species in healthy condition. Each loss of part or all of a nesting occurrence of this species will significantly worsen its conservation status.

**Stand Level**

Strategies to address known occurrences (nest site) of this species are:

- Obtain the locations of known nest sites from Regional MoE.
- When road construction or road use is considered in the vicinity of a known nest site, delay it until after the breeding season. If necessary, consult a biologist regarding mitigation measures.
  - This does not apply to roads that are already heavily travelled – main haul roads, public highways, etc.

**Landscape Level**

Strategies to address unrecorded occurrences (nest site) of this species are:

- Minimize road construction across grasslands in the BG and IDF. This may require a longer route and/or routing the road through a forested area.
- This species will so rarely interact with forest operations, that it is not reasonable to consider inventory of non-forested areas of suitable habitat prior to road construction.

75.5 REFERENCES AND ADDITIONAL INFORMATION


76. WESTERN GREBE

76.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Western Grebe (*Aechmophorus occidentalis*) is a large, strikingly black and white waterbird with a swan-like neck and a long, thin yellow bill. It has black upperparts from the base of the bill to the tail, and white underparts from the chin through the belly, including the cheek. It is the only grebe that fits this description.

Western Grebe forages mainly for fish in lakes and marshes, but will opportunistically feed on salamanders, crustaceans, and insects. They nest in fresh water lakes and marshes with extensive areas of open water bordered by emergent vegetation; nesting occurs in the emergent vegetation. Breeding areas have open water of at least several square kilometres, with largest colonies on most extensive lake systems. Nesting starts in late April or early May. The only historical Central Interior nesting location was Williams Lake, but they no longer nest there. Migrating and wintering birds have been observed as far north as Fort St. John and Smithers and are regular visitors to the entire CCBA.

The Western Grebe is provincially red-listed, because of the very limited number of breeding sites. They were formerly Identified Wildlife (1999) but were dropped from that list in 2004 as being “lower priority”. The Western Grebe (including the nest and eggs) is protected, in that it cannot be killed, collected or held in captivity without special permits, under the provincial *Wildlife Act*.

76.2 MANAGEMENT DIRECTION

The management direction for the Western Grebe is provided through land use plan objectives for maintenance of species at risk and general biodiversity, and the Volume 1 Identified Wildlife Management Strategy.

76.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations are unlikely to interact with Western Grebe habitat, because they apparently no longer nest within the Central Cariboo FD and, if they once more start nesting in the CCBA, they will inhabit relatively large fish-bearing lakes.
76.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Western Grebe.

Overall Objective

Retain 100% of nest sites of this red-listed species in healthy condition. Each loss of part or all of a nesting occurrence of this species will significantly worsen its conservation status.

Stand Level

Strategies to address known occurrences (nest site) of this species are:
• Manage the same as for American White Pelican feeding lakes.

Landscape Level

None.

76.5 REFERENCES AND ADDITIONAL INFORMATION


77. **YELLOW-BREASTED CHAT**

### 77.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Yellow-breasted Chat (*Icteria virens*) is a relatively large warbler-like bird but large in size, with a robust build, a large bill with strongly curved ridge on the upper beak, a long tail, and distinctive plumage. The upperparts are olive green to grayish olive, while the chin, throat, and breast are lemon-yellow (sometimes tinged with orange). The belly and under tail-coverts are white. The face is grayish with black lores, a white supercilium, and white eye-crescent on lower eye-lid. The sexes are very similar. During breeding season, the male sings a distinctive song (day or night), which consists of a series of irregularly spaced scolds, chuckles, mews, rattles, and other unmusical sounds. This is a unique bird unlikely to be confused with other species.

In the summer it eats mostly insects gleaned from foliage and, in late summer, also eats small fruits when available. Insects, spiders, and fruit are important diet items in winter. Nestlings are fed primarily larval and adult insects, particularly soft-bodied grasshoppers, crickets and caterpillars. It nests in low, dense vegetation in both riparian and upland habitat. It prefers second growth, shrubby old pastures, thickets, bushy areas, scrub, woodland undergrowth, and fence rows, including low wet places near streams, pond edges, or swamps. This includes black cottonwood, trembling aspen, water birch, stands with dense understoreys of wild rose, willow, and common snowberry. The nests are usually placed near ground in dense thickets and shrubs that provide concealment. It consists in a bulky cup composed of grasses, leaves, strips of bark, stems of weeds; lined with finer grasses, wiry plant stems, pine needles, and sometimes roots and hair. Most clutches are initiated from mid-May to late June. Young are tended by both parents, and leave the nest by mid-July.

In the CCBA a singing male was recently heard in the Williams Lake Creek area. Nesting occurs in the BG. The one CDC record of a singing male with no firm evidence of breeding, is from 1.25 km northwest of the junction of Alkali Creek and the Fraser River, along a spring-fed drainage 0.25 km from the Fraser River.

Yellow-breasted Chat, its nests, and eggs are protected from direct persecution under the federal *Migratory Birds Convention Act* and the provincial *BC Wildlife Act*. The Yellow-breasted Chat is listed as Endangered under Schedule 1 of the federal *Species at Risk Act*.
77.2 MANAGEMENT DIRECTION

The management direction for the Yellow-breasted Chat is provided through land use plan objectives for maintenance of species at risk and general biodiversity, and Identified Wildlife Management Strategy (2004).

77.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect Yellow-breasted Chat habitat through road stream crossings and through harvesting immediately adjacent to shrub thickets along streams, lakes, and wetlands in the BG and IDFxm.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
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<td></td>
</tr>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
</tr>
<tr>
<td>12</td>
<td>2</td>
<td>3</td>
<td>3</td>
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</tr>
</tbody>
</table>

77.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Yellow-breasted Chat.

Overall Objective

Retain 100% of nest sites of this nationally Endangered and red-listed species in healthy condition. Each loss of part or all of a nesting occurrence of this species will significantly worsen its conservation status.

Stand Level

Strategies to address known occurrences (nest site) of this species are:
- Obtain the locations of known nesting sites from Regional MoE.
- Manage WHAs by following the Identified Wildlife Management Strategy, and the associated Order.
- For known nest sites that are not WHAs, define a management area of 100 m radius around the nest – extend it further parallel to the riparian area if habitat suitable for nesting extends further, and manage as a WHA.
  - Maintain the riparian thicket habitat.
  - Do not build new roads and stream crossings within the management area.
  - Do not use pesticides.

Landscape Level

Strategies to address unrecorded occurrences (nest site) of this species are:
- None.
77.5 REFERENCES AND ADDITIONAL INFORMATION


10. PLANTS – MOSSES
78. ALKALINE WING-NERVED MOSS

78.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Alkaline wing-nerved moss (Pterygoneurum kozlovii) is an inconspicuous moss that grows in small to medium-sized tufts, or forms widespread, yet intermittent, turfs. The leaves are light or yellowish green and measure approximately 1 mm in length. Leaf edges may be somewhat curved and the slightly toothed apex tapers abruptly. The **mid-rib is light brown and is covered by two or three small flaps**. Alkaline Wing-nerved Moss has female structures at the tip of its main stems, which measure 2 to 3 mm in height. Small bulbils are often present along the underground stems, and these may develop into plants. The Alkaline Wing-nerved Moss differs from other *Pterygoneurum* species in that its **hood-like mature capsules** (0.8 and 1 mm in length) are **immersed** (hidden in leaves) and **lack a lid to allow the release of spores**; instead they split along one side to release spores. The capsules ripen from late fall to spring, resulting in a golden brown hue to fertile plants.

The moss **occurs on soil** along among grasses and sedges **along the margins of alkaline ponds** and sloughs in semi-arid grasslands in the BGxh; BGxw; IDFdk; and IDFxm in the CCBA. Approximately 100 apparently suitable sites occur in all of BC; about 75% have been searched for this species, resulting in 13 known occurrences.

Alkaline wing-nerved moss (*Pterygoneurum kozlovii*) is globally rare, and occurs only in Canada and Mongolia. In Canada, where most of the world’s populations occur in BC and Saskatchewan, the moss is listed as nationally Threatened. In BC the moss is red-listed. There is an extra duty to manage for this species in Canada because it is globally rare.

![Map of known sites](image)

<table>
<thead>
<tr>
<th>Known BGC Unit</th>
<th>Forest District</th>
<th>Global Rank</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
<th>COSEWIC</th>
<th>SARA Schedule</th>
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</thead>
<tbody>
<tr>
<td>Central Cariboo</td>
<td>G2G3</td>
<td>S2</td>
<td>Red</td>
<td>T (Nov 2004)</td>
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</table>

78.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.
78.3  **Forest Management Issues and Risk Assessment**

Forest operations may affect Alkaline Wing-nerved Moss habitat, through road construction adjacent to alkaline ponds, which may be dry much of the summer. The COSEWIC status report notes road construction as a management issue.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Relative Risk of Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planning &amp; Layout</td>
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<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
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<tr>
<td>Risk Ranking = A ( \times ) (B + C)</td>
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<tr>
<td>Planning</td>
<td>Harvest Area Layout</td>
</tr>
<tr>
<td>12</td>
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</tbody>
</table>

78.4  **Management Strategy**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Alkaline Wing-nerved Moss.

**Overall Objective**

Retain 100% of occurrences of this globally rare, nationally threatened, and red-listed and nationally threatened species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road construction should never encroach on the habitat of a known occurrence.
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Road construction should not encroach on the vegetation communities of alkaline ponds, including the communities around the edge that have vegetation distinct from the more upland communities. These sites are also important for other rare species and ecosystems.
- This species is globally rare, and a significant part of the global, Canadian, and provincial populations occurs in the CCBA. Hence, inventory for this moss should be completed prior to road construction that affects an alkaline permanent or seasonal pond.
78.5 REFERENCES AND ADDITIONAL INFORMATION


79. COLUMBIAN CARPET MOSS

79.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Columbian carpet moss (*Bryoerythrophyllum columbianum*) is a small, often red-brown moss that grows in small clumps or compact turfs either as pure colonies or intermixed with other mosses and lichens. Its most distinctive features are elongate-oval leaves, sharp-pointed leaf tips, and broad, somewhat ornamented leaf mid-ribs. The leaf mid-rib is much wider at midleaf, and its upper surface bulges as a unistratose pad of cells. Male and female organs are on separate stems.

*Bryoerythrophyllum columbianum* is restricted to the semi-arid steppe and grasslands of the BGxh in the CCBA. There are about 16 known extant locations in BC, with the one CCBA site being in Churn Creek Park. There have been extensive searches for this species, suggesting that most existing populations have been found.

79.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

79.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect Columbian carpet moss habitat, through road construction in dry grassland and sagebrush areas in the BGxh.
Species of Management Concern BCTS Cariboo Region

### 79.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Columbian carpet moss. There are presently no known populations outside Churn Creek Park.

**Overall Objective**

Retain $\geq 80\%$ of nesting occurrences of this blue-listed and nationally Special Concern species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a $\geq 30$ m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting dry grassland and sagebrush areas in the BGxh, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

### 79.5 REFERENCES AND ADDITIONAL INFORMATION


80. RUSTY CORD-MOSS

80.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Rusty cord-moss (*Entosthodon rubiginosus*) is a small, pale green to green moss that grows as individual stems or in tiny patches. Leaves are crowded at the apex of erect stems; both male and female organs occur on the same stem. The mouth of the capsule is bordered by a series of transversely-rectangular cells, below which are cells that are elongate and thick-walled; this characteristic separates it from the similar *E. fascicularis*. Sporophytes are common. It is inconspicuous and often hidden among other mosses.

Rusty cord-moss is restricted to seasonally damp and alkaline; usually silt or clay-rich soil at the edges of ponds, lakes, and sloughs, and on seepage slopes in relatively dry environments. It is most often found within a narrow band around the edge of a pond where the topography is flat to very slightly sloping. It has not been found in sites where tall rushes and sedges dominate. Seepage slopes in dry environments are typically open sites without shade, and possibly in very open Douglas-fir/Lodgepole pine stands. Potentially occurs in the BGxh and IDFxm in the CCBA.

Rusty cord-moss has been found at four sites in BC, one of which is near Beecher Lake south of Riske Creek in the CCBA. The species is globally very rare, and exists only in scattered locations in western North America.
## 80.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the rusty cord-moss.

### Overall Objective

Retain 100% of occurrences of this globally rare, nationally threatened, and red-listed and nationally threatened species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

### Stand Level

Strategies to address known occurrences of this species are:

- Road construction should never encroach on the habitat of a known occurrence.
  - Establish a ≥30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

### Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Road construction should not encroach on seepage areas in dry non-forested or open forest in the BGxh and IDFxm. These sites are also important for this and other rare species and ecosystems.
- This species is globally rare, and a significant part of the global, Canadian, and provincial populations occurs in the CCBA. Hence, inventory for this moss should be completed prior to road construction that affects seasonally damp and alkaline soil at the edges of ponds, lakes, and sloughs, and on seepage slopes in dry environments in the BGxh and IDFxm.

### References and Additional Information

http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr%5Frusty%5Fcord%5Fmoss%5Fe%2Epdf.

Species of Management Concern BCTS Cariboo Region

11. PLANTS – VASCULAR
81. ALPINE DRABA

81.1 SPECIES SUMMARY: IDENTIFICATION AND HABitat

Alpine draba (*Draba alpina*) is a small, compact plant with a branched stem-base and many persistent basal leaves. The stems are 2.5-13 cm long, smooth or more often covered in branched, star-like hairs; developing from a taproot. The basal leaves are oblong to elliptic and lack any serrations; densely covered in branched hairs. Stem leaves 1 or lacking. The flowerhead is slender and has 2- to 10-flowers; flower petals are 4-5 mm long, yellow and notched at the tips. Seed pods are flat and paper-like egg-shaped to elliptic silicles, 5-11 mm long and hairy with simple to branched hairs or glabrous; with 2-10 seeds. There are numerous species of *Draba* in the subalpine and alpine; a technical key and considerable experience is required to reliably distinguish them.

Alpine draba grows in moist to mesic meadows, rocky slopes and snowbeds in the subalpine and alpine zones (IMA and adjacent ESSF). It is an arctic and subarctic species that occurs rarely in the Coast Range and Rocky Mountains.

Photo © Jim Riley

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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</table>

81.2 MANAGEMENT DIRECTION

The management direction for alpine draba is provided by CCLUP direction to manage for species at risk and biodiversity in general.

81.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not affect alpine draba habitat.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Risk Ranking</th>
<th>Planning &amp; Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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### Relative Risk of Activities

- **Planning & Harvest Area Layout**
  - Probability of Interaction
  - Legal Consequence
  - Biological Consequence
  \[
  \text{Risk Ranking} = A \times (B + C)
  \]

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<td>Planting</td>
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<td>Vegetation Management</td>
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<tr>
<td>Density Management</td>
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</table>

### References and Additional Information

### 82. AMERICAN CHAMAERHODOS

#### 82.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

American chamaerhodos (*Chamaerhodos erecta* ssp. *nuttallii*) is a biennial or short-lived perennial, 8 – 30 cm high with 1 to several stems. The **stems are branched and coarse to glandular-hairy. Basal leaves have stalks and grow in a rosette** from a woody taproot; they are 1.5 – 4 cm long and **2 to 3 times divided in threes into linear or oblong segments, coarse to glandular-hairy. Stem leaves are similar, alternate, smaller and less divided.** The flowers are arranged in a somewhat flat-topped cluster at the end of the stem, with numerous short-stalked flowers growing from the base of the cluster. Flowers have **5 white, egg-shaped petals; calyces with 5 narrowly triangular lobes** and bristly hairy within. The brown fruits are 1.5 mm long and egg to pearl shaped.

Occurs on **dry, gravelly, open hillsides and terraces in steppe and montane zones (BGxh, IDFdk, IDFxm).** Occurs on several sites along the Fraser and Chilcotin rivers including Churn Creek Protected Area, Dock English Bluffs, and Big Creek Ecological Reserve.

<table>
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<tr>
<th>KNOWN BGC UNIT</th>
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<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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<td>Central Cariboo</td>
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<td>Blue</td>
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</tbody>
</table>

#### 82.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

#### 82.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect American chamaerhodos habitat, through road construction and quarries.
82.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the American chamaerhodos.

Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction and quarries on dry, gravelly, open hillsides and terraces in the BGxh, IDFdk, and IDFxm, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

82.5 REFERENCES AND ADDITIONAL INFORMATION


83. AMERICAN SWEET-FLAG

83.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

American sweet-flag (*Acorus americanus*) is a grass-like plant with tiny brownish-green flowers arranged in a spadix (a fleshy cylinder similar to the centre of a skunk cabbage flower). The spadix is slender, 4-10 cm long and is enclosed by the leaves. The bright green leaves are long (40-80 cm), narrow, and flat; they are diamond-shaped in cross-section (4-sided) and grow directly from a thick rhizome. The plant has a sweet-aromatic scent when leaves or rhizome are crushed. The combination of long, thin, sword-shaped leaves plus the spadix is not found in any other North American plant. Fresh plants are unique in the pleasant fragrance given off by rhizomes and leaves when broken.

American Sweet-flag inhabits shallow water in the montane zone; it may occur in wetlands, along low-gradient streams, or along lakeshores.

<table>
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<tr>
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</tbody>
</table>

83.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

83.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect the wetland habitat of American sweet-flag, through road construction.
83.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the American sweet-flag.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting shallow water edges of wetland habitats, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

83.5 REFERENCES AND ADDITIONAL INFORMATION


84. AUTUMN WILLOW

84.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Autumn willow (*Salix serissima*) is a willow that grows 1 to 5 m in height, with erect branches which are flexible at the base. **Twigs are yellow to red-brown and smooth.** Plants grow separately, it is not colonial. The simple alternate leaves are narrowly oblong to elliptic and lance- or narrowly egg-shaped; lower surface glaucous or not and smooth; **upper surface smooth and highly glossy;** margins toothed and bases pointed to rounded; stipules absent or rudimentary. The flowers are on stout catkins, with unisexual flowers lacking petals and sepals and emerging with or just before leaves; there are pale floral bracts. Many willows require a technical key and considerable experience to reliably identify.

Occurs in wet thickets, meadows and fens in the montane zone. In the CCBA it has only been recorded from near the San Jose River, south-east of Williams Lake. It may also occur elsewhere in the IDFxm.


<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
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<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo</td>
<td>G4</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
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</tbody>
</table>

84.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

84.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect the habitat of autumn willow, through road construction.
### 84.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the autumn willow.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting wetland, wet shrub, or wet meadow habitats in the IDFxm, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

### 84.5 REFERENCES AND ADDITIONAL INFORMATION


[http://www.env.gov.bc.ca/wld/documents/spsum/PDSAL022P0.pdf](http://www.env.gov.bc.ca/wld/documents/spsum/PDSAL022P0.pdf)
85. BACK'S SEDGE

85.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Back's sedge (*Carex backii*) is a grass-like plant that grows in tufts. The leaves are a few mm wide and up to 30 cm long, with crenate (scalloped) margins. Leaf colour is dull green to yellow-green, with the crenate margins being green. It is "easily" recognized (by a botanist) by its long, smooth surfaced perigynia (4.8–6.6 mm) with long beaks (1.9–2.9 mm). The common *Carex cordillerana* has similar leaves with the green margins being densely covered in minute projections (papillae). Technical keys and an experienced botanist are required for reliable sedge identification.

Back's sedge occurs in moist to mesic grasslands (SBSdk, IDFdk) and alluvial forests (also IDFxm) in the montane zone.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
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</table>

85.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

85.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect Back's sedge habitat, through road construction.
### Species of Management Concern BCTS Cariboo Region

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Relative Risk of Activities</th>
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<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning &amp; Harvest Area Layout</td>
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<tr>
<td></td>
<td>Planning</td>
</tr>
<tr>
<td>6</td>
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</table>

#### 85.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Back’s sedge.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting grassland habitats in the IDF and SBPS, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

#### 85.5 REFERENCES AND ADDITIONAL INFORMATION


86. BIRDFOOT BUTTERCUP

86.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Birdfoot buttercup (*Ranunculus pedatifidus* ssp. *affinis*) is a buttercup that grows 6 – 33 cm in height. It has 1 to several slender erect stems that are soft-hairy or smooth. The roots are fibrous.

The basal leaves have stalks and are heart to kidney-shaped with pointed tips. Leaf segments are undivided or parted or lobed, and the bases are squared-off to heart-shaped. Stem leaves are alternate, divided into 5 to 7 segments and those on the upper part of the stem lack stalks. The inflorescence has 1 – 7 flowers; each flower is on a 1 – 7 cm soft-hairy stalk. The receptacle is densely white short-hairy, the 5 – 10 petals are egg-shaped, yellow and distinct, with nectary on the upper surface. There are numerous round to egg-shaped, short-hairy to smooth fruits in a cylindric head.

Occurs in moist meadows in the montane to alpine zones; known in the CCBA at Nemiah Valley, Lilie Lake and near the north end of Big Creek Provincial Park.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
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<th>IDENTIFIED</th>
<th>COSEWIC</th>
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</table>

86.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

86.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect birdfoot buttercup habitat, through road construction.
Species of Management Concern BCTS Cariboo Region

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Layout</td>
<td>Road Construction</td>
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<td>1</td>
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</table>

86.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of birdfoot buttercup.

Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting moist meadow habitats in montane to subalpine areas, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

86.5 REFERENCES AND ADDITIONAL INFORMATION


87. BLUNT-SEPALED STARWORT

87.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Blunt-sepaled starwort (*Stellaria obtusa*) is similar to Common Chickweed (*Stellaria media*). Plants grow 3 – 20 cm high, and the smooth stems lay on the ground or grow somewhat upright and have several branches. The stems grow from a slender rhizome. Stem leaves are smooth except for a few basal marginal hairs, egg-shaped to abruptly sharp-pointed, and are opposite. Lower leaves are short stalked or all unstalked. There are no basal leaves, and leaves do not have stipules (a small leafy outgrowth at the base of a leaf or its stalk). Flowers are solitary and located within the leaf axils; they have no petals but they do have 4 – 5 sepals that are egg-shaped to elliptic, and very slightly or not at all papery on the margins. Fruits are globose to egg-shaped capsules with dark brown seeds, finely but distinctly cross-wrinkled with undulate ridges.

Occurs in wet to moist streambanks and meadows in montane zones (ESSF; ICH; IDF); the historical record near Wells was on a wet mine tailings pile.

87.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

87.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect blunt-sepaled starwort habitat, through road construction.
Species of Management Concern BCTS Cariboo Region

87.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of blunt-sepaled starwort.

Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting moist open sites in montane to subalpine areas, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

87.5 REFERENCES AND ADDITIONAL INFORMATION

http://www.env.gov.bc.ca/wld/documents/spsum/PDCAR0X0U0.pdf.
88. BOOTH’S WILLOW

88.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Booth’s willow (*Salix boothii*) is a willow that grows 0.25 to 6 m tall, with erect branches that are flexible at the base; the plants are not colonial. Twigs are yellowish to red-brown and smooth or sparsely hairy. The leaves are narrowly oblong to broadly elliptic. The **lower leaf surface is not covered with a waxy coating; it is smooth and sparsely long soft-hairy or with short silky hairs that are white to rust coloured.** The upper leaf surface is shiny to high glossy, and smooth to nearly smooth or sparsely long soft-hairy. The leaf margin is smooth to toothed, the bases have rounded to pointed tips. There are leaf-like stipules at the base of each leaf. **The leaves are alternate.** The tiny flowers are on unstalked, stout catkins; the flowers lack petals and sepals. The catkins emerge at the same time or just before the leaves. There are dark floral bracts with wavy or curly hairs. Fruits are stalked capsules surrounded by a tuft of hairs. Reliable identification of willows requires a technical key and considerable experience.

Occurs in moist to wet meadows and streambanks in the montane zone (ICH; IDF; MS; SBS).

Record for Dragon Lake at Quesnel from E-Flora BC.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
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</tbody>
</table>

88.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

88.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect Booth’s willow habitat, through road construction.
### 88.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Booth’s willow.

#### Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

#### Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

#### Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting moist to wet meadows and streambanks in the montane zone, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

### 88.5 REFERENCES AND ADDITIONAL INFORMATION


89. BREWER'S MONKEY-FLOWER

89.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Brewer's monkey-flower (*Mimulus breweri*) is a distinctive short (2 – 15 cm) herbaceous plant. The stems are simple or more often branched, and grow from a taproot. The leaves are oblong to linear, 1 – 2 cm long, more or less unstalked, and blunt-tipped. The leaves have 1 – 3 veins that are difficult to see. There are several to many slender flowers on stalks growing from the leaf axils. The flowers are 3 – 10 mm long; they have tubular, funnel-shaped corollas (fused petals) that are pink to magenta or red, smooth on the outside, with 2 weakly formed lips 5 – 8 mm long. The corolla has 5 lobes that are roughly the same size, and has scattered hairs and yellow or sometimes red spots within the throat. Fruits are oblong and pointy-tipped capsules, 4-7mm long with numerous seeds.

Occurs in moist to mesic open areas near seepage or streams and rocky slopes in montane zones (ESSF; ICH; IDF).


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<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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<td>Blue</td>
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</tbody>
</table>

89.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

89.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect Brewer's monkey-flower habitat, through road construction.
### 89.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Brewer’s monkey-flower.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:
- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a $\geq 30$ m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:
- Minimize road construction affecting moist to mesic open areas near seepage or streams and rocky slopes in the montane zone, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

### 89.5 REFERENCES AND ADDITIONAL INFORMATION


http://www.env.gov.bc.ca/wld/documents/spsum/PDSCR1B0N0.pdf.
90. CAROLINA DRABA

90.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Carolina draba (*Draba reptans*) is a very small (under 12 cm high) wild mustard, 5 – 20 cm high with simple or branched stems, hairy near the base with simple, branched or starlike hairs; growing from a taproot. The flowers are white, small, with notched petals, and arranged in elongated clusters of up to 30. Stems are without leaves except for a basal rosette and a pair of opposite leaves just above the basal rosette. There are branched or starlike hairs on the lower leaf surface. It flowers very early in the spring, and occurs in dry open rocky areas. The fruits a smooth to finely stiff-hairy flat silicles, 5 – 20 mm long and 1 – 2 mm wide.

The species occurs in dry and often calcareous cliffs, rocky slopes and forest opening in the steppe zone (BGxw). Within the CCBA this species has only been recorded from Doc English Bluff Ecological Reserve near the Fraser River.


<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
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<th>BC LIST</th>
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<td>Central Cariboo</td>
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<td>S1</td>
<td>Red</td>
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90.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

90.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect Carolina draba habitat, through road construction, quarries, or harvesting that affects small rock outcrops.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Risk Ranking = A * (B + C)</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
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<td>8</td>
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</table>

### 90.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Carolina draba.

#### Overall Objective

Retain 100% of occurrences of this red-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

#### Stand Level

Strategies to address known occurrences of this species are:

- Road construction should never encroach on the habitat of a known occurrence.
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

#### Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Avoid road construction, quarry construction, or harvesting on calcareous (limestone) slopes in the BG, to minimize the potential for affecting an unknown population of this species. The species is very rare in BC; hence extra effort should be made to detect its presence.
  - If development must affect these habitats, a rare plant inventory for this species should be done first to achieve the “overall objective” given above.
- This does not address non-calcareous potential locations for the species, but does address the most probable locations.

### 90.5 REFERENCES AND ADDITIONAL INFORMATION


91. CHAMISSO'S MONTIA

91.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Chamisso's montia (*Montia chamissoi*) is an inconspicuous, short (5 – 20 cm high) herbaceous plant with solitary, erect, simple to branched stems. The stems grow from slender rhizomes and stolons which produce bulblike offsets. Basal leaves are either reduced or lacking; stem leaves are opposite, 1 - 5 cm long, oblong to elliptic and tapering to the stalk. Flowers are in small clusters on 8 – 30 mm stalks, arising from leaf axils; single floral bracts occur at the base of the lowest flower stalk in a cluster. There are 5 white or pink flower petals and 2 sepals, 2 – 3 mm long. Fruit is 2 -3 mm long capsules; seeds are black, shiny and densely pimpled. Occurs in bogs, marshes and streambanks in the SBPS.

Within the CCBA this species is known from Caribou Flats and at Shaw Creek near Nimpo Lake.

![Photo © Hans Roemer](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
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<th>BC RANK</th>
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<td>S2S3</td>
<td>Blue</td>
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</table>

91.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

91.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect Chamisso's montia habitat, through road construction (especially stream crossings).
91.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Chamisso’s montia.

Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a $\geq 30$ m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting bogs, marshes and streambanks in the SBPS, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

91.5 REFERENCES AND ADDITIONAL INFORMATION

92. COAST MOUNTAIN DRABA

92.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Coast mountain draba (*Draba ruaxes*) is a small, compact plant with relatively large (for the genus) yellow flowers. Plants are 2 – 10 cm high with a branched, hairy stem-base that is often covered with dried remains of old leaves; developing from a taproot. Basal leaves are 5 – 12 mm long with long stalks, the lower leaf surface is covered in starlike hairs and the upper leaf surface with long, simple and few-branched hairs; stem leaves lacking. The inflorescence has 3 to 10 flowers, the flower petals are 4 – 5 mm long and yellow. Fruits are oval to egg-shaped, hairless to densely soft-hairy silicles, 5-8mm long; fruiting stalks almost as long as silicles; 10 – 16 seeds. There are numerous species of draba in the subalpine and alpine; a technical key and considerable experience is required to reliably distinguish them. Inhabits dry meadows, cliffs, rocky slopes and scree slopes in the subalpine and alpine zones.

Within the CCBA this species has only been recorded from Mount Downton in Itcha-Ilgachuz Provincial Park.

![Map of Coast Mountain Area]

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
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<td>Blue</td>
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</tbody>
</table>

92.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

92.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not affect coast mountain draba habitat.
## Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A × (B + C)</td>
<td>A = Probability of Interaction</td>
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<td>B = Legal Consequence of Interaction</td>
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<td></td>
<td>C = Biological Consequence of Interaction</td>
<td></td>
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<td></td>
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<tr>
<td>0 0 1 2</td>
<td>0 0 0 0</td>
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<tr>
<td></td>
<td>Planning</td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
</tr>
</tbody>
</table>

### 92.4 Management Strategy

None required.

### 92.5 References and Additional Information


93. DIVERSE-LEAVED CINQUEFOIL

93.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Diverse-leaved cinquefoil (*Potentilla diversifolia* var. *perdissecta*) is a reasonably recognizable herbaceous plant, 10 – 40 cm high. It has slender stems that are spreading to erect; smooth at the base, appressed-hairy further up; growing from a short, stout rhizome. **The basal leaves are palmately or pinnately compound with 5 – 7, oblong-lanceolate to egg-shaped leaflets**; the greenish or blue-green leaflets are strongly toothed, mostly above the middle, and are smooth to slightly hairy on the upper surface, generally appressed-hairy beneath. The one or two stem leaves are alternate. There are clusters of few to several stalked flowers in an open inflorescence on the top of the flower stem. The flowers are like those of buttercups – **bowl-shaped with 5 heart-shaped petals, notched at the tips and yellow**. Fruits are lopsided egg-shaped, smooth to faintly net-veined. **The leaves are more or less pinnately compound, with leaflets dissected to the base**, unlike the more common variety *diversifolia* in which the leaves are primarily palmately compound, with leaflets deeply toothed. Occurs in mesic to dry meadows and rock outcrops in montane to alpine zones.

In the CCBA the species is known only from Itcha-Ilgachuz Park.

![The common variety *diversifolia*.](https://example.com/image.png)

The common variety *diversifolia*.
Photo © Del Meidinger

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilcotin</td>
<td>G5T4</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

93.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.
93.3  **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest operations may affect diverse-leaved cinquefoil habitat, through road construction.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Harvest Area Layout</td>
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<td>Road Deactivation</td>
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<td>A = Probability of Interaction</td>
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<td>C = Biological Consequence of Interaction</td>
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</table>

**93.4  MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of diverse-leaved cinquefoil.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible, establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
- Prevent water and sediment inputs from ditches.
- If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting mesic to dry meadows and rock outcrops in montane to alpine zones, to minimize the potential for affecting an unknown population of this species.
- If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

**93.5  REFERENCES AND ADDITIONAL INFORMATION**


94. DRUMMOND’S CAMPION

94.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Drummond’s campion (Silene drummondii var. drummondii) is a reasonably identifiable herbaceous plant 20 – 50 cm in height. The stems are solitary to several, erect, simple or branched; strongly hairy with downswepet hairs, becoming glandular above and often with purple cross walls above. The stems grow from a taproot. The basal leaves are arranged in a rosette; the hairy leaf blades are 2 – 10 cm long and lanceolate or elliptic to oblanceolate, narrowed to slender stalks. The stem leaves are opposite, hairy and usually linear, in pairs of 2 to 4. The stem leaves lack stipules (leaf-like projections from the base of the leaf stem). Flowers are solitary or in a loose narrow cluster. The 5 petals are whitish to pinkish petals are often included in the calyces. The 5 sepals are united and form an obvious glandular tube, 10-15mm long and 10-nerved. Fruits are 5-valved, narrowly oblong capsules with dark brown seeds. Occurs on dry sites in steppe and montane zones, primarily the BG and IDF in the CCBA.

In the CCBA this species is known from Churn Creek, Big Creek, Bechers Prairie, and the Junction Sheep Range.

94.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

94.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect Drummond's campion habitat, through road construction and harvesting.
### 94.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Drummond's campion.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting dry sites in steppe and montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

### 94.5 REFERENCES AND ADDITIONAL INFORMATION


95. DWARF CLUBRUSH

95.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Dwarf clubrush (*Trichophorum pumilum*) is a sedge 5 – 15 cm high. The stems are tapered, grooved and smooth; they are nearly circular in cross-section. The base of the plant is covered with dead stems and brown sheaths. The stems grow from slender rhizomes. The leaves all grow from the base, with blackish to brownish sheaths, not cross-wrinkled. There are 1 to 3 leaves, slender, green and up to 3 cm long. There are 2 – 4 solitary, medium to light brown flowers on the top of a stem. Fruits are egg-shaped, blunt to more less pointed; awnless or nearly so, perianth bristles lacking. Similar to Alpine Bulrush (*Trichophorum alpinum*). Occurs in bogs, along lakeshores and in wet meadows in montane and subalpine zones (ICH; IDF; SBPS; SBS).

In the CCBA this species is known from Eagle Lake, Elkin Lake, Chilanko Forks and near Towdystan.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilcotin</td>
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<td>S2S3</td>
<td>Blue</td>
<td></td>
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</tr>
</tbody>
</table>

95.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

95.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect Dwarf clubrush habitat, through road construction.
Species of Management Concern BCTS Cariboo Region

Total Risk Ranking | Planning & Harvest Area Layout | Roads, Bridges and Culverts | Harvesting | Silviculture | Density Management
---|---|---|---|---|---
Risk Ranking = A * (B + C) | Planning, Layout | Road Construction | Road Deactivation | Bridge Installation | Bridge Removal | Falling | Yarding | Skidding | Forwarding | Loading | Processing | Staking | Site Preparation | Planting | Vegetation Management | Density Management
| A = Probability of Interaction | Road Maintenance | | | | | | | | | | | | | | | | |
| B = Legal Consequence of Interaction | | | | | | | | | | | | | | | | |
| C = Biological Consequence of Interaction | | | | | | | | | | | | | | | | |
6 | 2 | 1 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0

95.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Dwarf clubrush.

Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence.
  - Where feasible,
    - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
    - Prevent water and sediment inputs from ditches.
    - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting bogs, along lakeshores and in wet meadows in montane and subalpine zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

95.5 REFERENCES AND ADDITIONAL INFORMATION


96. ELEGANT JACOB’S-LADDER

96.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Elegant Jacob’s-ladder (*Polemonium elegans*) is normally a low growing plant 5 – 15 cm high, but sometimes the flower stems reach 40 cm. The plant is hairy throughout and is strongly skunky-smelling. The stem-base is branched, growing from a stout taproot. Leaves are mostly basal, short-stalked and alternate with expanded, persistent, papery bases. Leaves are pinnately compound with 13 – 27 opposite or offset, crowded and smooth-edged leaflets. Clusters of short-stalked flowers are in a terminal, head-like inflorescence; the corollas are 12 – 15 mm long with 5 flaring lobes shorter than the tube, blue or rarely white and funnel-shaped. Fruits are 3-chambered capsules. The flowers are blue and smaller than the more common skunky Jacob’s-ladder. [In photographs the flowers of the various Jacob’s-ladder species appear pink or purple, because photographic film is more sensitive to pink than blue. Hence flowers that mix pink and blue to create a colour, frequently appear pink in photographs.] Inhabits dry cliffs and scree slopes in the subalpine and alpine zones (BAFA; CMA; ESSF; IDF; IMA; MS; SBS).

In the CCBA this species is known from the Rainbow Range, Itcha Ilgachuz Provincial Park and Niut Mountain. It is likely to occur in similar sites throughout the leeward slopes of the Coast Ranges and Chilcotin mountains.

![Photo © Ian Cumming](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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</thead>
<tbody>
<tr>
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<td>S2S3</td>
<td>Blue</td>
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</tbody>
</table>

96.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

96.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not affect Dwarf clubrush habitat.
### Species of Management Concern BCTS Cariboo Region

#### 96.4 Management Strategy

None required.

#### 96.5 References and Additional Information


97. **ENANDER’S SEDGE**

### 97.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Enander's sedge (*Carex lenticularis var. dolia*) is a fairly large sedge (10 – 90 cm high) with smooth-edged, triangular stems, shorter than or slightly longer than leaves; growing from a short rhizome. The leaf blades arise from the lower part of the stem or well distributed along the stem. The inflorescence is composed of 3 to 9 spikes, 1 – 5 cm long; the terminal spikes have male flowers and occasionally female, the lower spikes have female flowers; the lowestmost bract subtending the spikes is leaf-like or scale-like. **The spikes are sheathless** with pale green, purplish-brown, or blackish-brown, ear-shaped lobes at the bases. **The fruit perigynia is 1.8 - 3.6 mm long, egg-shaped, 3-angled with rounded angles and 5 - 7 nerves on each side**; unstalked or with short stalks; beaks minute or short. The best field characters are that **the plant forms loose tussocks, with the leaves and stems generally growing at a near-horizontal angle to the ground**. The terminal spike has female flowers at the top and a few male flowers at the base, unlike the other three varieties in which the terminal spike has only male flowers. In addition **the basal spike is only 1.5 cm long, with a stalk up to 1 cm long**, unlike the other varieties in which the basal spike is up to 5 cm long and has a stalk up to 5 cm long. *Carex* species require the use of a technical key and considerable experience to reliably identify.

Occurs along streams and ponds in the montane and subalpine zones (ESSF; ICH; SBS). The only record (in the CDC supplementary botany records) within the CCBA is from the ESSF in Itcha-Ilgachuz Park. Rare Plants of BC, Illustrated Flora of BC, and E-Flora BC all incorrectly map the location at low elevation in the SBPS.

### 97.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

### 97.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect Enander's sedge habitat, through road road construction.
97.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Enander’s sedge.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting streams and ponds in the montane and subalpine zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

97.5 REFERENCES AND ADDITIONAL INFORMATION

98. FIVE-LEAVED CINQUEFOIL

98.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Five-leaved cinquefoil (*Potentilla nivea* var. *pentaphylla*) is a moderately small (5 – 30 cm high) reasonably identifiable plant. There are up to several, ascending to erect and loosely tufted stems; woolly-hairy to almost cobwebby; growing from a short rhizome. It has mostly basal leaves, palmately to pinnately compound with 3 – 5, egg-shaped to oblong leaflets; leaflets cleft halfway to the midrib or blunt-toothed, greenish, silky-hairy above and white-woolly or long-hairy beneath. The stem leaves are alternate, short-stalked to unstalked and become smaller upwards. Flowers occur in compact to open clusters of 1 – 9; the "buttercup-like" flowers are stalked, yellow, and bowl-shaped with 5 heart-shaped petals, shallowly notched at the tip; The fused sepals behind the petals are silky- to somewhat woolly-hairy with 5 elongated lobes alternating with 5 narrow bractlets shorter than the lobes. There are usually about 20 stamens. There are several to many fruits, which are lopsided egg-shaped and smooth. **There are 3 – 5 leaflets that are cleft halfway to the midrib**, unlike the more common variety *nivia* in which there are 3 leaflets that are coarsely toothed. Occurs on gravelly benches, grassy slopes, meadows and rock outcrops in steppe to alpine zones (BG, ESSF, IDF, MS).

In the CCBA this species is known from Cherry Creek west of Bluff Lake, and Bald Mountain and Doc English Bluff Ecological Reserve near Riske Creek.

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![Map of the Cariboo Region showing distribution of five-leaved cinquefoil](image)

**Table: Known BGC Unit**

<table>
<thead>
<tr>
<th>Known BGC Unit</th>
<th>Forest District</th>
<th>Global Rank</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
<th>COSEWIC</th>
<th>SARA Schedule</th>
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<tbody>
<tr>
<td>Central Cariboo; Chilcotin</td>
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<td>S2S3</td>
<td>Blue</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

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98.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

98.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect five-leaved cinquefoil habitat, through road construction.
98.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of five-leaved cinquefoil.

Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting gravelly benches, grassy slopes, meadows and rock outcrops in steppe to alpine zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

98.5 References and Additional Information


Species of Management Concern BCTS Cariboo Region

99. GASTONY'S CLIFF-BRAKE

99.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Gastony’s cliff-brake (*Pellaea gastonyi*) is a distinctive small fern that has a small cluster of fronds growing from a short, stout rhizome. The fronds occur in 2 slightly different forms, with the sterile leaves shorter than fertile leaves. The fronds are oblong or triangular, 5 – 25 cm long, 2 – 7 cm wide, and 2-pinnate towards the base, 1-pinnate in the upper part. The **frond segments are leathery, sparsely woolly along the midrib, with margins curved backwards.** Occurs on dry, calcareous cliffs and crevices in the montane and subalpine zones (BG, ESSF, IDF, MS); there is one central interior record, the remaining BC sites are all in the southeast.

This species is globally rare (G2G3), with a significant proportion of the global population in BC. There is therefore a special responsibility to manage for the species in BC. In the CCBA this species is known from Doc English Bluff Ecological Reserve near Riske Creek.


<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo</td>
<td>G2G3</td>
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<td>Blue</td>
<td></td>
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</tbody>
</table>

99.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

99.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect Gastony's cliff-brake habitat, through road construction.
99.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Gastony's cliff-brake.

Overall Objective

Retain 85% of occurrences of this globally uncommon and blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting dry, calcareous (limestone) cliffs and slopes in the montane and subalpine zones, to minimize the potential for affecting an unknown population of this species. The species is rare globally; hence extra effort should be made to detect its presence.
  - If road construction must affect these habitats, a rare plant inventory for this species should be done first to achieve the "overall objective" given above.

99.5 REFERENCES AND ADDITIONAL INFORMATION


100. **GEYER’S ONION**

100.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

Geyer's onion (*Allium geyeri var. tenerum*) is a somewhat grass-like wild onion, growing from an egg-shaped bulb. It is 10 – 50 cm tall with slender stems. There are three or more linear basal leaves, shorter than flowering stem; stem leaves lacking. There are several to many, stalked flowers in an inflorescence; the flowers are pink and bell-shaped with 6 tepals; the tepals are egg-shaped with pointed or blunt tips and faintly toothed margins. **Leaves and bulbs have a distinct onion smell and taste; stems are hollow.** Similar to Nodding Onion (*Allium cernuum*), but the flowers are more erect, not strongly nodding. Occurs in moist meadows, banks, and rock outcrops in the lowland, steppe and montane zones (BG, ESSF, IDF, MS).

In the CCBA this species is only known from a shallow drainage in a grassland at Westwick Lakes.

![Geyer's Onion](https://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Allium+geyeri+var.+tenerum)


<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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<tr>
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<td>S2S3</td>
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</table>

100.2 **MANAGEMENT DIRECTION**

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

100.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest operations may affect Geyer's onion habitat, through road construction.
100.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Geyer's onion.

Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting moist meadows, banks, and rock outcrops in steppe to alpine zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

100.5 REFERENCES AND ADDITIONAL INFORMATION

101. **HALL'S WILLOWHERB**

101.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

Hall's willowherb (*Epilobium halleanum*) is a medium size (20 – 60 cm high) herbaceous plant that **grows from scaly, succulent shoots from a rhizome**. Stems have lines of short, stiff hairs below, which are mixed with glandular hairs above. Leaves are opposite for at least the lower leaves. The leaves are 0.5 – 4.7 cm long and egg-shaped to elliptic; they are smooth edged to finely toothed, blunt to somewhat pointed; fringed with short, stiff hairs but overall hairless; unstalked or very short-stalked. Flowers are in a more or less nodding inflorescence when in bud, but erect when open. The **petals are white or pink, notched at the tips** and 1.6 – 5.5 mm long; the sepals are green, 1.2 – 2.8 mm long and hairless to sparsely glandular-hairy; the ovaries densely glandular-hairy and short-stiff hairy. The fruits are glabrous to hairy, 2.4 – 6 cm long capsules with stalks 10 – 40 mm long. The seeds are narrowly egg-shaped and pimply with a tuft of white hairs. Occurs on moist slopes and open forests in steppe, lowland, montane and subalpine zones (BG, ESSF, ICH, SBS).

In the CCBA this species is known from a 1958 record from Bowron Lake Road Mile 6. E-Flora BC maps several other locations, but there is no location data with the “dots” and hence the accuracy is unknown.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Quesnel</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

101.2 **MANAGEMENT DIRECTION**

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

101.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest operations may affect Hall's willowherb habitat, through road construction.
101.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Hall's willowherb.

Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  
  - Establish a $\geq 30$ m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  
  - Prevent water and sediment inputs from ditches.
  
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting moist slopes and open forests in steppe, lowland, montane and subalpine zones, to minimize the potential for affecting an unknown population of this species.
  
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

101.5 REFERENCES AND ADDITIONAL INFORMATION


102. HOLBOELL’S ROCKCRESS

102.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Holboell’s rockcress (*Arabis holboellii var. pinetorum*) is a native “mustard” species, growing 10 – 100 cm high, with 1 to several stems. The stems are hairy near the base. The basal leaves are arranged in a rosette, they are 1 – 5 cm long and 2 – 5 mm wide; stem leaves are 1 – 3 cm long and 2 – 7 mm wide, narrowly oblong to linear. Numerous flowers are arranged along a tall stalk; the flowers have white to purple petals, 6 – 10 mm long. The fruits are long and linear siliques (pods) that droop downward from bent stalks, 3 – 6 cm long and 1.5 – 2 mm wide. There are many *Arabis* species and varieties, and they are difficult to distinguish. There are three other varieties of Holboell’s rockcress in the CCBA, which are distinguished by the shape of the siliques – var. *pinetorum* has the stalks of the siliques gradually arched out and down, not abruptly bent downward, and the siliques are usually curved downward. The other three varieties have the stalks of the siliques abruptly bent downward, and the siliques usually straight. Mesic to dry rocky slopes, gravelly areas, shrublands and grasslands in the steppe to alpine zones (BG, ESSF, IDF, SBS).

In the CCBA this species is known from McCalister, Becher Prairie, and 134 Mile Ranch near Lac La Hache (CDC supplementary plant data).
102.2 **MANAGEMENT DIRECTION**

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

102.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest operations may affect Holboell's rockcress habitat, through road construction.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
<td></td>
</tr>
<tr>
<td>Planning &amp; Layout</td>
<td>Planning Road Area Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

102.4 **MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Holboell's rockcress.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.
Landscape Level
Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting mesic to dry rocky slopes, gravelly areas, shrublands and grasslands in the steppe to alpine zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

102.5 REFERENCES AND ADDITIONAL INFORMATION


103. HUDSON BAY SEDGE

103.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Hudson Bay sedge (*Carex heleonastes*) is a medium-size sedge 25 – 40 cm in height, with bluntly triangular stems in cross-section that are rough below the inflorescence; developing from a short rhizome. There are numerous leaf blades that are bluish green, flat and wide; borne on the lower part of the main stem; the sheaths are tight. The inflorescence is composed of 4 to 6 spikes in a 1 – 3 cm long dense head at the tip of the main stem. It is many-flowered, with both male and female flowers; the female flowers are near the tips, the male flowers are lower and inconspicuous. **The lower-most bract of the inflorescence spike is awn-like.** The fruit (perigynia bract) is 2.5-3mm long; green to dark-green, egg-shaped, flat on one side and convex on the other; smooth, nervet and unstalked. Occurs in bogs, fens and damp boreal meadows in the montane zone (ESSF, ICH, IDF, MSxv, SBPS).

In the CCBA this species is known from Maeford Lake and from north-east of Anahim Lake.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Chilcotin</td>
<td>G4</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

103.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

103.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect Hudson Bay sedge habitat, through road construction.
### 103.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Hudson Bay sedge.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting bogs, fens and damp boreal meadows in the montane zone, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

#### 103.5 REFERENCES AND ADDITIONAL INFORMATION


104. ICELAND KOENIGIA

104.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Iceland koenigia (*Koenigia islandica*) is a tiny (2 – 6 cm long) annual herbaceous plant; it is one of the world’s smallest terrestrial flowering plants. It has several slender simple or branched, ascending stems, that are often reddish or crimson. The stems are smooth and grow from a slender taproot. There are a few basal leaves, 2 – 9 mm long and somewhat fleshy and smooth, widely elliptic to lanceolate and usually unstalked. Stem leaves are alternate or opposite and similar to the basal leaves; they have wax-papery sheathing stipules. The inflorescences are formed of several tiny greenish flowers, which lack petals, in a cluster, either in leaf axils or on the tip of the stem. The tiny fruits are smooth and greenish, whitish or reddish. Occurs in moist to wet gravelly seepage sites in subalpine and alpine zones (BAFA; IMA; SBPS), especially around persistent snow patches near streams, ponds, and lakes.

In the CCBA this species is known from Blue Canyon Creek in Itcha Ilgachuz Park.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quesnel</td>
<td>G4</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

104.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

104.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect Iceland koenigia habitat, through road construction.
### 104.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Iceland koenigia.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:
- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:
- Minimize road construction affecting moist to wet gravelly seepage sites in subalpine and alpine zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

### 104.5 REFERENCES AND ADDITIONAL INFORMATION


105. **KELLOGG'S KNOTWEED**

105.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

Kellogg's knotweed (*Polygonum polygaloides* ssp. *kelloggii*) is a small (1 – 15 cm) annual herbaceous plant with solitary, angled and smooth, erect or ascending, usually branched stems. The stems develop from a taproot. Stem leaves are alternate, 10 – 40 mm long, linear and unstalked; they have ragged stipules. Flowers are grouped in a spike-like inflorescence at the end of stems; they are closely crowded and usually overlapping. There are groups of 1 – 4 inflorescences in the axils of white- or green-margined floral bracts. Unequally 5-lobed perianths and white or red. Fruits are brown to nearly black and 3-angled; dull or shiny, smooth or longitudinally lined. Occurs in wet vernal pools and ditches or dry roadsides and meadows in montane and subalpine zones (ESSF, ICH, IDF, MS).

In the CCBA the only known site is Riske Creek; the data is from the CDC supplementary plant data.

![Map of Central Cariboo showing the location of Kellogg's knotweed](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo</td>
<td>G4G5T3T5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

105.2 **MANAGEMENT DIRECTION**

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

105.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest operations may affect Kellogg's knotweed habitat, through road construction.
105.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Kellogg's knotweed.

Overall Objective

Retain 70% of occurrences of Kellogg's knotweed in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:
- Road design and construction should minimize encroachment on the habitat of the known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:
- Minimize road construction affecting wet vernal pools and ditches or dry roadsides and meadows in montane and subalpine zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

105.5 REFERENCES AND ADDITIONAL INFORMATION

Species of Management Concern BCTS Cariboo Region

106. KRUCKEBERG'S HOLLY FERN

106.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Kruckeberg's holly fern (*Polystichum kruckebergii*) is somewhat similar to sword fern, but is much smaller with the leaf blades less flat and stiffer. The fronds grow from a short, stout rhizome. The fronds are lanceolate, 10 – 40 cm long and 3 – 7 cm wide; 1-pinnate with oblong, **deeply cut pinnae that are twisted out of the plane of the blade**; pinnae teeth prominent with spinulose points and tending to be spreading or widely incurved. Sori are round, borne on veins; **in 1 or more definite rows on each side of the midvein**; the indusium is peltate. **_occurs** on dry to mesic, ultramafic rock outcrops and talus slopes in montane and subalpine zones (ESSF, MS, SBS).

In the CCBA this species is only known east of Quesnel – Sovereign Mountain, Mt. Anderson and near Barkerville. Two of the records are in the CDC supplementary plant data.

![Photo © Ian Cumming](image)

<table>
<thead>
<tr>
<th>Known BGC Unit</th>
<th>Forest District</th>
<th>Global Rank</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified</th>
<th>COSEWIC</th>
<th>SARA Wildlife</th>
<th>Schedule</th>
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</thead>
<tbody>
<tr>
<td>Quesnel</td>
<td>G4</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
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</tbody>
</table>

106.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.
106.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest operations may affect Kruckeberg's holly fern habitat, through road construction, harvesting and silviculture.

<table>
<thead>
<tr>
<th>Relative Risk of Activities</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning &amp; Layout</td>
<td>Roads Layout</td>
<td>Road Construction</td>
<td>Bridge Removal</td>
<td>Falling</td>
</tr>
<tr>
<td>A (Probability of Interaction)</td>
<td>B (Legal Consequence)</td>
<td>C (Biological Consequence)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Risk Ranking</td>
<td>Planning &amp; Layout</td>
<td>Roads, Bridges and Culverts</td>
<td>Harvesting</td>
<td>Silviculture</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

106.4 **MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Kruckeberg's holly fern.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status. This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

- If harvesting will affect any area in which the fern is growing, consult a biologist regarding mitigation measures. For example,
  - Minimize the effects of harvesting and silviculture by minimizing damage to the plants
  - Leave patches of trees, advanced regeneration, and CWD to provide patches of shade during the stand regeneration to mitigate the increased sun intensity.
Landscape Level

Strategies to address unrecorded occurrences of this species are:

- In the general area from the junction of Lightning Creek with the Swift River to Barkerville, field crews should watch for Kruckeberg's holly fern.

106.5 References and Additional Information


107. LEAST MOONWORT

107.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Least moonwort (*Botrychium simplex*) is a tiny somewhat fern-like plant 0.5 – 7 cm high. Branched, fleshy stems grow from a short rhizome. A single stem divides into two blades near ground level – a sterile leaved blade, and a leafless, branched fertile blade. The sterile blade is 1 – 7.5 cm long and variable in shape; it is close to the common stalk and almost clasps it at times; there are 1 – 3 pairs (rarely 5) of rounded pinnae. The leafless fertile blade is long-stalked and usually taller than the sterile blade, lengthening as spores ripen. The sporangia are small and widely spaced. Pinnae are less lobed than other moonworts. Similar to Common Moonwort (*Botrychium lunaria*)

Occurs in damp meadows, vernal pools, moist woodlands and roadsides with rather poor or slightly acidic soil, in the lowland and montane zones (ICH; IDF; MS; SBPS).

In the CCBA this species is known from the Dean River, south-east of Towdystan.

![Photo © Jim Riley](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilcotin</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

107.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.
107.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest operations may affect least moonwort habitat, through road construction, harvesting and silviculture.

<table>
<thead>
<tr>
<th>Relative Risk of Activities</th>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Risk Ranking = A * (B + C)</td>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence</td>
<td>C = Biological Consequence</td>
<td>A = Planning</td>
</tr>
<tr>
<td>Planning Layout</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

107.4 **MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of least moonwort.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.
- For harvesting, consult a biologist regarding mitigation measures – it is likely that with minor modifications to standard operational practices the population can be maintained.
Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting damp meadows, vernal pools, moist woodlands and roadsides in the lowland and montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

107.5 REFERENCES AND ADDITIONAL INFORMATION


108. LEMMON'S ROCKCRESS

108.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Lemmon's rockcress (*Arabis lemmonii* var. *drepanoloba*) is a small wild “mustard” that grows 5 – 20 cm high. It has smooth to densely hairy stems. The basal leaves are 1.5 – 2 cm long and 3 – 6 mm wide, lanceolate, and with the margin smooth or slightly toothed. The stem leaves are oblong to lanceolate, ear-like in shape at their bases, and smooth to hairy. There are a few purple flowers on a stem, with petals 4 – 7 mm long. Elongated fruits are 3 – 4 cm long, and horizontally spreading with a slight upward or downward arch; seeds have very narrow wings.

Occurs in mesic to moist fields, and scree and talus slopes in the alpine.

In the CCBA the species is known from the Tchaikazan Glacier, near Taseko Lake. The record is from the CDC supplementary plant data.

108.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

108.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not affect the alpine habitat of Lemmon's rockcress.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Risk Ranking = A * (B + C)</th>
<th>A = Probability of Interaction</th>
<th>B = Legal Consequence of Interaction</th>
<th>C = Biological Consequence of Interaction</th>
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### Relative Risk of Activities

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<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
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<tbody>
<tr>
<td>Planning</td>
<td>Road Layout</td>
<td>Road</td>
<td>Site Preparation</td>
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<tr>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
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<td>Silviculture</td>
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<td>Skidding</td>
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<td>Site Preparation</td>
<td>Silviculture</td>
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</tbody>
</table>

### 108.4 MANAGEMENT STRATEGY

None.

### 108.5 REFERENCES AND ADDITIONAL INFORMATION


109. **LITTLE FESCUE**

109.1 **Species Summary: Identification and Habitat**

Little fescue (*Festuca minutiflora*) is a densely tufted, perennial grass that grows 4 – 30 cm high. There are visible nodes in taller plants. The grass grows from fibrous roots. The leaves have *inconspicuous sheaths at the stem base*, leaves remain entire and do not shred; the *leaf blades are folded*, 1-7 cm long. Flowers are in a tiny, narrow, panicle inflorescence, 1 – 4 cm long; spikelets 2- to 5-flowered, 2 – 5.5 mm long; lower glumes shorter than upper ones; *lemmas awned*; ovary tops sparsely hairy. Occurs on dry, stony slopes in alpine zones.

In the CCBA this species is known from Taseko Mountain and Bluff Lake.

![Map of the Cariboo Region showing the location of Little Fescue](image)

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<thead>
<tr>
<th>Known BGC Unit</th>
<th>Forest District</th>
<th>Global Rank BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
<th>COSEWIC</th>
<th>SARA Schedule</th>
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</table>

109.2 **Management Direction**

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

109.3 **Forest Management Issues and Risk Assessment**

Forest operations will not affect the habitat of little fescue.
## Relative Risk of Activities

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<th>Total Risk Ranking</th>
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<td>Probability of Interaction</td>
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</tbody>
</table>

### 109.4 Management Strategy

None.

### 109.5 References and Additional Information


110. LOW HAWKSBEARD

110.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Low hawksbeard (Crepis modocensis ssp. modocensis) is a small plant (10 – 30 cm high) with silvery white, broad, dandelion-like leaves. It has 1 – 4 erect few-branched stems with whitish, crisped, densely stiff hairs near the base; growing from a woody-based taproot. The basal leaves are 7 – 25 cm long; deeply and pinnately cut with lanceolate, toothed and sharp-pointed or long pointed lobes and abruptly callus-tipped teeth; leaf blades are smooth or woolly-hairy, the midribs and stalks are short-hairy. The stem leaves are similar to basal leaves, and become smaller upwards. The broad, dandelion-like flower heads are yellow, and all the flowers are ray-flowered. The flowers have grey-woolly, stout involucral bracts containing glandless bristles; the bracts are whitish to blackish, the outer ones lanceolate and half as long as the inner ones. The hairs of the pappus—the seed appendage that aids in their dispersal—are bristly and suggest the “moustache” feathers on either side of the beak of certain hawks, whence their common name. It has deeply incised, long-stemmed, “pinnate” (feather-like), basal leaves. A technical key and considerable experience is required to distinguish between the various species of Crepis.

Occurs in dry grasslands and shrublands in the steppe zone (BGxw1). There is a historical site from the Junction Sheep Range; the only known modern site in BC is in the Pavilion Lake area, Kamloops FD.

![Historical location from Rare Plants of BC.](https://example.com)

© Jim Riley

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
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<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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<td>Red</td>
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</table>

110.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

110.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect low hawksbeard habitat, through road construction.
### 110.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of low hawksbeard.

#### Overall Objective

Retain 100% of occurrences of this red-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

#### Stand Level

Strategies to address known occurrences of this species are:

- Road construction should never encroach on the habitat of a known occurrence.
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

#### Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting dry grasslands and shrublands in the BG, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species should be done first to achieve the “overall objective” given above.

### 110.5 References and Additional Information


111. MANY-HEADED SEDGE

111.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Many-headed sedge (*Carex sychnocephala*) is a medium-size sedge (5 – 50 cm high) with stems barely exceeding the leaf height, and often nodding. The plant grows in clumps from a fibrous root mass. The numerous leaf blades are 1.5 – 4 mm wide, and flat; developing from the lower 1/3 of the stem; sheaths tight. The inflorescence is composed of 5 – 15 spikes, aggregated into a 1 – 3 cm long ellipsoid head; unstalked with both male and female flowers, female flowers towards the tips. The long leaf-like bracts at the base of the spikes are 2 – 15 cm long and sheathless; the lowermost bracts are much elongated, and the others are slightly shorter. The long, narrow pale green or tan fruit is 4.5 – 6 mm long and 0.9 - 1.2 mm wide, and narrowly lanceolate; green to straw-coloured or brownish; the margins are narrowly winged nearly to the bases and with the upper 1/2 fringed with teeth. A technical key and considerable experience is required to reliably identify *Carex* species. Occurs in wet to moist meadows and on shorelines in steppe and montane zones (BG, IDF, MS, SBPS, SBS).

In the CCBA this species is known from near Anahim Creek, Scum Lake, Tatlayoko Lake, and Elkin Lake.

<table>
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<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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<tr>
<td>Chilcotin</td>
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<td>Blue</td>
<td></td>
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</tbody>
</table>

111.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

111.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect many-headed sedge habitat, through road construction.
### 111.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of many-headed sedge.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting wet to moist meadows and on shorelines in steppe and montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

### 111.5 REFERENCES AND ADDITIONAL INFORMATION


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<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
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<td>Road Construction</td>
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</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
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</table>
112. MARSH MUHLY

112.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Marsh muhly (*Muhlenbergia glomerata*) is a moderately tall grass (30 – 120 cm high) with hollow, unbranched or sparingly branched, erect stems that are slightly compressed and are finely short-hairy. The stems grow from scaly rhizomes. Leaf blades are 2 – 15 cm long and 2 – 6 mm wide, flat and minutely rough or occasionally smooth; the ligules are jagged to more or less fringed with fine hairs, membranous and squared off at the tips. The inflorescence is a densely-flowered, somewhat lobed panicle, 1.5 – 12 cm long; with tightly appressed branches and densely clustered spikelets. The spikelets are unstalked to nearly short-stalked and are 1-flowered; the glumes are 1-nerved and smooth to minutely rough near the tips; the lemmas are 3-nerved, oblanceolate, short soft-hairy along the midnerves, margins and at the base and unawned or short awn-tipped. Occurs in wet to moist, mineral-rich or calcareous streambanks, bogs, meadows, ditches, lake margins and hot springs in steppe and montane zones (BG, ESSF, ICH, IDF, MS, SBPS).

In the CCBA this species is known from near Puntzi Lake (CDC supplementary plant data), Tatla Lake, One Eye Lake, and Kleena Kleene in the Chilcotin, and Kimball Lake on the upper Cariboo River.

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**Known BGC Unit**

<table>
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<tr>
<th>Forest District</th>
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<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
<th>COSEWIC</th>
<th>SARA Schedule</th>
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<td>Blue</td>
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112.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

112.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect marsh muhly habitat, through road construction.
### 112.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of marsh muhly.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a $\geq 30$ m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting wet to moist, mineral-rich or calcareous streambanks, bogs, meadows, ditches, lake margins and hot springs in steppe and montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect wet to moist sites that are mineral-rich or calcareous, in the steppe and montane zones, a rare plant inventory for this species should be done first to achieve the “overall objective” given above. These sites may have other species at risk present, and may be mineral licks and/or wallows for ungulates and bears.
  - If road construction must affect other habitats suitable for marsh muhly, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.
112.5 **REFERENCES AND ADDITIONAL INFORMATION**


113. MEADOW ARNICA

113.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Meadow arnica (*Arnica chamissonis* ssp. *incana*) has flowers similar to the common heart-leaved arnica. It grows 20 – 100 cm in height, with solitary, erect stems and occasionally branched below middle; stems sparsely to densely hairy. Basal leaves shrivel by flowering time. Stem leaves are 3 – 30 cm long and 0.3 – 8 cm wide; lanceolate to oblanceolate, margin smooth to toothed, decreasing in size up the stem. Stem leaves are in 5 to 10 pairs, rarely only 4 pairs. There are 5 - 15 flower heads with both ray and disk flowers; the ray flowers are yellow with conspicuous apical teeth; the disk flowers are also yellow. The involucral bracts are 8 – 15 mm tall; the bracts are lanceolate and sparsely to densely hairy with a conspicuous tuft of whitish hairs at the apex. The fruits are cylindric, with tawny or whitish pappus (fluff) that is finely barbed or feathery. Occurs in wet to mesic meadows and forest openings in the montane and subalpine zones (ICH; IDF; SBPS; SBS).

In the CCBA this species is known from near Riske Creek, Itcha Ilgachuz Park (both from CDC supplemental plant data), Alkali Lake, Scum Lake, Kleena Kleene, and Haines Creek north of Wildhorse Meadow.


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<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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113.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

113.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect meadow arnica habitat, through road construction, harvesting and silviculture.
### 113.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of meadow arnica.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction and harvesting affecting wet to mesic meadows and forest openings in the montane and subalpine zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction or harvesting must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the "overall objective" given above.

### 113.5 REFERENCES AND ADDITIONAL INFORMATION


114. MILKY DRABA

114.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Milky draba (*Draba lactea*) is a small wild “mustard” that grows 5 – 10 cm high, usually with a branched stem base and erect, smooth stems. Stems grow from a taproot. The basal leaves are 0.5 – 2 cm long; they are hairy with some starlike hairs towards the apex, and the lower leaf surface has branched hairs or stalked, starlike hairs with 9 or more rays. The leaf margins are hairy-fringed with simple or branched to starlike hairs near the apex and midribs. There is 1 or no stem leaf. The inflorescence is of 2 to 7 flowers with a 1 – 8 mm long smooth to sometimes short-hairy stalks. Flower petals are 2.5 – 4 mm long and creamy white; the sepals are 1.5 - 2.2 mm long and sparsely soft-hairy. Occurs in mesic to dry meadows and cliffs in subalpine and alpine zones.

In the CCBA this species is only known from Stonecrop Ridge in Itcha Ilgachuz Provincial Park.


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<tbody>
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<td>S2S3</td>
<td>Blue</td>
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</table>

114.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

114.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not interact with the alpine habitat of milky draba.
### Total Risk Ranking

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#### Risk Ranking = A * (B + C)

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</tr>
</tbody>
</table>

**114.4 MANAGEMENT STRATEGY**

**Stand and landscape Level**

None required.

**114.5 REFERENCES AND ADDITIONAL INFORMATION**


115. MONTANA LARKSPUR

115.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Montana larkspur (*Delphinium bicolor* ssp. *bicolor*) is a moderately tall (10-40 cm), conspicuous herbaceous plant with numerous large blue-purple flowers. Growing from fibrous, many-branched roots; the stems are erect, smooth to minutely-hairy, bases often reddish. The leaves are mostly on the lower stem; at time of flowering there are 2 – 7 basal leaves and 3 – 6 stem leaves. The leaf stalks are 0.3 – 8 cm long; leaf blades are rounded, 1 – 4 cm long, 1.5 – 7 cm wide (smaller higher up the stem), 3- to 4-times dissected into linear segments, 3 – 19 broad ultimate segments that are 1 – 8 mm wide on basal leaves and 1 – 3 mm wide on stem leaves, smooth to minutely-hairy. The inflorescence has 3 – 12 flowers. The flowers are bilaterally symmetric; the bracts are linear, 4 – 6 mm long and minutely-hairy. The flower stalks are ascending to spreading, 1 – 4 cm long, somewhat minutely-hairy. The flowers have 4 petals; the upper 2 are fused, white or pale blue, purple-lined, spurred, enclosed in upper sepal, nectary inside spur; the lower 2 petals are dark blue, clawed, 7 – 12 mm long, 2-lobed, shallowly notched (0.1 – 2 mm), the hairs sparse, short, white, mostly on inner lobes on claw. There are 5 sepals, dark blue to purple, the lateral two spreading, 16 – 21 mm long, 6 – 11 mm wide, the lower two similar to lateral, the upper one spurred, the spur straight to gently curved downward. The more common upland larkspur has deeply notched lower petals, narrower ultimate leaf segment, and grows from a taproot. Occurs in dry grasslands, shrublands, rocky slopes and forests from the steppe to subalpine zones (ESSF; ICH; IDF; MS).

In the CCBA this species is known from a single historical record near Alexis Creek; the exact data is not available.

![Historical record from Rare Plants of BC](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC SCHEDULE</th>
<th>SARA SCHEDULE</th>
</tr>
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<tbody>
<tr>
<td>Chilcotin</td>
<td>G4G5T4T5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
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</tbody>
</table>

115.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.
### 115.3 Forest Management Issues and Risk Assessment

Forest operations may affect Montana larkspur habitat, through road construction, harvesting and silviculture. The plants are likely to survive harvesting in the absence of disc trenching.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout Risk</th>
<th>Roads, Bridges and Culverts Risk</th>
<th>Harvesting Risk</th>
<th>Silviculture Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning &amp; Layout</td>
<td>Roads, Bridges and Culverts</td>
<td>Harvesting</td>
<td>Silviculture</td>
</tr>
<tr>
<td>A = Probability of Interaction</td>
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<td>B = Legal Consequence</td>
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<td>C = Biological Consequence</td>
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</tr>
<tr>
<td>Planning Area Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
<td>Bridge Installation</td>
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<td>1</td>
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</tbody>
</table>

### 115.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Montana larkspur.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.
- Minimize soil disturbance during harvesting and silviculture.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction and harvesting affecting dry grasslands, shrublands, rocky slopes and forests from the steppe to subalpine zones, to minimize the potential for affecting an unknown population of this species.
- If road construction or harvesting must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.
115.5 REFERENCES AND ADDITIONAL INFORMATION


116. MUTTON GRASS

116.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Mutton grass (*Poa fendleriana* ssp. *fendleriana*) is a bunchgrass with erect stems 15 – 70 cm tall. It develops tillers at the base and rarely produces short rhizomes. Leaves are mainly basal, and are rather firm and stiff. The *leaf blades are folded or inrolled*, rarely flat, and are *thick with a smooth outer surface*; the inner surface of blades of sterile shoots are usually distinctly rough or minutely soft-hairy; the ligules have smooth or rough backs; the sheath margins are open about 2/3 their length. The upper leaf blades are often absent or very reduced. It is drought resistant, palatable and nutritious, and starts growth very early; the name reflects the value placed on the grass for sheep feed east of the Rocky Mountains. Flowers occur in a lanceolate to egg-shaped, erect and congested panicle *inflorescence*, 2-12cm long, *frequently with more than 100 spikelets*; there are 1 to 2 branches per node, smooth to rough and appressed at maturity. The *spikelets* are 4 – 8 mm long, *with 2 – 7 flowers and laterally compressed*; lower glumes 1- to 3-nerved; lemmas 3 – 6 mm long, lanceolate with sharp-pointed tips and smooth to slightly rough surfaces; palea keels rough, somewhat minutely soft or short silky-hairy. Mutton grass occurs in dry grasslands, talus, and ridges. It is well adapted to dry slopes and is found on clay loam as well as sandy or gravelly soils. Occurs in dry grasslands and ridges in steppe and lower montane zones (BG; IDFxw).

Within the CCBA this species has a very limited distribution; it has been recorded from Kelly Lake.

116.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

116.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect mutton grass habitat, through road construction.
### Species of Management Concern BCTS Cariboo Region

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
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</thead>
<tbody>
<tr>
<td>Risk Ranking</td>
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<td>Bridge Removal</td>
<td>Falling</td>
<td>Site Preparation</td>
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<td>B = Legal Consequence of Interaction</td>
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<td>C = Biological Consequence of Interaction</td>
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<td>Planning</td>
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<td>Harvesting</td>
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**Relative Risk of Activities**

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<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
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<td>Planning</td>
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<td>Falling</td>
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<td>Road Maintenance</td>
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</table>

**116.4 MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the mutton grass.

**Overall Objective**

Retain 100% of occurrences of this red-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road construction should never encroach on the habitat of a known occurrence.
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting grasslands, meadows, and other dry non-forested sites in the BG, IDFxm and IDFxw, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species should be done first in the BG at least, and if feasible in the IDFxm and IDFxw, to achieve the “overall objective” given above.

**116.5 REFERENCES AND ADDITIONAL INFORMATION**


117. NORTHERN JACOB’S-LADDER

117.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Northern Jacob’s-ladder (*Polemonium boreale*) is an attractive, short (8 – 30 cm high) herbaceous plant with blue bell-shaped flowers with yellow centers. There is one or more erect or ascending hairy stems that grow from a rhizome; with a branching stem-base. Leaves are mostly basal, alternate and pinnately compound with 13 – 23 elliptic to oval and distinctly hairy leaflets, 4 – 12 mm long and 1 – 5 mm wide. Flowers are clustered in a head-like inflorescence in leaf axils and at the tip of the stem; the blue (sometimes white) flower is broadly bell-shaped, 15 – 20 mm long; the bell has 5 lobes that are rounded at the tips; The fused bracts behind the petals has 5 teeth that are lanceolate to oblong and usually pointed. The flowers are larger than the more common showy Jacob’s-ladder. [In books the flowers of the various Jacob’s-ladder species appear pink, because photographic film is more sensitive to pink than blue. Hence flowers that have both pink and blue in the colour, frequently appear pink in photographs.] Occurs in mesic to dry meadows, scree slopes, tundra and rock outcrops in montane to alpine zones.

In the CCBA this species is known from Campanula Peak in Itcha Ilgachuz Provincial Park.

Image at 

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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</thead>
<tbody>
<tr>
<td>Chilcotin</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
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</table>

117.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

117.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not affect northern Jacob’s-ladder habitat.
### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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</thead>
<tbody>
<tr>
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<td>A = Probability of Interaction</td>
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</table>

### 117.4 MANAGEMENT STRATEGY

None required.

### 117.5 REFERENCES AND ADDITIONAL INFORMATION


118. **NUTTALL'S DRABA**

118.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

Nuttall’s draba (*Draba densifolia*) is a small (0.5-15cm high) mat-forming wild “mustard” with leaf rosettes at the ends of numerous rootcrown branches, which are clothed with old leaf bases. It has erect, smooth to hairy stems with simple to branched hairs; the stems grow from a taproot. Leaves are all basal with the upper surface usually smooth, and the lower surface with simple to 3-branched hairs; leaves are linear to linear-oblongolate with hairy-fringed margins of stiff simple hairs. There are no stem leaves. There are 3 – 15 flowers in an inflorescence; flowers have 2 – 5 mm hairy stalks, 2 – 6 mm yellow petals, and 2 - 2.5 mm soft-hairy sepals. Fruits are egg-shaped to elliptic silicles, 2 – 7 mm long and hairy or smooth. There are many similar-appearing, yellow-flowered, mat-forming species of *Draba*. A technical key and considerable experience is required to reliably identify them. Occurs within meadows, rocky slopes and cliffs in subalpine and alpine zones.

In the CCBA this species is only known from Campanula Peak in Itcha Ilgachuz Provincial Park. E-Flora BC lists a record for near the Junction Sheep Range from Ecosystem Classification data – this is likely an error.

![Map of NUTTALL'S DRABA in the Cariboo Region](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilcotin</td>
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<td>S2S3</td>
<td>Blue</td>
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</tbody>
</table>

118.2 **MANAGEMENT DIRECTION**

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

118.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest operations will not affect Nuttall's draba habitat.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Risk Ranking</th>
<th>Planning Layout</th>
<th>Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
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### Relative Risk of Activities

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<th>Roads, Bridges and Culverts</th>
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#### 118.4 MANAGEMENT STRATEGY

None required.

#### 118.5 REFERENCES AND ADDITIONAL INFORMATION


119. PLAINS BUTTERWEED

119.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Plains butterweed (*Senecio plattensis*) is a medium-height (16 – 50 cm high) herbaceous plant with bright yellow flowers. There are erect, solitary stems, branched above and thinly to moderately white woolly-hairy. There is a short woody stem-base growing from fibrous roots. The basal leaves are stalked, 2 – 11 cm long, lanceolate to oblanceolate, margins nearly smooth to toothed, and long hairy to densely white woolly-hairy. The stem leaves are similar and are progressively smaller up the stem, becoming unstalked. There are up to several flowerheads composed of both ray and disk flowers; the stalks of the flowerheads are white woolly-hairy; the bracts behind the flowerhead are smooth, lanceolate, green or purplish-tipped and densely long-hairy below; margins translucent and ray and disk flowers yellow. The fruits are smooth or rarely coarse-hairy, with white hairlike bristles.

Occurs in dry open meadows and forests in the steppe and montane zones (BG; IDF; SBPS; SBS).

In the CCBA this species is recorded in the CDC database from two sites near Anahim Lake, in shrub wetlands. E-Flora BC also has an old record from “between Quesnel and Williams Lake, in Lodgepole pine forest”, which is arbitrarily mapped below as mid-way between the towns, “25 km southeast of Tatla Lake, in open white spruce forest”, and Stum Lake.


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<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chilcotin</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

119.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

119.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect plains butterweed habitat, through road construction, harvesting and silviculture. The plants are likely to survive harvesting in the absence of disc trenching.
### 119.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Plains Butterweed.

#### Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

#### Stand Level

Strategies to address known occurrences of this species are:
- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.
- During harvesting and silviculture, minimize soil disturbance. If necessary, consult a biologist regarding mitigation measures.

#### Landscape Level

Strategies to address unrecorded occurrences of this species are:
- Minimize road construction and harvesting affecting dry open meadows and dry forest openings in the steppes and montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction and harvesting must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.
- Minimize soil disturbance when harvesting areas that include dry forest openings.
119.5 REFERENCES AND ADDITIONAL INFORMATION


120. **PORCUPINE SEDGE**

120.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

Porcupine sedge (*Carex hystricina*) is a fairly tall sedge (15 – 100 cm high) with stems as long as or longer than the leaves; grows from a stout rhizome. There are **3 – 7 leaf blades per stem**; they are flat with crosswalls and **margins slightly rolled-under**; the sheaths are reddish with lower ones breaking into threads. The inflorescence is formed of 2 to 5 spikes; the **terminal spike** is 2 – 4 cm long **with male flowers**, and the **1 – 4 lower spikes have female flowers**. The lower spikes are long-stalked and curved back, the upper spikes are short-stalked and erect. The bracts are leaf-like and below and sheathing the female spikes; the lower bracts are much longer than the spikes and their stalks. The **fruits** are 5 – 7 mm long, lanceolate to egg-shaped and usually pale green; smooth, shiny, inflated, **15 – 20-nerved**, spreading or directed downwards.

Occurs in swamps and wet meadows, and along shorelines and streambanks in the steppe and montane zones (BG; IDF, MS, SBPS).

In the CCBA this species is known from near the Fraser River at McEwan Creek, and from near Eagle Lake.

<table>
<thead>
<tr>
<th><strong>KNOWN BGC UNIT</strong></th>
<th><strong>FOREST DISTRICT</strong></th>
<th><strong>GLOBAL RANK</strong></th>
<th><strong>BC RANK</strong></th>
<th><strong>BC LIST</strong></th>
<th><strong>IDENTIFIED WILDLIFE</strong></th>
<th><strong>COSEWIC</strong></th>
<th><strong>SARA SCHEDULE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Chilcotin</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

120.2 **MANAGEMENT DIRECTION**

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

120.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest operations may affect porcupine sedge habitat, through road construction.
Species of Management Concern BCTS Cariboo Region

Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Road Layout</td>
<td>Road Road Construction</td>
<td>Road Maintenance</td>
</tr>
<tr>
<td>6 2 1 2</td>
<td>2 2 2 1</td>
<td>0 0 0 0</td>
<td>0 0 0 0</td>
<td>0 0 0 0</td>
</tr>
</tbody>
</table>

120.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of porcupine sedge.

Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting swamps, wet meadows, shorelines, and streambanks in the steppe and montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

120.5 REFERENCES AND ADDITIONAL INFORMATION


121. PORCUPINEGRASS

121.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Porcupinegrass (*Hesperostipa spartea*, also known as *Stipa spartea*) is a tall (45 – 140 cm high) tufted perennial grass growing from fibrous roots, and with long “needle and thread” seeds. The long “thread” (awn) portion of the seed is hygroscopic, untwisting in wet weather and twisting in dry weather. The seeds are much longer (25+ cm) than most other related species. The lower stem nodes are usually crossed by lines of hairs. The leaf blades are 1.5 – 4.5 mm long, flat to inrolled; the lower ligules are blunt to rounded, not toothed or ragged along the margins; the upper ligules are pointed, thin and often ragged along margins; the upper ligules are longer than lower ones. The inflorescence is a 10 – 25 cm long panicle with ascending to erect branches; glumes are 22 – 45 mm, slender, unequal and pointed; the lemmas are awned, with awns bent, 9 – 18 cm long and rough and straight tip segments; lemmas are mostly smooth with brown hairs on the base and margins. Occurs on dry to mesic slopes and in open forests in the steppe and lower montane zones (BG and IDF).

In the CCBA the species is known from the Riske Creek area – Becher Prairie, River Ranch, Rock Lake, and “Stonehenge site”. There is an E-Fauna BC record from about 3 miles north of Marguerite on Hwy 97, where it was common in an open meadow between aspen groves.

Porcupinegrass (*Hesperostipa spartea*) and short-awned porcupinegrass (*Hesperostipa curtiseta*) were formerly considered to be varieties of the same species, *Stipa spartea* var. *spartea* and *S. spartea* var. *curtiseta*. Some of the records for porcupinegrass may actually be misidentifications of short-awned porcupinegrass.

![Map of the Cariboo region showing the known occurrences of porcupinegrass.](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Chilcotin; Quesnel</td>
<td>G5</td>
<td>S2</td>
<td>Red</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

121.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.
121.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest operations may affect porcupinegrass habitat, through road construction, harvesting and silviculture. The plant will probably survive harvesting, in the absence of disc trenching.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Bridge Installation</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

121.4 **MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of porcupinegrass.

**Overall Objective**

Retain 100% of occurrences of this red-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road construction should never encroach on the habitat of a known occurrence.
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.
- Confirm that porcupinegrass is actually present in the area, and that the record was not a misidentification of short-awned porcupinegrass.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction and harvesting affecting dry to mesic slopes and open forests in the BG and IDFxm, to minimize the potential for affecting an unknown population of this species.
  - If road construction or harvesting must affect these habitats, a rare plant inventory for this species should be done first in at least the BG, and preferably the IDFxm, to achieve the “overall objective” given above.
- If harvesting in these habitats, minimize soil disturbance and avoid disc trenching.
121.5 REFERENCES AND ADDITIONAL INFORMATION

http://www.env.gov.bc.ca/wld/documents/spsum/PMPOA5X0Y0.pdf.

122. **PURPLE ONIONGRASS**

122.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

Purple oniongrass (*Melica spectabilis*) is a perennial grass growing from rhizomes; it is **bulbous-based**, the bulbs spaced at intervals of 1 – 3 cm along the rhizomes and remaining attached. The stems are erect, 30 – 80 cm tall. The leaf sheaths usually open for 3 – 10 mm, but are occasionally completely closed; they are minutely rough. The leaf blades are smooth or minutely rough- to crisp-hairy, 2 - 4 mm wide, flat to slightly in-rolled. The ligules are collar-like but generally open in front, usually irregular-jagged, blunt to rounded, smooth, 1 – 3 mm long. The inflorescence is a narrow panicle 7 – 15 cm long; the branches are slender and erect. The spikelets have 3 – 8 flowers and are somewhat compressed, 9-15 mm long; glumes less than 1/2 the length of the spikelets. The lower ones are about 5 mm long, prominently 3-nerved, but with lateral nerves shorter, obscure. The upper glumes are 6 – 7 mm long and 5 – 7-nerved. The lemmas are smooth, strongly 7- to 11-nerved, blunt, 6 – 8 mm long, unawned. Occurs in wet to dry meadows and open forests in the montane and subalpine zones (BAFA; CMA; ESSF; ICH; IDF; IMA; MS; SBS).

In the CCBA the species is known from Potato Mountain, Tatlayoko Valley, where it was common over 5-10 ha in the subalpine. There is also an Ecosystem Classification record from near Horsefly, given by E-Flora BC. The record is possible, but there are too many errors in that database to know for certain.

![Map of Purple Oniongrass](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED</th>
<th>COSEWIC</th>
<th>SARA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilcotin</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

122.2 **MANAGEMENT DIRECTION**

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

122.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest operations may affect purple oniongrass habitat, through road construction, harvesting and silviculture. The plant will probably survive harvesting, in the absence of disc trenching.
### 122.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of purple oniongrass.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a $\geq 30$ m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

- For harvesting, or silviculture near a known occurrence, consult a biologist regarding mitigation measures – harvesting and silviculture may be able to occur without harm to the plant, in the absence of disc trenching.

**Landscape Level**

- Minimize road construction and harvesting affecting wet to dry meadows and open forests in the montane and subalpine zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction or harvesting must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

### REFERENCES AND ADDITIONAL INFORMATION


PURPLE-LEAVED WILLOWHERB

Species Summary: Identification and Habitat

Purple-leaved willowherb (Epilobium ciliatum ssp. watsonii) is a medium-size (15 – 150 cm high) herbaceous plant with simple or branched, generally finely stiff-hairy stems; the hairs are either in lines or spreading. The stems grow from fleshy bulblets. Leaves are opposite or alternate, 1 – 15 cm long, lance or egg-shaped and the leaf margin is finely-sharp toothed to almost smooth; veins are distinct and leaf stalks are 0 – 8 mm long. The flowers are on the tip of the stem, there are leaves at the base of the flower cluster. The flowers are finely stiff-hairy, some hairs spreading and some glandular hairs; the flower petals are rose-purple to white, notched at the tips and 2 – 14 mm long; the sepals are reddish, 2 – 7.5 mm long.; The fruit are hairy capsules, 1.5 – 10 cm long with 0 – 3 cm long stalks; seeds longitudinally grooved with tufts of white hair, readily detaching.

Occurs in wet to mesic disturbed areas, roadsides, in fields and ditches from lowland to montane zones (ICH; IDF; SBS).

In the CCBA this species is known from south of Riske Creek and 3.2 km north of the Chilcotin River bridge on the Big Creek Road near Lees Corner.

Management Direction

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

Forest Management Issues and Risk Assessment

Forest operations may affect purple-leaved willowherb habitat, through road construction and maintenance.
### Relative Risk of Activities

- **Total Risk Ranking**
- **Planning & Layout**
- **Roads, Bridges and Culverts**
- **Harvesting**
- **Silviculture**
- **Density Management**

<table>
<thead>
<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking</td>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence</td>
<td>C = Biological Consequence</td>
<td>Planning</td>
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</tbody>
</table>

### 123.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of purple-leaved willowherb habitat.

#### Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

#### Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

#### Landscape Level

- Minimize road construction affecting wet to mesic disturbed areas, roadsides, in fields and ditches from lowland to montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction or maintenance must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

### 123.5 REFERENCES AND ADDITIONAL INFORMATION


124. RIVERBANK ANEMONE

124.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Riverbank anemone (*Anemone virginiana* var. *cylindroidea*) is a moderately tall (30 – 100 cm) herbaceous plant with a 2 – 3 green or yellow-green flowers on each plant. They flower in the spring at low elevations. They have a woody stem base, with 1 – 5 whorled leaves growing on long 5 – 35 cm stalks from the base; sparsely hairy. Leaves are all basal, ascending and palmately 3-parted, 8 – 20 cm wide with coarsely toothed margins. Flowers are positioned at the end of long hairy stalks; flowers are over 13 mm wide, and have 5 petal-like sepals that are oblong to elliptic or egg-shaped. There is an oval to egg-shaped fruit head (2 – 4 cm long) on 13 – 25 cm stalks; the achenes are wide, not winged and densely woolly-hairy; beaks curved. The habitat is moist to mesic gravel bars, stream banks, and forests in the montane zone (SBS).

In the CCBA the only known record is from “Quesnel, spruce-balsam stand”.


<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quesnel</td>
<td>G5T4T5</td>
<td>S1</td>
<td>Red</td>
<td></td>
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</tr>
</tbody>
</table>

124.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

124.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect riverbank anemone habitat, through road construction, harvesting, and silviculture. It is likely to survive harvesting in the absence of disc trenching.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

### Relative Risk of Activities

- **Planning & Layout**
  - Road Construction
  - Road Maintenance
  - Road Deactivation
  - Bridge Installation
  - Bridge Removal
  - Falling
  - Yarding
  - Skidding
  - Forwards
  - Loading
  - Processing
  - Handling
  - Site Preparation

- **Silviculture**
  - Vegetation Management
  - Density Management

### 124.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of riverbank anemone habitat.

#### Overall Objective

Retain 100% of occurrences of this red-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

#### Stand Level

Strategies to address known occurrences of this species are:

- Road construction should never encroach on the habitat of a known occurrence.
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

#### Landscape Level

- Minimize road construction affecting moist to mesic gravel bars and stream banks in the montane zone, to minimize the potential for affecting an unknown population of this species.
- This species is so rare, and its potential occurrence encompasses so many habitats, that it is not feasible to consider inventory of moist to mesic gravel bars, stream banks, and forests in the montane zone prior to road construction, harvesting, and silviculture.

### 124.5 REFERENCES AND ADDITIONAL INFORMATION


125. **RIVERGRASS**

### 125.1 Species Summary: Identification and Habitat

Rivergrass (*Scolochloa festucacea*) is a tall (1 - 1.5 m) semi-aquatic grass that grows up to 1.5 m tall. It is a stout perennial with a thick rhizome. Leaf blades are flat, firm, elongate and narrowing gradually to slender tips; the ligules are jagged and with **sheaths open, strongly keeled and usually smooth**. The flowerhead is long (15 – 25 cm) and open, and the long branches are mostly smooth below the mid-point. The **3- to 4-flowered spikelets** are located at the end of branches, with upper glumes longer than lower glumes and **awnless; lemmas 7-nerved**; calluses bearded. Rivergrass grows in standing water of ponds, marshes, lakeshores, and stream sides in the steppe and montane zones (BG, IDF, SBPS, SBS).

In the CCBA this species is known from near Williams Lake (marsh along San Jose River, outlet to Williams Lake, and Williams Lake River), Tatla Lake (marsh at Ranger Station and 17 miles east of Tatla Lake on Hwy 20), Hargreaves Creek (Farwell Canyon Road), and Spain Lake. The Sugar Cane Indian Reserve was named after this grass.

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### Known BGC Unit

<table>
<thead>
<tr>
<th>Known BGC Unit</th>
<th>Forest District</th>
<th>Global Rank</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
<th>COSEWIC</th>
<th>SARA Schedule</th>
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</thead>
<tbody>
<tr>
<td>Central Cariboo; Chilcotin</td>
<td>G5</td>
<td>S2</td>
<td>Red</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 125.2 Management Direction

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

### 125.3 Forest Management Issues and Risk Assessment

Forest operations may affect rivergrass habitat, through road construction (especially stream crossings).
### 125.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of rivergrass habitat.

**Overall Objective**

Retain 100% of occurrences of this red-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

**Stand Level**

Strategies to address known occurrences of this species are:
- Road construction should never encroach on the habitat of a known occurrence.
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:
- Minimize road construction affecting standing water of non-forested ponds, marshes, lakeshores, and stream sides in the steppe and montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species should be done first to achieve the "overall objective" given above.
- A rare plant inventory is not needed for standing water of forested (shaded) ponds, marshes, lakeshores, and stream sides in the steppe and montane zones, because that habitat is not used.

### 125.5 REFERENCES AND ADDITIONAL INFORMATION


126. SHEATHING PONDWEED

126.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Sheathing pondweed (*Stuckenia vaginata*) is an aquatic, perennial herb with stems up to 120 cm long, 1-3 mm wide; unbranched or sparsely branched, developing from long rhizomes. Leaves are all submerged, thread-like and linear. 5 – 10 cm long; lower leaves up to 3 mm wide, with 1 vein with rounded or blunt or notched tips, firm and dark green; stipules 2-5 cm long and fused into inflated sheaths with leaf blades arising close to the tips of the sheaths. There are 3 – 12 whorls of flowers on thin stalks in a 1.5 – 7 cm long spikelike inflorescence. Fruits are almost globe-shaped achenes, 3.5 – 4 mm long, 2.5 – 3 mm wide, widest above the middle, and a surface with fine, ray-like grooves. Similar to more common fineleaf pondweed (*Stuckenia filiformis*), with the key differentiating characters emphasized in the description. Occurs in lakes in montane zones (BG, IDF, MS, SBS), primarily in alkaline waters in shallow-to-deep ponds, lakes, or streams. It tends to occur in areas of low wave action up to a depth of approximately 2 m.

In the CCBA this species is known from the west end of Williams Lake, near the lake outlet (CDC supplementary plant data). The CDC mapped location is incorrectly placed at the junction of Williams Lake River and the Fraser River.

![Map of Central Cariboo showing location of Sheathing Pondweed](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

126.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

126.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not affect the lake habitat of sheathing pondweed.
### Risk Ranking

Risk Ranking = A * (B + C)

- **A** = Probability of Interaction
- **B** = Legal Consequence of Interaction
- **C** = Biological Consequence of Interaction

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking</td>
<td>Planning</td>
<td>Road Layout</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

### Relative Risk of Activities

- **Planning & Harvest Area Layout**
  - Road Layout
  - Road Construction
  - Road Maintenance
  - Road Deactivation
  - Bridge Installation
  - Bridge Removal
- **Felling**
- **Yarding**
- **Skidding**
- **Forwarding**
- **Loading**
- **Processing**
- **Handling**
- **Site Preparation**
- **Vegetation Management**
- **Density Management**

| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

### Management Strategy

None required.

### References and Additional Information


127. SHEEP CINQUEFOIL

127.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Sheep cinquefoil (*Potentilla ovina* var. *ovina*) is a small (5 – 15 cm high) alpine plant with 1 to several, spreading to erect and appressed-hairy stems. The stem-base is branched, growing from a short, thick rhizome. Most leaves are basal, short-stalked and pinnately compound with 7 – 21 rather crowded leaflets; leaflets deeply cleft, nearly to the base into linear-oblong lobes; silky-hairy on both surfaces and greyish green; sometimes undertain by crinkly hairs. Flowers are “buttercup-like” and occur is clusters of 1 – 6, they have stalks; the corollas are bowl-shaped with 5, egg-shaped, yellow petals, notched at the tip; the fused bracts behind the petals are 5-lobed with lance-triangular lobes, hairy to sometimes glandular and alternating with 5 shorter, narrower bractlets. Fruits are numerous lopsided-egg-shaped achenes.

Occurs in moist meadows to dry, open rocky slopes in subalpine to alpine zones (BAFA; ESSF; IMA).

In the CCBA this species is known from Konni Mountain in the south Chilcotin.

127.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

127.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect sheep cinquefoil habitat, through road construction.
127.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of sheep cinquefoil habitat.

Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:
- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:
- Minimize road construction affecting moist meadows to dry, open rocky slopes in subalpine to alpine zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species should be done first to achieve the “overall objective” given above.

127.5 REFERENCES AND ADDITIONAL INFORMATION

128. SHORT-BEAKED FEN SEDGE

128.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Short-beaked fen sedge (*Carex simulata*) is a medium-size sedge (20 – 90 cm high), with single or a few stems together; **stems longer than leaves** and growing from a stout, creeping rhizome. There are 2 – 5 leaf blades per stem, 1 – 2.5 mm wide, flat and crowded towards the base; sheaths are green, the lower ones bladeless. The **inflorescence** is composed of 5 – 15 spikes, 0.5 – 1 cm long, **developing in an dense egg-shaped or nearly cylindrical, 1 – 3 cm head**; unstalked with both female and male flowers, or almost all female or all male flowers; male flowers towards the tips; spike bracts inconspicuous. The fruits are 1.7 – 2.5 mm long and broadly egg-shaped to elliptical; strongly flattened, smooth and few-nerved; **beaks finely toothed**. Occurs in wet, sometimes calcareous, fens and along streambanks and meadows in montane zones (IDF, SBPS).

In the CCBA this species is known from 24 km east of Tatla Lake, Tatla Lake Creek at the Chilanko River, LeBlanc Lake, Minton Creek near Fletcher Lake, south of Patterson Lake, west of Little White Lake, near Kleena Kleene, south of Puntzi Lake, near Riske Creek, and west of Caribou Flats.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quesnel</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

128.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

128.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect short-beaked fen habitat, through road construction.
Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
<td>Bridge Installation</td>
<td>Bridge Removal</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

128.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of short-beaked fen sedge habitat.

Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting wet fens, streambanks, and meadows in montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect wet calcareous habitats, a rare plant inventory for this species should be done first to achieve the "overall objective" given above. These sites may have other species at risk present, and may be mineral licks and/or wallows for ungulates and bears.
- The probability of interaction with this species is sufficiently low that the objective can be met without a rare plant inventory of affected wet to moist sites that are not calcareous.

128.5 REFERENCES AND ADDITIONAL INFORMATION

http://www.env.gov.bc.ca/wld/documents/spsum/PMCYP03CH0.pdf.

129. SHORT-FLOWERED EVENING-PRIMROSE

129.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Short-flowered evening-primrose (*Camissonia breviflora*) is an attractive perennial up to 1 m tall, with yellow flowers. Leaves grow directly from a long taproot, and are arranged in a basal rosette. Leaves are 5 – 15 cm long, and 5 – 15 mm wide, deeply pinnatipartite, slightly hairy with narrowed to slender stalks that are 1/2 to 2/3 as long as blade. The yellow flowers are solitary on leafless stems, emerging from the basal rosette; the petals are 6 – 8 mm long, and the sepals are bent downwards. Fruits are capsules 10 – 25 mm long, narrowly egg-shaped, tapered and hairy. Occurs along streambanks, dry meadows and grassy areas in montane zones (IDF, MS, SBS).

There is one 1925 record in the CDC “historical data” from the Nemiah area of the Chilcotin; the exact location is unknown.


<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilcotin</td>
<td>G5</td>
<td>S1</td>
<td>Red</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

129.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

129.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect short-flowered evening-primrose habitat, through road construction.
Species of Management Concern BCTS Cariboo Region

### Risk Ranking

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planning</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
<td>Bridge Installation</td>
</tr>
<tr>
<td></td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Bridge Removal</td>
<td>Bridge Removal</td>
<td>Bridge Removal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling</td>
<td>Yarding</td>
<td>Yarding</td>
<td>Yarding</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skidding</td>
<td>Loading</td>
<td>Loading</td>
<td>Loading</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Processing</td>
<td>Handling</td>
<td>Handling</td>
<td>Handling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Site Preparation</td>
<td>Vegetation Management</td>
<td>Vegetation Management</td>
<td>Vegetation Management</td>
</tr>
</tbody>
</table>

**Relative Risk of Activities**

- **Planning & Harvest Area Layout**
  - 
- **Roads, Bridges and Culverts**
  - Road Construction
  - Road Maintenance
  - Road Deactivation
  - Bridge Installation
  - Bridge Removal
- **Harvesting**
  - Falling
  - Yarding
  - Skidding
  - Loading
  - Processing
  - Handling
- **Silviculture**
  - Site Preparation
  - Vegetation Management
- **Density Management**

\[
A = \text{Probability of Interaction} \\
B = \text{Legal Consequence of Interaction} \\
C = \text{Biological Consequence of Interaction} \\
R = A \cdot (B + C)
\]

### 129.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the short-flowered evening-primrose.

**Overall Objective**

Retain 100% of occurrences of this red-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road construction should never encroach on the habitat of a known occurrence.
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

- Minimize road construction affecting streambanks, dry meadows and grassy areas in montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species should be done first to achieve the “overall objective” given above; however this is not likely to be feasible given the wide geographic area in which the species could potentially occur.

### 129.5 REFERENCES AND ADDITIONAL INFORMATION


130. SICKLE-POD ROCKCRESS

130.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Sickle-pod rockcress (*Arabis sparsiflora*) is a small wild mustard with white flowers. It is a biennial or short-lived perennial that grows from a simple or branched stem-base; there are 1 to several stems that are simple or branched, 0.3 – 1.0 m tall, smooth above, more or less hairy toward base. The basal leaves are numerous in a rosette; they are narrow, 2 – 3 cm long and 1.5 – 2.5 mm wide, gradually narrowed to a slender, fringed stalk. Stem leaves are unstalked, ear-like at the bases, lanceolate, with margins smooth or slightly toothed, 1.5 – 2.0 cm long, 2 – 3 mm wide, smooth to sparsely hairy. There are many flowers arranged in a raceme; they are symmetric, petals are 6 – 10 mm long, white to purple; sepals slightly bulge on one side at the base. Fruits are siliques that are directed at right angles from the axis of the inflorescence or slightly upward; the siliques curve downward and are 5 – 7 cm long, 2 mm wide. Occurs in mesic to dry grasslands, gravelly river banks and disturbed areas in the steppe and lower montane zones (BG to MS).

In the CCBA this species is known from the Big Creek Ecological Reserve, with the plants growing on rocky scree on east-facing slope (E-Flora BC data).


<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo</td>
<td>G5</td>
<td>S1</td>
<td>Red</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

130.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

130.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect sickle-pod rockcress habitat, through road construction.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Risk Ranking</th>
<th>Planning &amp; Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>Planning</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
</tr>
<tr>
<td>B = Legal Consequence of Interaction</td>
<td>Harvest Area Layout</td>
<td>Road Layout</td>
<td>Road Construction</td>
</tr>
<tr>
<td>C = Biological Consequence of Interaction</td>
<td>Roads and Culverts</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
</tr>
<tr>
<td>Total Risk Ranking = A * (B + C)</td>
<td>8</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### 130.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the sickle-pod rockcress.

**Overall Objective**

Retain 100% of occurrences of this red-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road construction should never encroach on the habitat of a known occurrence.
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting mesic to dry grasslands, gravelly river banks and disturbed areas in the steppe and lower montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species should be done first to achieve the “overall objective” given above; however this is not likely to be feasible given the wide geographic area in which the species could potentially occur.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

### 130.5 REFERENCES AND ADDITIONAL INFORMATION


131. **SILVERY ORACHE**

### 131.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Silvery orache (*Atriplex argentea* ssp. *argentea*) is an annual herb growing from a taproot. The plant has an overall rounded shape, and grows up to about 15 – 80 cm tall. Stems are light-yellow and are much branched. The triangular-shaped leaves are opposite, except the upper leaves are alternate; stalked or stalkless; lanceolate to egg-shaped or diamond-shaped, 2 – 6 cm long, squared-off to wedge-shaped at the base, margins smooth to slightly toothed, **covered with a white mealy substance and generally greyish-green overall**, sometimes nearly smooth on upper surfaces. The inflorescence is composed of spikes growing from leaf axils; the flowers are yellowish-green, numerous and inconspicuous (resembling spiny seeds); there are fused pistillate bracteoles, broadest above the middle, 4 – 10 mm long, firmly enclosing the fruit, the margins green and deeply toothed. Fruits are bladder-like structures called utricles that contain single tiny brown seeds. Occurs in **saline** disturbed areas in the steppe and montane zones (BG; IDF).

In the CCBA this species is known from a meadow 3.5 km south of the junction of Chilcotin and Fraser Rivers, where it was common on flat dry loess (E-Flora BC data). The other two locations are from Rare Plants of BC, and have no data associated with them.

![Map of Central Cariboo and Chilcotin regions with Silvery Orache location highlighted]

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Chilcotin</td>
<td>G5T5</td>
<td>S1</td>
<td>Red</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 131.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

### 131.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect silvery orache habitat, through road construction.
131.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the silvery orache.

Overall Objective

Retain 100% of occurrences of this red-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

Stand Level

Strategies to address known occurrences of this species are:

- Road construction should never encroach on the habitat of a known occurrence.
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting saline disturbed areas in the steppe and montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species should be done first to achieve the “overall objective” given above.

131.5 REFERENCES AND ADDITIONAL INFORMATION


132. SLENDER HAWKSBEARD

132.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Slender hawksbeard (*Crepis atrarba* ssp. *atrarba*) has a woody base growing from a taproot; there are 1 – 2 erect stems that are grey-woolly (sometimes eventually becoming glabrous) and the stems are 15 – 35 cm tall. The basal leaves are linear to lanceolate, with long stalks, pinnately or bipinnately divided into linear or lanceolate segments or rarely entire, greyish-woolly or more often nearly smooth, 10 – 35 cm long. The stem leaves are similar to the basal ones, becoming linear and entire upwards. Flowers are in "dandelion-like" yellow heads; 3 – 40 flowers in a flat- to round-topped inflorescence; there are 3 – 18 flowerheads. Involucres are 8 – 15 mm tall, cylindric; involucral bracts greyish-woolly to nearly glabrous or rarely glabrous, with or without black, glandless bristles on the inner and sometimes the outer bracts, the outer ones 5-10, deltoid, abruptly sharp-pointed, the longest less than 1/2 as long as the 8 – 10 inner ones, these lanceolate, abruptly sharp-pointed or obtuse; ray flowers yellow, 10-18 mm long. Fruits are achenes that are usually greenish or rarely brownish, 3 – 10 mm long, slender, weakly to strongly ribbed, mostly tapering to a slender tip at the apex; pappus white, of hairlike bristles. The other subspecies that occurs in the CCBA is taller (30 – 70 cm), there are 10 – 40 flowerheads, and the involucral bracts are nearly or completely devoid of bristles. The plants are relatively small, 15 – 35 cm tall with 2 – 18 flowerheads and the involucral bracts have some glandless bristles; in contrast to the more common subspecies *originalis* which is 30 – 70 cm tall with 10 – 40 flowerheads and has involucral bracts that are nearly or completely devoid of bristles. Occurs in sandy or gravelly grasslands, shrublands and open forests in the steppe and lower montane zones (BGxh3, ESSFmw).

In the CCBA this species is known from Churn Creek, in a mesic disturbed area with less than 1% vegetation cover.


<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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</thead>
<tbody>
<tr>
<td>Central Cariboo</td>
<td>G5T5</td>
<td>S1</td>
<td>Red</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

132.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.
132.3 FOrest Management Issues and Risk Assessment

Forest operations may affect slender hawksbeard habitat, through road construction, harvesting, and silviculture.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Relative Risk of Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>Planning &amp; Layout</td>
</tr>
<tr>
<td>B = Legal Consequence of Interaction</td>
<td>Roads, Bridges and Culverts</td>
</tr>
<tr>
<td>C = Biological Consequence of Interaction</td>
<td>Harvesting</td>
</tr>
<tr>
<td>Planning Area Layout</td>
<td>Road Construction</td>
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<tr>
<td>Road Layout</td>
<td>Road Maintenance</td>
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<td>Road Construction</td>
<td>Road Deactivation</td>
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<td>Road Maintenance</td>
<td>Bridge Installation</td>
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<tr>
<td>Bridge Removal</td>
<td>Bridge Filling</td>
</tr>
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<td>Bridge Filling</td>
<td>Yarding</td>
</tr>
<tr>
<td>Yarding</td>
<td>Skidding</td>
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<tr>
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<td>Forwarding</td>
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<td>Forwarding</td>
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<tr>
<td>Loading</td>
<td>Processing</td>
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<td>Processing</td>
<td>Handling</td>
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<td>Handling</td>
<td>Site Preparation</td>
</tr>
<tr>
<td>Site Preparation</td>
<td>Silviculture</td>
</tr>
<tr>
<td>Silviculture</td>
<td>Vegetation Management</td>
</tr>
<tr>
<td>Vegetation Management</td>
<td>Density Management</td>
</tr>
</tbody>
</table>

| Risk Ranking | 8 | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 2 |

132.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the slender hawksbeard.

**Overall Objective**

Retain 100% of occurrences of this red-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

**Stand Level**

Strategies to address known occurrences of this species are:
- Road construction and harvesting should never encroach on the habitat of a known occurrence.
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:
- Minimize road construction and harvesting affecting sandy or gravelly grasslands, shrublands and open forests in the steppe and lower montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction or harvesting must affect these habitats, a rare plant inventory for this species should be done first to achieve the “overall objective” given above; however this is not likely to be feasible given the wide geographic area in which the species could potentially occur.

132.5 References and Additional Information


133. **SLENDER MANNAGRASS**

### 133.1 Species Summary: Identification and Habitat

Slender mannagrass (*Glyceria pulchella*) is a perennial grass growing from rhizomes. The stems are erect, but often root at the lower nodes; 40 – 100 cm tall. The leaf sheaths are rough, the hairs angled backwards, open at least near the tops; the leaf blades are 2 – 5 mm wide, flat, minutely rough on both surfaces; ligules are 1.5 – 4 mm long. The inflorescence is a loose panicle 15 – 25 cm long or more, the branches ascending to spreading-ascending. Spikelets mostly have 3 – 6 flowers, are egg-shaped to cylindrical, compressed, 3.5 – 6 mm long. The lower glumes are 1.5 – 2 mm long, the upper ones 2 – 2.3 mm long. The lemmas are 1.6 – 2.2 mm long, prominently 7-nerved, the nerves finely rough. Occurs at streamsides, marshes, lakeshores and ponds in the montane zone.

In the CCBA this species is known from Sutton Lake meadow near 150 Mile House (CDC supplementary plant data). E-Flora BC also maps two other records from the Ecosystem Classification database; these records require verification.


<table>
<thead>
<tr>
<th>Known BGC Unit</th>
<th>Forest District</th>
<th>Global Rank</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
<th>COSEWIC</th>
<th>SARA Schedule</th>
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<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 133.2 Management Direction

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

### 133.3 Forest Management Issues and Risk Assessment

Forest operations may affect slender mannagrass habitat, through road construction.
### 133.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the slender mannagrass.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting edges of streams, marshes, lakeshores and ponds in the montane zone, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

### 133.5 References and Additional Information


[http://www.env.gov.bc.ca/wld/documents/spsum/PMPOA2Y0G0.pdf](http://www.env.gov.bc.ca/wld/documents/spsum/PMPOA2Y0G0.pdf)

134. SMALL-FLOWERED LOUSEWORT

134.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Small-flowered lousewort (*Pedicularis parviﬂora* ssp. *parviﬂora*) is an annual or biennial herb that grows 10 – 40 cm in height with single, ascending to erect, simple or more commonly branched stems that grow from a spindly taproot. Basal leaves are small or lacking. **Stem leaves are unstalked**, 1 – 5 cm long, alternate, lance-oblong and **pinnately cleft to lobed** with segments either toothed or entire. Several flowers form compact head-like clusters at the ends of branches; the clusters elongating with a few lower flowers in leaf axils; bracts similar to leaves but reduced upwards. The **flower corollas** are 11 – 17 mm long **with 2 lips**; the upper lip is slightly arched, hood-like, beakless and with or without slender teeth near the tip. The lower lip is 3-lobed and fringed with minute hairs. **Calyces have 2 lobes with jagged-teeth**. Fruits are egg-shaped and abruptly pointy-tipped capsules, 8 – 17 mm long and smooth with several seeds. Occurs in wet meadows, fens and bogs in the montane and subalpine zones (ICH, MS, SBS).

In the CCBA this species is known from the upper Blackwater River (Rare Plants of BC), and near Bowron Lake (Illustrated Flora of BC), without any data available for either location beyond map dots; hence the map locations are approximate.

134.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

134.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect small-flowered lousewort habitat, through road construction.
### 134.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the small-flowered lousewort.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a $\geq 30$ m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting wet meadows, fens and bogs in the montane and subalpine zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

### 134.5 REFERENCES AND ADDITIONAL INFORMATION

Species of Management Concern BCTS Cariboo Region

135. SMALL-FRUITED WILLOWHERB

135.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Small-fruited willowherb (*Epilobium leptocarpum*) is a spindly herbaceous plant 5 – 30 cm high with **simple or branched stems, erect or decumbent at the base**; often hairy or glabrous except for decurrent lines of hairs from the leaf bases. The stems grow from a taproot. Leaves are mostly opposite, short stalked, 0.5 – 4 cm long and 2 – 13 mm wide, lanceolate to lance-oblong or elliptic and blunt to pointed at the bases; **leaf margins finely toothed**, glabrous or hairy. The whitish to pink flowers are nodding to almost erect, short appressed-hairy, few-flowered, in a terminal inflorescence; petals are 2 – 6 mm long and sepals are glabrous to short-hairy, 1-4mm long. Fruits are more or less glabrous capsules, 1 – 5 cm long; **seeds pimply in parallel lines with tufts of tawny hairs**, 3 – 6 mm long. Occurs in moist meadows and along streambanks in montane and alpine zones (BAFA, ESSF, ICH, IMA, MS, SBS).

In the CCBA this species is known from the headwaters of Graveyard Creek, in a submesic tall shrub-dryland between the convergence of creeks.


<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

135.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

135.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect small-fruited willowherb habitat, through road construction.
### 135.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the small-fruited willowherb.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting moist meadows and along streambanks in montane and alpine zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

### 135.5 REFERENCES AND ADDITIONAL INFORMATION


136. SMOOTH DRABA

136.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Smooth draba (*Draba glabella* var. *glabella*) is a wild “mustard” 10 – 40 cm high, with erect, starlike-hairy, simple or branched stems. It grows from a taproot. The basal leaves are 0.5 – 4 cm long, oblanceolate and entire to toothed. There are 2 – 10 stem leaves, 0.8 – 3 cm long and 3 – 12 mm wide, egg-shaped to oblanceolate and toothed to entire; hairs are stalked and star-like, 4 to 5 rayed with the longer 2 rays usually paralleling the leaf axis and again branched; leaf margins are hairy-fringed with mostly simple to branched hairs, generally star-like with continual branching. The inflorescence has several to many flowers with occasional solitary flowers on upper leaf axils; flower stalks are 2 – 15 mm long, soft-hairy to glabrous, ascending and straight. The white to occasionally yellow petals are notched at the tips; sepals are sparsely hairy. Fruits are lanceolate to oblong and glabrous to short-hairy silicles, 6 – 15 mm long; plane or rarely twisted. Occurs in moist to mesic meadows and cliffs in subalpine and alpine zones (BAFA; IMA; SBPSxc).

In the CCBA this species is only known from near Lilie Lake, in an area of wet meadows and Lodgepole pine forest. It is also known just south of the CCBA at Davey Jones Creek on China Head Mountain.

136.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

136.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not affect smooth draba habitat.
### Management Strategy

None required.

### References and Additional Information


137. **SPRENGEL'S SEDGE**

### 137.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Sprengel's sedge (*Carex sprengelii*) is a medium size sedge (30 – 90 cm high) with erect or decumbent with stems as long or longer than leaves; grows from stout, matted, shredded rhizomes. There are 5 – 8 leaf blades per stem, 2 – 5.4 mm wide and scattered; the lower leaves are reduced; the sheaths are long and concave to blunt. The inflorescence is composed of 3 – 7 spikes, not crowded; there are 1 – 3 terminal spikes that are linear and 1 – 2 cm long with male flowers. There are 2 – 4 cylindrical lower spikes that are 1 – 3.5 cm long with female flowers. The spikes are long stalked and spreading to nodding; bracts subtending female spikes are short-sheathing and leaf-like, 1.5 – 2.5 cm long. **Fruits** are 5 – 6 mm long, **globe-shaped** and greenish to straw-coloured; smooth and **2-ribbed with a few obscured nerves** and short-stalked; beaks deeply bidentate.

Occurs in moist to wet, gravelly or sandy slopes, open sites and alluvial woodlands in the montane zone (IDF, SBS).

In the CCBA known from Quesnel (moist grassy bank at edge of wood, also along roadbed) (E-Flora BC data) and the Sugar Cane Indian Reserve (Ray Coupé, pers. comm.).

![Map showing the distribution of Sprengel's Sedge](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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</thead>
<tbody>
<tr>
<td>Central Cariboo; Quesnel</td>
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<td>S1</td>
<td>Red</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

### 137.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

### 137.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect Sprengel's sedge habitat, through road construction, harvesting, and silviculture. This plant is likely to survive harvesting in the absence of disc trenching.
### 137.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the Sprengel’s sedge.

**Overall Objective**

Retain 100% of occurrences of this red-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road construction and harvesting should never encroach on the habitat of a known occurrence.
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction and harvesting affecting moist to wet, gravelly or sandy slopes, open sites and alluvial woodlands in the montane zone, to minimize the potential for affecting an unknown population of this species.
  - If road construction or harvesting must affect these habitats, a rare plant inventory for this species should be done first to achieve the “overall objective” given above; however this is not likely to be feasible given the wide geographic area in which the species could potentially occur.

### 137.5 REFERENCES AND ADDITIONAL INFORMATION

http://www.env.gov.bc.ca/wld/documents/spsum/PMCYP03CT0.pdf.

138. **STALKED MOONWORT**

138.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

Stalked moonwort (*Botrychium pedunculosum*) is a small fern-like plant, 5 – 25 cm tall, with branched, fleshy stems growing from a short rhizome. There is a single stem divided into two blades, a dull-green sterile blade and a leafless, branched fertile blade. The stalk below the blades is usually reddish brown. The **sterile blade is pinnate and broadly triangular** to egg-shaped, with up to 5 pairs of primary pinnae and entire margins. The pinnae have irregular lobes and vary from pinnatifid to bifid to narrowly fan shaped and **the lower ones often bear sporangia**. The leafless fertile blade is longer than the sterile segment and has clustered greenish grape-like spore sacs; **larger plants usually have two large ascending lateral branches**. Positive identification of moonworts depends on the use of technical keys, often complicated by morphological variation within and between populations, and the presence of several species growing together at the same site. Fronds mature in mid-July to September. Occurs within floodplain forests on valley bottoms, in moist to wet meadows and riparian areas and in margins of willow or alder patches.

In the CCBA this species is known from just east of Cottonwood along Hwy 26 (in moist depression at edge of predominantly coniferous woods) and “Hwy 26, 6.2 km east of Victoria Creek” (CDC supplementary plant data). Since Victoria Creek and Hwy 26 do not intersect, the second location is ambiguous – it is placed on the map below as determined by the CDC. A third data record for “east of Quesnel Hwy 26” is too vague to map, and may be just a repeat of the other locations.

Special consideration should be given to management of this species, because it is globally rare and a significant proportion of the global population is in BC. This species was first described in 1976, with the specimen from near Cottonwood House being part of the series used to name the species.

![Map of Quesnel area with Stalked Moonwort location marked](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quesnel</td>
<td>G2G3</td>
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<td>Red</td>
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</table>

138.2 **MANAGEMENT DIRECTION**

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.
138.3  FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations impact stalked moonwort through harvesting, road construction, and silviculture. Tree removal may adversely affect plants of stalked moonwort through an abrupt change in microclimate (decreased shade) from forested to non-forested habitat, and tree removal may also significantly increase understorey plant competition. Conversion to other tree or understorey species, or increased crown closure, during regeneration may adversely affect the habitat. Road construction, site preparation such as disc trenching or mounding, or vegetation management may destroy existing plants. Special consideration should be given to management of stalked moonwort, because it is globally rare, as well as being red-listed in BC.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Relative Risk of Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>Planning &amp; Harvesting</td>
</tr>
<tr>
<td>B = Legal Consequence</td>
<td>Road Layout</td>
</tr>
<tr>
<td>C = Biological Consequence</td>
<td>Road Construction</td>
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<tr>
<td>of Interaction</td>
<td>Road Maintenance</td>
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<tr>
<td>of Interaction</td>
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<td>Bridge Installation</td>
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<tr>
<td>of Interaction</td>
<td>Vegetation Management</td>
</tr>
<tr>
<td>of Interaction</td>
<td>Density Management</td>
</tr>
</tbody>
</table>

138.4  MANAGEMENT STRATEGY

The following forest management strategy is designed to address both stand level (recorded sites) and landscape level (unrecorded sites) management of stalked moonwort. Special consideration should be given to management of this species, because it is globally uncommon.

Overall Objective

Manage 100% of the area occupied by this globally uncommon and red-listed species to maintain, and preferably enhance, the suitability of the habitat for the existing plants and for the regeneration of new plants (this may include some harvesting). Each loss of part or all of an occurrence of this plant will significantly worsen its conservation status.

Stand Level

Strategies to address known occurrences of this species are:

- Road construction, harvesting and other operations should never encroach on the habitat of a known occurrence.
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.
- Protect stalked moonwort occurrences with no-harvest reserves such as wildlife tree patches; do not construct roads, harvest or conduct other operations in the reserves.

Landscape Level

Strategies to address unrecorded occurrences of this species are:
• The SBS east of Quesnel should be inventoried for this species, because to the lack of precision in two of the three records. A qualified biologist should design the inventory project to emphasize areas of the most likely habitat and focussed on Cottonwood and Victoria Creek.
  ➢ Until this is done, a biologist experienced in field inventory of rare species and able to identify stalked moonwort should survey for the species when developing harvest and road construction plans within a 2 km radius\(^\text{12}\) of the known site near Cottonwood in the SBS.
  ➢ Forestry field crews should be aware of the appearance of all moonworts, and watch for them during normal layout (etc.) work in the summer in all field work. If moonworts are found, they should be identified to determine if one of the three rare species is present.
• Provide the Conservation Data Centre (Victoria) with a map, photographs, description, GPS coordinates, and one ‘pressed’ frond for the location of any stalked moonwort found, so that the abundance and locations of the species can be tracked. Reporting forms are at http://www.env.gov.bc.ca/cdc/documents/plantobs.pdf.

138.5 References and Additional Information


\(^{12}\) The 2 km radius value is inherently an arbitrary compromise between “too small” and “too large” an area.
139. **SWOLLEN BEAKED SEDGE**

139.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

Swollen beaked sedge (*Carex rostrata*) grows in tufts from short-creeping rhizomes; 30 – 70 cm high with smooth, triangular stems, except for slightly below inflorescence; stem slightly longer than leaves. Leaf sheaths are tight; ligules as long as wide; leaf blades 4 to 8 per stem; leaves are 1 – 4 mm wide, and borne on the lower 1/2 of the stem, leaves folded or channelled with the upper surface covered in silica papillae (a whitish, waxy coating that rubs off); lower leaves reduced. Flowers are in 3-6, sometimes 8, spikes; there are 1 – 2, sometimes to 4, terminal spikes 1.5 – 5 cm long, with long stalks and many male flowers. The lower spikes are 3 – 6.5 cm long, cylindrical with female flowers and short-stalked; bracts subtending lowest spike, leaf-like and sheathless. **Fruits** are 5 – 9 mm long, somewhat inflated and strongly nerved; abruptly contracted into bidentate beaks with straight teeth. Similar to the common *C. utriculata*, which has flat leaves that are 5 – 12 mm wide, green, and not covered with a whitish wax. Occurs in peat bogs in the montane and subalpine zones (ESSF, IDF, SBPS, SBS).

In the CCBA known from Lessard Lake (CDC supplementary plant data).

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilcotin</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

139.2 **MANAGEMENT DIRECTION**

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

139.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest operations will not affect swollen beaked sedge habitat.
### 139.4 Management Strategy

None required.

### 139.5 References and Additional Information


140. TENDER SEDGE

140.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Tender sedge (*Carex tenera*) is 20 – 70 cm high with stems taller than leaves, and growing from a fibrous root mass. There are many leaf blades, 1.5 – 2.5 mm wide, growing from the lower 1/3 of the stem; sheaths tight. The inflorescence is composed of 4 – 10 spikes, 2.5 – 5 cm long in a loose cluster; unstalked with male and female flowers on each spike, female flowers towards the tips; bracts subtending the spikes inconspicuous, reduced and sheathless. Fruits 3 – 4.5 mm long, egg-shaped and light green to straw-coloured; more of less flattened with winged margins near the bases; strongly nerved on both sides and upper halves fringed with teeth.

Occurs on mesic to dry, open forests, shorelines and meadows in steppe and montane zones (ESSF, ICH, SBS).

In the CCBA this species is known from Horsefly Lake Provincial Park lakeshore and in a marsh at Sucker Point, Horsefly Bay on Quesnel Lake.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

140.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

140.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect tender sedge habitat, through road construction, harvesting, and silviculture. This plant is likely to survive harvesting in the absence of disc trenching.
### 140.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the tender sedge.

#### Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

#### Stand Level

Strategies to address known occurrences of this species are:
- Road design and construction and harvesting should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

#### Landscape Level

Strategies to address unrecorded occurrences of this species are:
- Minimize road construction and harvesting affecting mesic to dry, open forests, shorelines and meadows in steppe and montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

### 140.5 REFERENCES AND ADDITIONAL INFORMATION


[http://www.env.gov.bc.ca/wld/documents/spsum/PMCYP03DJ0.pdf](http://www.env.gov.bc.ca/wld/documents/spsum/PMCYP03DJ0.pdf)
141. UPSWEPT MOONWORT

141.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Upswept moonwort (Botrychium ascendens) is a small fern-like plant, with a single above ground frond. The frond is usually about 5 – 13 cm tall, yellow-green, and divided into two blades which share a common stalk. The mostly sterile segment is once pinnatifid with 3 – 5 pairs of strongly ascending, narrowly triangular pinnae which have deeply lacerate margins. The sterile segment often has a few sporangia on the margins of the pinnae or on small branches. The fertile segment is longer than the sterile segment, is branched, and bears grape-like sporangia. **Strongly ascending pinnae with lacerate margins and a yellow-green color** are diagnostic of the upswept moonwort, distinguishing it from dainty moonwort and mountain moonwort; **fan-shaped pinnae** distinguish it from common moonwort.

Reliable field determination of moonworts depends on the careful use of technical keys and on comparison with silhouette outlines of verified specimens. Identification can be complicated because there is often a high degree of morphological variability between individuals in a population and between populations of the same species; several species may grow together at the same site. Also, the few diagnostic characters may not be apparent in small plants. Fronds mature in June and July. Occurs in mesic to moist meadows and grassy fields, and in coniferous forests near streams, within the lowland and montane zones (ESSF, IDF, IMA).

In the CCBA this species is known from the alpine at Festuca Pass and Pipe Organ Mountain in Itcha-Ilgachuz Provincial Park. It may occur at lower elevations, in the montane zone, in the CCBA. Special consideration should be given to management of upswept moonwort, because it is globally rare as well as provincially red-listed.

![Map of the CCBA showing the location of upswept moonwort](image)

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilcotin; Quesnel</td>
<td>G2G3</td>
<td>S2</td>
<td>Red</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

141.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.
141.3 Forest Management Issues and Risk Assessment

Forest operations impact the upswept moonwort through harvesting, road construction, and silviculture. Tree removal may adversely plants of upswept moonwort through an abrupt change in microclimate (decreased shade) from forested to non-forested habitat, and tree removal may also significantly increase understory plant competition. Conversion to other tree or understory species, or increased crown closure, during regeneration may adversely affect the habitat. Road construction, site preparation such as disc trenching or mounding, or vegetation management may destroy existing plants. Special consideration should be given to management of upswept moonwort, because it is globally rare and a significant proportion of the global population is in BC.

### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Risk Ranking</td>
<td>A * (B + C)</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>Risk Ranking</td>
<td>Planning Area Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

141.4 Management Strategy

The following forest management strategy is designed to address both stand level (recorded sites) and landscape level (unrecorded sites) management of the upswept moonwort. Special consideration should be given to management of this species, because it is globally rare.

**Overall Objective**

Manage 100% of the area occupied by this globally uncommon and red-listed species to maintain, and preferably enhance, the suitability of the habitat for the existing plants and for the regeneration of new plants (this may include some harvesting). Each loss of part or all of an occurrence of this plant will significantly worsen its conservation status.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road construction, harvesting and other operations should never encroach on the habitat of a known occurrence.
  - Establish a \( \geq 30 \) m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.
- Protect upswept moonwort occurrences with no-harvest reserves such as wildlife tree patches; do not construct roads or conduct other operations in the reserves.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:
Minimize road construction affecting mesic to moist meadows and grassy fields within the lowland and montane zones, to minimize the potential for affecting an unknown population of this species.

- If road construction must affect these habitats, a rare plant inventory for this species should be done first to achieve the “overall objective” given above; this may not be feasible, given the wide geographic area.
- This is not likely to be feasible to do for coniferous forests near streams, given the wide geographic area in which the species could potentially occur.

A biologist experienced in field inventory of rare species and able to identify upswept moonwort should survey for the species when developing harvest and road construction plans within a 2 km radius of known sites in the same BGC unit.

Forestry field crews should be aware of the appearance of all moonworts, and watch for them during normal layout (etc.) work in the summer in the ESSF and IDF. If moonworts are found, they should be identified to determine if one of the three rare species is present.

Provide the Conservation Data Centre (Victoria) with a map, photographs, description, GPS coordinates, and one ‘pressed’ frond for the location of any upswept moonwort found, so that the abundance and locations of the species can be tracked. Reporting forms are at http://www.env.gov.bc.ca/cdc/documents/plantobs.pdf.

This is unlikely to be sufficient to meet the objective given above, because most presently unrecorded populations, assuming they exist, will not be detected prior to road construction and harvesting activities.

This species is globally uncommon, with a significant proportion of the global population in BC. There is therefore an extra responsibility to manage for this species. However, lack of inventory data and lack of well-defined habitat descriptions prevents effective management for the species during forest operations. To provide additional information for this species to permit meaningful management for the species during forest operations:

- Conduct a upswept moonwort reconnaissance inventory for the CCBA, west of the Fraser River. Given the wide potential range of the species this inventory will need to be stratified by BGC unit and habitat type. A primary objective of the inventory should be to describe the habitats used by the species, to allow predictions of occurrence/absence by habitat type; hence as much of the inventory as possible should occur in areas with Terrestrial Ecosystem Mapping and Predictive Ecosystem Mapping, to enable correlations with TEM and PEM habitat types.
  - Record all other moonwort and other rare plant species encountered.
  - Record any Magnum Mantleslugs encountered – it is also highly susceptible to forest operations, is poorly inventoried, is globally uncommon, and may occur in “coniferous forests near streams”.

### 141.5 REFERENCES AND ADDITIONAL INFORMATION


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The 2 km radius value is inherently an arbitrary compromise between “too small” and “too large” an area.
142. WATER BUR-REED

142.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Water bur-reed (Sparganium fluctuans) is a perennial aquatic plant with stems that grow from long rhizomes; the stems are usually submerged, 80 – 150 cm tall. Leaves are alternate, limp, unkeeled, usually floating, linear, and ribbon-like; up 60 – 100 cm long. Flowers are in a branched inflorescence with 2 – 4 female heads below and 1 – 6 male heads above. Male heads are globe-shape and unstalked, female heads are in leaf axils and are subtended by conspicuous leaflike bracts. Perianths are divided into 6 spoonlike segments, often with dark spots at the tips and attached near the base of the flower stalk. Fruits are unstalked, beaked achenes, more or less constricted at the middle. Occurs in ponds, lakeshores and slow-moving streams in the montane zone (IDF, SBS); sometimes also in wetlands.

In the CCBA this species is known from the south side of Ten Mile Lake near Quesnel.

142.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

142.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not affect water bur-reed habitat.
<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Relative Risk of Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning &amp; Harvest Area Layout</td>
</tr>
<tr>
<td></td>
<td>Roads, Bridges and Culverts</td>
</tr>
<tr>
<td></td>
<td>Silviculture</td>
</tr>
</tbody>
</table>

**Risk Ranking:**
- **A** = Probability of Interaction
- **B** = Legal Consequence of Interaction
- **C** = Biological Consequence of Interaction

<table>
<thead>
<tr>
<th>Activity</th>
<th>Planning</th>
<th>Harvest Area Layout</th>
<th>Roads Construction</th>
<th>Road Maintenance</th>
<th>Road Deactivation</th>
<th>Bridge Installation</th>
<th>Bridge Removal</th>
<th>Falling</th>
<th>Yarding</th>
<th>Sticking</th>
<th>Forwarding</th>
<th>Loading</th>
<th>Processing</th>
<th>Handling</th>
<th>Site Preparation</th>
<th>Silviculture</th>
<th>Planning</th>
<th>Vegetation Management</th>
<th>Density Management</th>
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<tbody>
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</tr>
</tbody>
</table>

### 142.4 MANAGEMENT STRATEGY

None required.

### 142.5 REFERENCES AND ADDITIONAL INFORMATION


143. WATER MARIGOLD

143.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Water marigold (Megalodonta beckii var. beckii) is an aquatic perennial herb with lower stems that are submerged and upper portions usually emergent. Submerged leaves are opposite, sessile, and divided into numerous thread-like segments (i.e., “feathery”), 1.5 – 4 mm long. The lance-shaped, emergent leaves are sessile, opposite, and 1 – 3.5 cm long with sharply toothed margins. Solitary flower heads are borne on the ends of the emergent stems. The golden yellow flowerheads have both ray and disk flowers. The yellow rays are 1 – 2 cm long. Each flowerhead has 5 – 6 involucral bracts, with the outer being larger and leafier than the inner bracts. Achenes are 10 – 14 mm long and nearly round in cross-section, with 3-6 long, slender, barbed awns at the tops. Water marigold is the only truly aquatic member of the Asteraceae in BC. It is readily distinguished by its aster-like flowers and dimorphic emergent and submergent leaves. Occurs in lakeshores and ponds in the lowland, steppe and montane zones (ICH, IDF, SBS).

In the CCBA this species is known from “Quesnel” and “Quesnel Lake” (Rare Plants of BC).

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quesnel</td>
<td>G4G5T4T5</td>
<td>S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

143.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

143.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not affect water marigold habitat.
143.4 Management Strategy

None required.

143.5 References and Additional Information


144. WEDGESCALE ORACHE

144.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Wedgescale orache (Atriplex truncata) is an annual with erect or curled, simple to branched, stems 25 – 120 cm high. Stems grow from a taproot. Leaves are 2 – 7 cm long, lance-shaped to lance-linear or oblong; short-stalked or stalkless; leaves are squared off or arrowhead-shaped at the base with smooth to wavy toothless margins. Lower leaves are opposite and upper leaves alternate. Small, green flowers are borne in clusters in leaf axils. Male flowers lack petals; female flowers lack both petals and sepals and are subtended by 2 wedge-shaped bracts. Fruits are membranous bladders enclosed within 2, lance-shaped, smooth or wavy margined bracts. Similar to silvery orache (Atriplex argentea ssp. argentea) but lacking white, mealy substance covering leaves.

Occurs in dry roadsides, waste places and alkaline flats in the steppe and montane zones (BG; IDF).

In the CCBA this species is known from Dyck Meadow, 2 miles southwest of Punzi Lake (CDC supplementary plant data), from near Farwall Canyon on the south side of the Chilcotin River, and west of Williams Lake (both E-Flora BC).

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo;</td>
<td>G5</td>
<td>S1</td>
<td>Red</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chilcotin</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

144.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

144.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect wedgescale orache habitat, through road construction. Road maintenance may also affect dry roadside populations.
Species of Management Concern BCTS Cariboo Region

### 144.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the wedgescale orache.

**Overall Objective**

Retain 100% of occurrences of this red-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road construction should never encroach on the habitat of a known occurrence.
  - Establish a $\geq 30$ m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - Minimize the effects of road maintenance on a population.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting waste places and alkaline flats in the steppe and montane zones in the steppe and montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect alkaline flats, a rare plant inventory for this species should be done first to achieve the “overall objective” given above.
  - If road construction must affect “waste places”, and for road maintenance, in the steppe and montane zones, a rare plant inventory for this species should be done first to achieve the “overall objective” given above; however it is so rare, and its potential occurrence encompasses so much area, that it will not be feasible to consider inventory other than for alkaline flats.

### 144.5 REFERENCES AND ADDITIONAL INFORMATION

Species of Management Concern BCTS Cariboo Region


145. WESTERN DOGBANE

145.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Western dogbane (*Apocynum x floribundum*) is a perennial 20 – 70 cm in height with erect stems; developing from a rhizome; **milky juice within stems**. Stem leaves are opposite, petiolate, 3 – 8 cm long, oval to elliptic, spreading and ascending. The flower corolla is tubular with 5 narrowly lanceolate lobes and the calyx is at least half as long as corolla. Fruits are long cylindric pods with numerous seeds. Western dogbane is a hybrid resulting from natural crossing of spreading dogbane (*A. androsaemifolium*) and hemp dogbane (*A. cannabinum*); hence it is intermediate in appearance between the two parent species. Spreading dogbane leaves are spreading and drooping; in contrast, hemp dogbane has upright yellow-green leaves. Spreading dogbane flowers are pink or whitish with pink veins, and 6 – 8 mm long; in contrast hemp dogbane has greenish-white flowers 2 – 5 mm long.

Hybridization is apparently rare, but the viability of hybrids is very good. Once a hybrid becomes established, it may persist for many decades and grow into large, discontinuous stands. Occurs on mesic to dry roadsides, fields, shrublands and open forests in lowland, steppe and montane zones (BG, ICH, IDF, SBS).

In the CCBA this species is known from 1 km southeast of Redstone, beside Hwy 20 near the west end of Bayliff Road. It is also known just south of the CCBA near Big Bar Creek.

145.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

145.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect western dogbane habitat, through road construction, harvesting and silviculture. This species is likely to survive harvesting in the absence of disc trenching.
145.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the western dogbane.

Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction and harvesting should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.
- Minimize soil disturbance during harvesting and silviculture. If necessary, consult a biologist regarding mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction and harvesting affecting mesic to dry fields, shrublands and open forests in lowland, steppe and montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction or harvesting must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

145.5 REFERENCES AND ADDITIONAL INFORMATION


146. WESTERN HAWKSBEARD

146.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Western hawksbeard (*Crepis occidentalis* ssp. *conjuncta*) is also listed as ssp. *pumila* in Rare Plants of BC and E-Flora BC. It is a perennial herb growing from a taproot and stem-base. There are 1 – 3 erect stems, densely and closely grey-short woolly-hairy, or nearly glabrous in age, often glandular-stiff-hairy above, sometimes with black glandular bristles above, 5 – 40 cm tall. The basal and stem leaves are “dandelion-like”: long-stalked, toothed, with the teeth pointing backwards, or deeply pinnately cut with lanceolate or linear toothed lobes, these entire, abruptly sharp-pointed or with long-pointed tips, mostly 10 – 35 cm long, the leaf blades are grey-short woolly-hairy, or nearly glabrous in age. The stems have 2 – 25 flowerheads in candelabra-like clusters; flower heads are yellow, dandelion-like. The involucres are 11-19 mm tall, cylindric or bell-shaped; involucral bracts grey, short woolly-hairy and (ssp. *conjuncta*) without gland-tipped hairs, the longest outer ones usually less than 1/2 as long as the inner, triangular or egg-shaped, abruptly sharp-pointed, rarely linear, the inner ones lanceolate, abruptly sharp-pointed or with long-pointed tips with membranous margins; ray flowers yellow, 16-19 mm long. Achenes are light to dark brown, 6 – 10 mm long, spindle-shaped, 10- to 18-ribbed, only slightly tapering to a slender tip; pappus white to yellowish-white, of copious, soft, hairlike bristles. Occurs in dry grasslands and shrublands in the steppe and montane zones (BG, ESSF, ICH).

In the CCBA this species is known from R.C.A.F. Peak, Tchaikazan Valley, west of Taseko Lake.

E-Flora BC has a photo.

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**Known BGC Unit** | Forest District | Global Rank | BC Rank | BC List | Identified | COSEWIC | SARA Wildlife | Schedule
---|---|---|---|---|---|---|---|---
Chilcotin | G5T3T5 | S1 | Red

146.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

146.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect western hawksbeard habitat, through road construction.
146.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the western hawksbeard.

Overall Objective

Retain 100% of occurrences of this red-listed species in healthy condition. Each loss of part or all of an occurrence of this species will significantly worsen its conservation status.

Stand Level

Strategies to address known occurrences of this species are:

- Road construction should never encroach on the habitat of a known occurrence.
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting dry grasslands and shrublands in the steppe and montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species should be done first to achieve the “overall objective” given above; however, this is not likely to be feasible given the wide geographic potential occurrence for this species.

146.5 REFERENCES AND ADDITIONAL INFORMATION


147. WESTERN JACOB’S-LADDER

147.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Western Jacob's-ladder (Polemonium occidentale ssp. occidentale) is a perennial herb, 20 – 100 cm high, with single, erect stems from a decumbent base and glandular-hairy; grows from a rhizome. Leaves are mostly basal and alternate; pinnately compound with 11 – 27 lanceolate to elliptic leaflets, 10 – 35 mm long and 3 – 10 mm wide and pointed at the tip; hairless or nearly so. Flowers are in crowded head-like to somewhat elongate clusters of short-stalked flowers, terminal or axillary; corollas bell-shaped, 10 – 16 mm long, blue to purple or rarely white with 5 lobes twice as long as tubes; calyces green to purple, 5 – 8 mm long with 5 teeth. Occurs in wet to moist streambanks, swamps, meadows and thickets in steppe to subalpine zones (BG, ESSF, ICH, IDF, MS, SBPS, SBS).

In the CCBA this species is known from along the Dean River, with no exact data available (Rare Plants of BC).

Photo © Jim Riley

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilcotin</td>
<td>G5?T5?</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

147.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.
147.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest operations may affect western Jacob's-ladder habitat, through road construction.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

147.4 **MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of western Jacob's-ladder.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:
- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a \( \geq 30 \) m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:
- Minimize road construction affecting wet to moist streambanks, swamps, meadows and thickets in steppe to subalpine zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.
147.5 REFERENCES AND ADDITIONAL INFORMATION


148. **WHITE WINTERGREEN**

148.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

White wintergreen (*Pyrola elliptica*) is a perennial herb, 15 – 25 cm in height with short, erect stems and many basal leaves; growing from a slender rhizome. **Leaves are evergreen and all basal, somewhat leathery, with broadly elliptic to oblong or egg-shaped blades;** thin, fine-toothed and dull with stalks rarely as long as blades. There are 2 – 20 flowers on the end of a stem; the flowers are weakly bilaterally symmetric; **petals** are egg-shaped, spreading and **white or creamy, rarely pink tinged**; sepal tips are usually sharp pointed, egg-shaped and somewhat bent back. Fruit are globe-shaped, depressed capsules. Similar to Green Wintergreen (*Pyrola chlorantha*). Dry to moist forests in montane zones (ESSF, ICH, IDF, MS, SBS).

In the CCBA this species is known from near the Fraser River between Quesnel and Macalister (Rare Plants of BC).

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cariboo; Quesnel</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
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<td></td>
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</tbody>
</table>

148.2 **MANAGEMENT DIRECTION**

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

148.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest operations may affect white wintergreen habitat, through road construction, harvesting and silviculture. This plant may survive harvesting in the absence of disc trenching; or may die due to increased habitat dryness.
### 148.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of white wintergreen.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.
- Minimize soil disturbance during harvesting and silviculture. If necessary, consult a biologist regarding mitigation measures.

**Landscape Level**

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting dry to moist forests in the montane zone, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

### 148.5 REFERENCES AND ADDITIONAL INFORMATION


149. WHITEBARK PINE

149.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Whitebark pine (*Pinus albicaulis*) sometimes grows up to 20 m tall with a straight trunk; however it is more often contorted and dwarfed, or shrubby and sprawling. **The bark is thin with light-whitish scales**; young twigs are hairy; **needles are in bunches of five**, unlike lodgepole pine, which has bunches of three needles. Occurs on mesic to dry slopes in the subalpine to alpine zones (ICH, IDF, IMA, MH, MS, SBPS, SBS) on moderately dry to fresh, nitrogen-medium soils. They can be common in parkland forests on water-shedding sites that are free of snow early in the year.

Where it is reasonably common, whitebark pine is a 'keystone' species of high-elevation ecosystems. It strongly influences patterns of subalpine snow accumulation and snowmelt, and its continued decline may alter watershed hydrology. Whitebark pine also moderates microenvironments and facilitates the recruitment and growth of other plants. Clark's nutcracker has evolved to exploit the highly nutritious seed of this pine; its seeds are also an important source of dietary fat for other animals from squirrels to grizzly bears.

Whitebark pine presently has a relatively high numbers of individuals over a moderately large range in subalpine regions of BC. However, long-term trends suggest a major decline resulting from mountain pine beetle and white pine blister rust epidemics, global warming, and successional replacement.

In the CCBA this species is fairly common along the east slope of the Coast Range, with scattered locations in the Quesnel Highlands and Cariboo Mountains (E-Flora BC).


<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
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</thead>
<tbody>
<tr>
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<td>S3?</td>
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<tr>
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</tbody>
</table>

149.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.
149.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations impact whitebark pine through direct loss through harvesting, and loss of habitat through harvesting, silviculture and road construction. Harvesting will directly remove all mature trees within the block boundary and road right of way. Road construction will permanently destroy the habitat. During silviculture, the species is normally not planted as part of plantation forests, and, due to its shade intolerance, in not likely to naturally regenerate or (if small trees survive harvesting and pine mistletoe slashing) survive in plantation forests. Natural regeneration largely relies on Clarke’s Nutcracker caching seeds, which is not likely to occur after harvesting.

Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning, Harvest Area Layout</td>
<td>Road Construction, Road Maintenance</td>
<td>Bridge Installation, Bridge Removal</td>
<td>Yarding, Skidding, Forwarding, Loading, Processing, Handling, Site Preparation, Planting, Vegetation Management, Density Management</td>
</tr>
<tr>
<td>A = Probability of Interaction of Interaction</td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Falling</td>
<td>Silviculture</td>
</tr>
<tr>
<td>B = Legal Consequence of Interaction</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>C = Biological Consequence of Interaction</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>6</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

149.4 MANAGEMENT STRATEGY

The following forest management strategy is designed to address both stand level (recorded sites) and landscape level (unrecorded sites) management of the whitebark pine.

Overall Objective

Retain ≥ 70% of occurrences of the blue-listed species in healthy condition. Each loss of part or all of an occurrence of this blue-listed species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- Protect most live individual trees and/or most of the habitat of known whitebark pine populations during harvesting, road construction, and silviculture. Most of the trees will be outside areas of merchantable timber, or on rocky outcrops within otherwise merchantable areas; hence avoidance should generally be possible.
- There are areas south of Charlotte Lake and west of Taseko Lakes where whitebark pine is growing in productive forests of Lodgepole pine at relatively low elevations – probably due to Clarke’s Nutcracker planting shortly after a burn (Ray Coupé, pers. comm.). In areas such as this, harvesting of beetle-killed whitebark pine will occur with the Lodgepole pine, but the area is should be regenerated with a similar or greater amount of whitebark pine as originally occurred.
- Avoid concentrating and/or diverting subsurface or surface water flows into or away from areas inhabited by the tree.
Landscape Level
Strategies to address unrecorded occurrences of this species are:
- Within the area of occurrence of whitebark pine, ensure that the occurrence and location of individual and patches of whitebark pine are noted during block and road layout.

149.5 REFERENCES AND ADDITIONAL INFORMATION


150. WHITISH RUSH

150.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Whitish rush (*Juncus albescens*) is a small, tufted, grass-like perennial with stems that are 7 – 20 cm in height with erect stems; developing from fibrous roots. **Leaves are all basal, tapered, circular in cross section and lacking cross-walls.** The inflorescence is a 2- to 6-flowered, single, terminal head with **flowers lacking bractlets**; perianth segments long pointed and pale brown to whitish; stamens 6, anthers shorter than the filaments; **involucral bracts awned with awns longer than flowers.** Mature fruit is necessary for positive species determination. Occurs in wet, calcareous fens in montane to alpine zones (BAFA, ESSF, IMA, MS, SBPS).

In the CCBA this species is known from in a calcareous fen at Redstone Flat I.R. near Tatla Lake and in a subalpine seepage area with shrub-carr at “Coleman Creek” and southwest of Bluff Lake.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
<th>IDENTIFIED WILDLIFE</th>
<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilcotin</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
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</tbody>
</table>

150.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

150.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect whitish rush habitat, through road construction.
150.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of whitish rush.

Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction affecting wet, calcareous fens in montane to alpine zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species should be done first to achieve the “overall objective” given above. Many species of rare plants occur in wet calcareous habitats.

150.5 REFERENCES AND ADDITIONAL INFORMATION


151. WIND RIVER DRABA

151.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Wind River draba (*Draba ventosa*) is a very small perennial herb, 2 – 4 cm high. It has a branched stem-base with leafless stems covered in long-stalked, starlike hairs; usually covered in dry remains of older leaves; developing from a taproot. The basal leaves are 5 – 12 mm long, densely hairy and egg-shaped-elliptic to oblanceolate; **hairs long-stalked and starlike on both leaf surfaces**, also simple and branched hairs. There are **no stem leaves**. The 3 – 20 flowers are in a raceme; flower petals are 4 – 5 mm long and yellow. Fruits are oval to egg-shaped siliques, plane, 5 – 8 mm long; densely and softly hairy with a mixture of simple and branched hairs; segments thick, often somewhat corrugated; fruiting stalks about the same length as siliques. Occurs in dry meadows, rocky slopes, cliffs and scree slopes in alpine zones (BAFA; IMA).

In the CCBA this species is known from the northeast ridge of Perkins Peak (E-Flora BC) and an alpine rock ridge at the Valleau Creek headwaters.

151.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

151.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not affect Wind River draba habitat.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Risk Ranking = A ( \times ) (B + C)</th>
<th>Planning &amp; Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2</td>
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<td>0</td>
<td>0</td>
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</tbody>
</table>

#### Relative Risk of Activities

- **Planning & Harvest Area Layout**
  - Road Layout
  - Road Construction
  - Road Maintenance
  - Road Deactivation
  - Bridge Installation
  - Bridge Removal

- **Harvesting**
  - Falling
  - Yarding
  - Skidding
  - Forwarding
  - Loading

- **Silviculture**
  - Site Preparation
  - Planting
  - Vegetation Management
  - Density Management

#### 151.4 Management Strategy

None required.

#### 151.5 References and Additional Information


152. WOODY-BRANCHED ROCKCRESS

152.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Woody-branched rockcress (Arabis lignifera) is a relatively large biennial to short-lived perennial herb, 30 – 100 cm high; 1 to several stems, either simple or branched. The basal leaves are oblanceolate, 1.5 – 4.5 cm long and 3 – 5 mm wide; developing in an indistinct rosette; 3- and 4-rayed trichomes on the underside of the leaves. Stem leaves are similar, 2 – 4 cm long, becoming unstalked upwards and clasping at the base. Flowers are in a few-flowered raceme; flowers with pink to purple petals, sepals 6 – 9 mm long. Fruits spread at right angles to the axis of the inflorescence and curve downward; 4 – 6 cm long. Very similar to A. sparsiflora. Occurs on moist to dry gravelly slopes; within shrublands and open forests in the steppe and montane zones (BG, ESSF, ICH, IDF, SBS).

In the CCBA this species is known from Bluff Lake, about 12 miles southsouthwest of Tatla Lake post office.

<table>
<thead>
<tr>
<th>KNOWN BGC UNIT</th>
<th>FOREST DISTRICT</th>
<th>GLOBAL RANK</th>
<th>BC RANK</th>
<th>BC LIST</th>
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<th>COSEWIC</th>
<th>SARA SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilcotin</td>
<td>G5</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
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</tbody>
</table>

152.2 MANAGEMENT DIRECTION

Management direction is from the CCLUP direction to manage for species at risk and biodiversity in general.

152.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations may affect woody-branched rockcress through road construction and harvesting on moist to dry gravelly slopes within shrublands and open forests. The plant may re-grow on a site after harvesting from seeds in the soil seed bank; surface soil disturbance may improve this.
Species of Management Concern BCTS Cariboo Region

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Road Layout</td>
<td>Road Construction</td>
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</tr>
</tbody>
</table>

152.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the woody-branched rockcress.

Overall Objective

Retain 70% of occurrences of this blue-listed species in healthy condition. Each loss of part or all of an occurrence of this species will incrementally worsen its conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the species. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this species are:

- Road design and construction should minimize encroachment on the habitat of a known occurrence. Where feasible,
  - Establish a ≥ 30 m buffer between the edge of the bladed road right-of-way and the edge of the occurrence, to minimize the effects of dust, ditch water, road right-of-way clearance, and road maintenance activities.
  - Prevent water and sediment inputs from ditches.
  - If necessary, consult a biologist regarding the exact boundaries of the occurrence, and details of mitigation measures.
- Road maintenance near a known occurrence should minimize the impact on the plants. If necessary, consult a biologist regarding mitigation measures.

Landscape Level

Strategies to address unrecorded occurrences of this species are:

- Minimize road construction and harvesting affecting moist to dry gravelly slopes and within shrublands and open forests in the steppe and montane zones, to minimize the potential for affecting an unknown population of this species.
  - If road construction must affect these habitats, a rare plant inventory for this species does not need to be done first to achieve the “overall objective” given above.

152.5 REFERENCES AND ADDITIONAL INFORMATION

Species of Management Concern BCTS Cariboo Region


4. FORESTED ECOSYSTEMS
153. **(BALSAM POPLAR, BLACK COTTONWOOD) – SPRUCES / RED-OSIER DOGWOOD**

153.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The (balsam poplar, black cottonwood) – spruces / red-osier dogwood (*Populus balsamifera* (ssp. *balsamifera*, ssp. *trichocarpa*) – *Picea* spp. / *Cornus stolonifera*) ecological community occurs along valley bottoms adjacent to large rivers. It is typically a middle bench, floodplain forest community occurring on sandy or gravelly fluvial materials adjacent to streams and rivers; with short flood durations followed by continual subirrigation. Soils coarse textured, moist to very moist and rich to very rich in nutrients. It has an **open canopy of balsam poplar and/or black cottonwood with scattered interior spruce. Red-osier dogwood and mountain alder are the dominant shrubs** (red-osier dogwood can be a minor component), with minor components of other shrubs such as mountain alder, twinberry, prickly rose and highbush cranberry. The herb layer can be sparse or well-developed, but common horsetail is always present. The moss layer is poorly developed.

153.2 **MANAGEMENT DIRECTION**

Management direction for the (balsam poplar, black cottonwood) – spruces / red-osier dogwood ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

153.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management issues for (balsam poplar, black cottonwood) – spruces / red-osier dogwood ecological community are limited to direct destruction during road construction, especially stream crossings. Harvesting is presently unlikely due to the active floodplain location, but may occur if the demand for cottonwood increases.
153.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of (balsam poplar, black cottonwood) - spruces / red-osier dogwood ecological community.¹⁴

**Overall Objective**

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

**Stand Level**

Strategies to address known occurrences of this community are:

- Maintain the ecological community in a natural state (i.e., same species composition, physical structure, tree composition and density, and ecological processes).
  - do not build roads or harvest in or adjacent to an occurrence.
- Maintain the natural hydrological regime of this community; seepage is fundamental to the ecology of this ecosystem.
  - As a default measure, implement a 80 m no-road construction and no-harvesting buffer on the upslope side, or all around if the occurrence is a depression on flat ground.
  - Alternatively a soil hydrologist or ecologist can develop a prescription to maintain the hydrological regime.
- Prevent water or sediment inputs from ditches.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

¹⁴ Based on the IWMS account for the hybrid white spruce / ostrich fern ecological community.
153.5 REFERENCES AND ADDITIONAL INFORMATION


154. DOUGLAS-FIR – HYBRID WHITE SPRUCE / ELECTRIFIED CAT’S-TAIL MOSS

154.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Douglas-fir – hybrid white spruce / electrified cat’s-tail moss (Pseudotsuga menziesii – Picea engelmannii x glauca / Rhytidiadelphus triquetrus) ecological community occurs on steep (>30%) north- and east-facing slopes, lower to upper positions. These are moderately dry but cool sites with infrequent summer frost due to the steep slopes. Soils are gravelly loamy, sandy, and silty and range from poor to rich in nutrients. The forest canopy is typically dominated by either Douglas-fir or lodgepole pine, with both species present in the regeneration layers. There is often a significant component of hybrid white spruce, especially in the regeneration layers. There is a low cover of shrubs (prickly rose, kinnikinnick, tall Oregon-grape, saskatoon, black twinberry, birch-leaved spirea, highbush-cranberry) and herbs (pinegrass, wild sarsaparilla, prince’s pine, trailing raspberry, showy aster, rough-leaved ricegrass, creamy peavine, heart-leaved arnica, bunchberry and twinflower). There is a thick, well-developed moss carpet of step moss, red-stemmed feathermoss, electrified cat’s-tail moss, freckle pelt, and knight’s plume.

Photo © Ministry of Forests and Range

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBSdw2/05</td>
<td>Central Cariboo</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quesnel</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

154.2 MANAGEMENT DIRECTION

Management direction for the Douglas-fir – hybrid white spruce / electrified cat’s-tail moss ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

154.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Douglas-fir – hybrid white spruce / electrified cat's-tail moss ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
Species of Management Concern BCTS Cariboo Region

### 154.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir – hybrid white spruce / electrified cat's-tail moss ecological community.

#### Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

#### Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area by avoiding Mountain Pine Beetle salvage harvest of the ecological community, which, if left, will remain as a nearly fully stocked fir or spruce stand.
- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Relative Risk of Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>Planning &amp; Layout</td>
</tr>
<tr>
<td>B = Legal Consequence of Interaction</td>
<td>Roads, Bridges and Culverts</td>
</tr>
<tr>
<td>C = Biological Consequence of Interaction</td>
<td>Harvesting</td>
</tr>
<tr>
<td></td>
<td>Silviculture</td>
</tr>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>
Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

154.5 REFERENCES AND ADDITIONAL INFORMATION


155. **DOUGLAS-FIR – HYBRID WHITE SPRUCE / FALSEBOX**

155.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The Douglas-fir – hybrid white spruce / falsebox (*Pseudotsuga menziesii* – *Picea engelmannii* x *glauca* / *Paxistima myrsinites*) ecological community is the predominant site unit of the SBSmw on gentle to moderately steep, lower to upper slope positions and level sites with medium-textured soils. The climax forest canopy is dominated by hybrid white spruce and subalpine fir, although Douglas-fir is common as a long-lived seral species. Due to past fires, seral lodgepole pine and Douglas-fir stands are common. In all stands, subalpine fir is the most abundant species of tree regeneration. The undergrowth vegetation has a moderate cover of low shrubs, especially black huckleberry, falsebox, and thimbleberry. The herbaceous layer has few grasses but a moderate cover of forbs, including bunchberry, twinflower, queen's cup, wild sarsaparilla, and heart-leaved arnica. Moss cover is nearly continuous and dominated by red-stemmed feathermoss, knight’s plume, step moss, and electrified cat’s-tail moss.

![Photo © Ministry of Forests and range](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBSmw/01</td>
<td>Central Cariboo</td>
<td>S3</td>
<td>Blue</td>
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</tr>
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</table>

155.2 **MANAGEMENT DIRECTION**

Management direction for the Douglas-fir – hybrid white spruce / falsebox ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

155.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management affects the Douglas-fir – hybrid white spruce / falsebox ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Layout</td>
<td>Road Construction</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### 155.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir – hybrid white spruce / falsebox ecological community.

**Overall Objective**

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective can be monitored, because Terrestrial Ecosystem Mapping has been completed for most of the range of the ecological community.

**Stand Level**

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.
Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of the distribution within the CCBA.
  - Most of the range of this ecological community has been Terrestrial Ecosystem and/or Predictive Ecosystem Mapped; hence the exact sites and boundaries of most occurrences are known, subject to field verification.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

155.5 References and Additional Information


156. DOUGLAS-FIR – HYBRID WHITE SPRUCE / KNIGHT’S PLUME

156.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Douglas-fir – hybrid white spruce / knight’s plume (Pseudotsuga menziesii – Picea engelmannii x glauca / Ptilium crista-castrensis) ecological community occurs on moderate to steep (>30%) south- and west-facing upper slopes. Soils are medium-textured (SBSmw) or deep, loamy soils (SBSwk1) but have a high gravel (SBSmw) and coarse fragment (> 25 cm) content (SBSwk1). This site series is also present on broad ridge tops and gentler upper slopes where soils are shallow (35 – 80 cm) to bedrock, but deeper and more continuous than in the /02 site series. The mature forest canopy is typically dominated by Douglas-fir and occasionally by lodgepole pine in the SBSmw, and by lodgepole pine with sparse hybrid white spruce and subalpine fir in the SBSwk1. Tree regeneration is typically dense and predominantly subalpine fir, with hybrid white spruce and Douglas-fir. The undergrowth vegetation has a sparse to moderate cover of low shrubs (especially falsebox, saskatoon, and black huckleberry), and a sparse cover of herbaceous species. Mosses, especially red-stemmed feathermoss and knight’s plume, typically cover 50% or more of the surface. In the SBSmw the vegetation is distinguished from other dry sites by abundant mosses, few or no cladonia and cladina lichens, and little or no velvet-leaved blueberry; black gooseberry, lady fern, oak fern, bluejoint, and hardhack are present. In the SBSwk1 the vegetation is distinguished from other sites by the presence of Douglas maple and the absence of velvet-leaved blueberry, three-leaved foamflower, and false Solomon’s-seal.

156.2 MANAGEMENT DIRECTION

Management direction for the Douglas-fir – hybrid white spruce / knight’s plume ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity...
Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

156.3  FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Douglas-fir – hybrid white spruce / knight’s plume ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.

Relative Risk of Activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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<tr>
<td>Harvest Area Layout</td>
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<tr>
<td>Density Management</td>
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<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

156.4  MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir – hybrid white spruce / knight’s plume ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective can be monitored, because Terrestrial Ecosystem Mapping has been completed for most of the range of the ecological community.

Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to
plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.

- Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of the distribution within the CCBA.
  - Most of the range of this ecological community has been Terrestrial Ecosystem and/or Predictive Ecosystem Mapped; hence the exact sites and boundaries of most occurrences are known, subject to field verification.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

**156.5 REFERENCES AND ADDITIONAL INFORMATION**


157. DOUGLAS-FIR – HYBRID WHITE SPRUCE / THIMBLEBERRY

157.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Douglas-fir – hybrid white spruce / thimbleberry (Pseudotsuga menziesii – Picea engelmannii x glauca / Rubus parviflorus) ecological community occurs on mid to lower and toe slope positions and have mesic to subhygric moisture regime; commonly receive intermittent seepage. Soils are fine to coarse in texture. The mature forest canopy is dominated by Douglas-fir and/or hybrid white spruce; subalpine fir and scattered lodgepole pine may also occur in the canopy. Deciduous seral forests (paper birch, cottonwood, and trembling aspen) are common. Tree regeneration is predominantly spruce but all of the overstory species are usually present. Shrubs and herbs have a low to moderate abundance, with abundant thimbleberry. Common shrub species include beaked hazelnut, Douglas maple, black gooseberry, black twinberry, prickly rose, wild sarsaparilla, cream-flowered peavine, common mitrewort, rough-leaved ricegrass, red-osier dogwood, soopolallie, and highbush-cranberry. Many herbaceous species are also present but none consistently has a high cover. Mosses very from low to high cover, with electrified cat’s-tail moss and feathermosses dominating.

![Photo](https://example.com/photo.jpg)

Photo © Ministry of Forests and Range

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBSdw1/06; SBSmh/01; SBSmh/05; SBSmh/06</td>
<td>Central Cariboo Quesnel</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

157.2 MANAGEMENT DIRECTION

Management direction for the Douglas-fir – hybrid white spruce / thimbleberry ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

157.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Douglas-fir – hybrid white spruce / thimbleberry ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Road construction upslope may alter the seepage patterns that maintain the soil moisture for this community.
Species of Management Concern BCTS Cariboo Region

Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Harvest Area Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
<td></td>
<td>Density Management</td>
</tr>
<tr>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

157.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir – hybrid white spruce / thimbleberry ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective can be partially monitored, because Terrestrial Ecosystem Mapping has been completed for some of the range of the ecological community.

Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize the risk of altering soil seepage hydrology by locating all roads and bladed trails no closer than 100 m upslope of the community.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.
    - These become very brushy sites following harvesting and can be very difficult to regenerate without aggressive site preparation (Ray Coupé, pers. comm.). This will need to be considered when planning harvesting and conservation of these sites.
Species of Management Concern BCTS Cariboo Region

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of the distribution within the CCBA. Most of the range of this ecological community has been Terrestrial Ecosystem and/or Predictive Ecosystem Mapped; hence the exact sites and boundaries of most occurrences are known, subject to field verification.

- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.

- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

157.5 References and Additional Information


158. **DOUGLAS-FIR – LODGEPOLE PINE / CLAD LICHENS**

158.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The Douglas-fir – lodgepole pine / clad lichens (*Pseudotsuga menziesii – Pinus contorta / Cladonia spp.*) ecological community occurs on hilltops, upper slopes and ridge crests where bedrock is near (<50 cm) the surface and frequently exposed. Soils are coarse textured and very poor to rich in nutrients. In the SBSmh, also occurs on level and gently sloping sites with coarse glaciofluvial soils, predominantly gravelly sands. The **forest canopy is relatively open and dominated by Douglas-fir and/or lodgepole pine.** subalpine fir and paper birch may be present in sub-canopy layers. Shrub cover is sparse to moderate. Herbaceous species cover is sparse; includes early blue violet, pinegrass and low forbs. Moss cover is usually low, but red-stemmed feathermoss and wavy-leaved moss may be abundant. **Terrestrial lichen cover is moderate to high, especially Cladonia lichens.** Species common on mesic and wetter sites, such as thimbleberry, black twinberry, and creamy peavine, are absent.

In the site identification guide the SBSmh/02 and SBSmh/03 were formerly separated out as a separate community, the Douglas-fir – lodgepole pine / velvet-leaved blueberry / cladonia.

![Photo © Ministry of Forests and Range](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
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<th>Identified Wildlife</th>
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</thead>
<tbody>
<tr>
<td>SBSdw1/02; SBSdw2/02; SBSmh/02; SBSmh/03</td>
<td>Central Cariboo</td>
<td>S3</td>
<td>Blue</td>
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</tr>
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<td></td>
<td>Quesnel</td>
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<td></td>
</tr>
</tbody>
</table>

158.2 **MANAGEMENT DIRECTION**

158.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Douglas-fir – lodgepole pine / clad lichens ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.

<table>
<thead>
<tr>
<th>Relative Risk of Activities</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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<td>Road Construction</td>
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<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
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</tbody>
</table>

158.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir – lodgepole pine / clad lichens ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
  - The preferred option is to leave these stands alone, even if the mature/old trees are mostly dead. There is often enough existing natural regeneration to adequately, if not fully, restock the site. Even if little natural regeneration is present, successfully restocking these sites will be extremely difficult because of the bedrock outcrop habitat.
  - Underplanting of dead or partly dead stands, focussing on pockets of deep soil is desirable to quickly re-establish this “at risk” ecological community. Planting should have an objective of re-establishing a mature/old stand of mixed Douglas-fir and Lodgepole pine with an open canopy (i.e., natural stand density rather than timber-focussed stand density).

- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate.
to high. The windfirming measures can be within the ecological community, subject to the other strategies.

- Given the typically exposed location of this community, adjacent harvesting may result in little increase in windthrow risk.

- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of the distribution within the CCBA.
  - Most of the range of this ecological community has been Terrestrial Ecosystem and/or Predictive Ecosystem Mapped; hence the exact sites and boundaries of most occurrences are known, subject to field verification.

- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.

- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

**158.5 REFERENCES AND ADDITIONAL INFORMATION**


159. DOUGLAS-FIR – SUBALPINE FIR / BLACK HUCKLEBERRY

159.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Douglas-fir – subalpine fir / black huckleberry (Pseudotsuga menziesii – Abies lasiocarpa / Vaccinium membranaceum) ecological community occurs on upper slopes and ridge tops where soils are very shallow (<20 cm) over bedrock. Soils are loamy and gravelly in texture and range from very poor to rich in nutrients. The mature forest canopy is typically dominated by short Douglas-fir and lodgepole pine. Low shrubs, especially black huckleberry, are abundant. Several herbaceous species are present but none is abundant, and total herb cover is sparse to moderate. Mosses, principally red-stemmed feathermoss, wavy-leaved moss, and juniper haircap moss, cover about 50% of the surface. Sites are mostly small, and the vegetation is distinguished by abundant lichens and Dicranum mosses.

Photo © Ministry of Forests and Range

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
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<td>Blue</td>
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</tr>
<tr>
<td>Quesnel</td>
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</table>

159.2 MANAGEMENT DIRECTION

Management direction for the Douglas-fir – subalpine fir / black huckleberry ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

159.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Douglas-fir – subalpine fir / black huckleberry ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
159.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir – subalpine fir / black huckleberry ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective can be monitored, because Terrestrial Ecosystem Mapping has been completed for most of the range of the ecological community.

Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
  - The preferred option is to leave these stands alone, even if the mature/old trees are mostly dead. There is often enough existing natural regeneration to adequately, if not fully, restock the site. Even if little natural regeneration is present, successfully restocking these sites will be extremely difficult because of the bedrock outcrop habitat.
  - Underplanting of dead or partly dead stands, focusing on pockets of deep soil is desirable to quickly re-establish this "at risk" ecological community. Planting should have an objective of re-establishing a mature/old stand of mixed Douglas-fir and Lodgepole pine with an open canopy (i.e., natural stand density rather than timber-focussed stand density).
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
  - Given the typically exposed location of this community, adjacent harvesting may result in little increase in windthrow risk.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to
plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.

- Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

**159.5 REFERENCES AND ADDITIONAL INFORMATION**


160. DOUGLAS-FIR – WESTERN REDCEDAR / WAVY-LEAVED MOSS

160.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Douglas-fir – western redcedar / wavy-leaved moss (*Pseudotsuga menziesii* – *Thuja plicata* / *Dicranum polysetum*) ecological community occurs on crest slope positions. Soils are thin, coarse in texture (gravelly loamy) and poor to rich in nutrients. Bedrock is frequently exposed. These are very dry sites with open forest canopies dominated by Douglas-fir and lodgepole pine. Tree regeneration is sparse and consists of scattered, poorly growing redcedar, subalpine fir, Douglas-fir, and lodgepole pine. The undergrowth contains several dry-site species including common juniper, soopolallie, prickly rose, pussy-toes, white-flowered hawkweed, western fescue, and rough-leaved ricegrass. Red-stemmed feathermoss and wavy-leaved moss are abundant.

![Photo © Ministry of Forests and Range](https://example.com/photograph.jpg)

<table>
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<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
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<th>Identified Wildlife</th>
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<td>S2? Red</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

160.2 MANAGEMENT DIRECTION


160.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Douglas-fir – western redcedar / wavy-leaved moss ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.


160.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir – western redcedar / wavy-leaved moss ecological community.\(^{15}\)

**Overall Objective**

Retain 100\% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

**Stand Level**

Strategies to address known occurrences of this community are:

- Avoid all disturbance to the community plus a 150 m wide buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes). This includes if there is high tree mortality – there will normally be sufficient natural regeneration present to at least partially restock the site to natural tree density. Underplant with Douglas-fir and/or western redcedar to fill large gaps. As a red-listed community it is best to let natural ecological processes to regenerate the stand, beyond speeding recovery through underplanting.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

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\(^{15}\) Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
160.5 REFERENCES AND ADDITIONAL INFORMATION


161. DOUGLAS-FIR / BLUEBUNCH WHEATGRASS – PINEGRASS

161.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Douglas-fir / bluebunch wheatgrass – pinegrass (Pseudotsuga menziesii / Pseudoroegneria spicata – Calamagrostis rubescens) ecological community occurs on upper, mid and crest positions with warm aspects. Soils are medium in texture (loamy) and range from medium to rich in nutrients. The forest canopy is nearly continuous, with Douglas-fir dominating the forest canopy and tree regeneration layers, although tree regeneration is often sparse. The undergrowth is dominated by bluebunch wheatgrass, pinegrass, and kinnikinnick.

161.2 MANAGEMENT DIRECTION

Management direction for the Douglas-fir / bluebunch wheatgrass – pinegrass ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

161.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Douglas-fir / bluebunch wheatgrass – pinegrass ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
### Total Risk Ranking

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<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
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<td>Risk Ranking = A * (B + C)</td>
<td>Risk Ranking = A * (B + C)</td>
<td>Risk Ranking = A * (B + C)</td>
<td>Risk Ranking = A * (B + C)</td>
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<tr>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

### 161.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir / bluebunch wheatgrass – pinegrass ecological community.\(^{16}\)

**Overall Objective**

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because there is presently only a very incomplete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
  - Harvesting should be modelled on Mule Deer Winter Range uneven-age fir management (most occurrences will be in MDWR), with reduced stocking standards if required to maintain the natural moderate canopy closure.

- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
  - Given the typically exposed location, and open stand structure, of this community, adjacent harvesting may result in little increase in windthrow risk.

- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to

\(^{16}\) Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.

- Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

**161.5 REFERENCES AND ADDITIONAL INFORMATION**

162. **DOUGLAS-FIR / BLUEBUNCH WHEATGRASS – STIFF NEEDLEGRASS**

### 162.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The Douglas-fir / bluebunch wheatgrass – stiff needlegrass (*Pseudotsuga menziesii / Pseudoroegneria spicata – Achnatherum occidentale*) ecological community occurs on very steep (>45%) south- and west-facing slopes with loamy soils. The forest canopy is open and dominated by multi-sized Douglas-fir, often with several large snags. Douglas-fir regeneration is sparse and occurs primarily in shaded areas but not directly beneath the canopy of large trees. Stunted aspen are common. The undergrowth includes a moderate cover of common juniper, bluebunch wheatgrass, and spreading needlegrass. Moss cover is sparse. **Abundant bluebunch wheatgrass and sparse pinegrass** distinguish these from other IDFdk3 sites.

![Photo © Ministry of Forests and Range](image)

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<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
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<tr>
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<td>Quesnel</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

### 162.2 **MANAGEMENT DIRECTION**

Management direction for the Douglas-fir / bluebunch wheatgrass – stiff needlegrass ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

### 162.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management affects the Douglas-fir / bluebunch wheatgrass – stiff needlegrass ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
162.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir / bluebunch wheatgrass – stiff needlegrass ecological community.  

**Overall Objective**

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

This objective cannot be fully monitored, because there is presently only a very incomplete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
  - Harvesting should be modelled on Mule Deer Winter Range uneven-age fir management (most occurrences will be in MDWR), with reduced stocking standards if required to maintain the natural open canopy.

- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
  - Given the typically exposed location, and open stand structure, of this community, adjacent harvesting may result in little increase in windthrow risk.

- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to

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17 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
- Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:
- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.  
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

**162.5 REFERENCES AND ADDITIONAL INFORMATION**


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18 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
163. **DOUGLAS-FIR / COMMON JUNIPER / CLAD LICHENS**

163.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The Douglas-fir / common juniper / clad lichens (*Pseudotsuga menziesii* / *Juniperus communis* / *Cladonia* spp.) ecological community occurs on level to gently sloping positions including terraces and inactive floodplains. Soils are subxeric to submesic, sandy and coarse textured, and range from very poor to poor in nutrients; developed in glacio-fluvial and fluvial materials. **The open canopy is dominated by lodgepole pine**; most regeneration is Douglas-fir, but lodgepole pine persists through regeneration in the frequent canopy gaps. The most common shrub is common juniper, often accompanied by small amounts of soopolallie and prickly rose. **Kinnikinnick dominates the poorly developed herb layer**, which typically includes bluebunch wheatgrass, spreading needlegrass, spikelike goldenrod, yarrow, wild strawberry, Rocky Mountain fescue, and Rocky Mountain butterweed. The well developed lichen layer is dominated by cladonia lichens, pelt lichens, and lesser green reindeer lichen. **Grasses are always present but not abundant**. In the long term, Douglas-fir may take over old stands, excluding the lodgepole pine and changing the understorey; stand-replacing disturbances such as fire are needed.

### Table 163.1 - Species of Management Concern BCTS Cariboo Region

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<tr>
<th>BGC Unit</th>
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<th>BC List</th>
<th>Identified Wildlife</th>
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<th>BC Rank</th>
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<td>Central Cariboo</td>
<td>S2</td>
<td>Red</td>
<td>Y (Jun 2006)</td>
</tr>
</tbody>
</table>

163.2 **MANAGEMENT DIRECTION**


163.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management affects the Douglas-fir / common juniper / clad lichens ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral
Species of Management Concern BCTS Cariboo Region

communities, and/or alteration of successional patterns. Mining of granular materials for road construction and maintenance can be a significant risk.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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<td>B = Legal Consequence of Interaction</td>
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<td>Risk Ranking = A * (B + C)</td>
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163.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir / common juniper / clad lichens ecological community.

Implement the Identified Wildlife (2004) strategy at both the stand and landscape level.

Overall Objective

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

- This community may degrade into a fir-dominated stand from lack of stand initiating disturbance, or there may be high tree mortality; however due to past losses of the community there should be no harvesting until the WHAs have been designated.

Stand Level

Strategies to address known occurrences of this community are:

- Manage WHAs by following the Identified Wildlife Management Strategy, and the Section 7 Notice if issued.
- Avoid all disturbance to the community plus a 150 m wide buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

In the long-term, multi-stakeholder landscape level planning should identify which stands (at least 20) of this ecological community should be managed for as Wildlife Habitat Areas, and which can be managed for forest harvesting.
163.5 REFERENCES AND ADDITIONAL INFORMATION


164. DOUGLAS-FIR / DOUGLAS MAPLE / STEP MOSS

164.1 Species Summary: Identification and Habitat

The Douglas-fir / Douglas maple / step moss (Pseudotsuga menziesii / Acer glabrum / Hylocomium splendens) ecological community occurs on mid and upper slope positions of steep south- and west-facing slopes. Soil is medium to coarse textured and poor to rich in nutrients. It includes the warmest sites in the subzone. The mature forest canopy is dominated by Douglas-fir but occasionally includes scattered hybrid white spruce and subalpine fir. Tree regeneration is also dominated by Douglas-fir. Shrub and herb layers have a large diversity of species and typically high total percent ground cover. Present are choke cherry, American vetch, and abundant showy aster; absent or in low abundance are kinnikinnick and velvet-leaved blueberry.

![Photo © Ministry of Forests and Range]

<table>
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<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBSmh/04</td>
<td>Central Cariboo Quesnel</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

164.2 Management Direction

Management direction for the Douglas-fir / Douglas maple / step moss ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

164.3 Forest Management Issues and Risk Assessment

Forest management affects the Douglas-fir / Douglas maple / step moss ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-
climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.

<table>
<thead>
<tr>
<th>Relative Risk of Activities</th>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Layout</td>
<td>Road Construction</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

**164.4 MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir / Douglas maple / step moss ecological community.

**Overall Objective**

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

- This community may have high mortality due to Douglas-fir Bark Beetle, in which case it is no longer in mature/old condition and harvesting is desirable to initiate new stand development.

**Stand Level**

Strategies to address known occurrences of this community are:

- For occurrences that do not have high tree morality, avoid all disturbance to the community plus a 150 m wide buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
- For occurrences that have high tree mortality, and/or the 150 m buffer has high tree mortality, in consultation with an ecologist develop a salvage plan (including post-harvest silviculture) that meets the objectives of (1) minimizing short-term alterations to the community; and (2) achieving a long-term mature ecological community (trees and understory) with characteristics within the natural range of variation for the natural ecological community.
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community and the buffer. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.

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*Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.*
• Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

164.5 REFERENCES AND ADDITIONAL INFORMATION


165. DOUGLAS-FIR / PRICKLY ROSE / WILD SARSAPARILLA

165.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Douglas-fir / prickly rose / wild sarsaparilla (*Pseudotsuga menziesii* / *Rosa acicularis* / *Aralia nudicaulis*) ecological community occurs on moist, lower and toe positions of north- or east-facing slopes; includes moist sites only slightly wetter than /06 sites. Soils are medium to fine in texture and range from medium to very rich in nutrients. Sites occur primarily at the base of longer north-facing slopes where seepage water is present following spring snowmelt and after heavy summer rains but not during most of the growing season. The Douglas-fir dominated forest canopy is moderately closed and often contains paper birch. The sparse to moderately dense tree regeneration is primarily Douglas-fir, often with some paper birch. The undergrowth is characterized by a moderate density of shrubs and several moist-site forbs. Douglas maple, northern gooseberry, violets, and wild sarsaparilla are abundant.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFxm/07</td>
<td>Central Cariboo</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

165.2 MANAGEMENT DIRECTION

Management direction for the Douglas-fir / prickly rose / wild sarsaparilla ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.
165.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Douglas-fir / prickly rose / wild sarsaparilla ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Up-slope harvesting and/or road construction may alter seepage patterns resulting from up-slope hydrology.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking</td>
<td>Planning</td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
</tr>
<tr>
<td>A * (B + C)</td>
<td></td>
<td>10</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

165.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir / prickly rose / wild sarsaparilla ecological community.

Overall Objective

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

- This community may have high mortality due to Douglas-fir Bark Beetle, in which case it is no longer in mature/old condition and harvesting is desirable to initiate new stand development.

Stand Level

Strategies to address known occurrences of this community are:

- For occurrences that do not have high tree morality, avoid all disturbance to the community – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
- For occurrences that have high tree morality, and/or the 80 m buffer has high tree mortality, in consultation with an ecologist develop a salvage plan (including post-harvest silviculture) that meets the objectives of (1) minimizing short-term alterations to the community; and (2) achieving a long-term mature ecological community (trees and understory) with characteristics within the natural range of variation for the natural ecological community.
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community and the buffer. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

- Maintain the natural hydrological regime of this community; seepage is fundamental to the ecology of this ecosystem.
  - As a default measure, implement a 80 m no-road construction and no-harvesting buffer on the

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20 Based on the IWMS account for the hybrid white spruce / ostrich fern ecological community.
upslope side, or all around if the occurrence is a depression on flat ground.

- Alternatively a soil hydrologist or ecologist can develop a prescription to maintain the hydrological regime.
- Prevent water or sediment inputs from ditches.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

### 165.5 REFERENCES AND ADDITIONAL INFORMATION


166. DOUGLAS-FIR / RED-STEMMED FEATHERMOSS – STEP MOSS

166.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Douglas-fir / red-stemmed feathermoss – step moss (Pseudotsuga menziesii / Pleurozium schreberi – Hylocomium occurs on steep slopes with cool aspects north- or east-facing; may be near the base of short slopes and depression. SBSdk/04 usually on south-aspect bedrock outcrops or ridges. Soils are medium to coarse textured and very poor to rich in nutrients. The canopy is relatively closed and dominated by Douglas-fir and lodgepole pine; the lodgepole pine may be replaced by hybrid white spruce and/or subalpine fir in SBSdk/04. Undergrowth is dominated by mosses (mostly red-stemmed feathermoss and knight’s plume) and usually has little to medium shrub and herb cover; in SBSdk/04 there is about 40% shrub cover of “dry site” species. Douglas-fir regeneration is often dense. There are typically few vascular plants other than scattered pinegrass, showy aster, and twinflower.

BGC Unit | Forest District | BC Rank | BC List | Identified Wildlife
--- | --- | --- | --- | ---
IDFdk3/05; IDFdk4/07; IDFxm/05; IDFxm/06; SBSdk/04 | Central Cariboo Quesnel; Chilcotin | S3 | Blue

166.2 MANAGEMENT DIRECTION

Management direction for the Douglas-fir / red-stemmed feathermoss – step moss ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

166.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Douglas-fir / red-stemmed feathermoss – step moss ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
166.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir / red-stemmed feathermoss – step moss ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

- This community may have high mortality due to Douglas-fir Bark Beetle, in which case it is no longer in mature/old condition and harvesting is desirable to initiate new stand development.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

Landscape Level
Species of Management Concern BCTS Cariboo Region

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

166.5 REFERENCES AND ADDITIONAL INFORMATION


167. **DOUGLAS-FIR / ROCKY MOUNTAIN JUNIPER / KINNIKINNICK**

167.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The Douglas-fir / Rocky Mountain juniper / kinnikinnick (*Pseudotsuga menziesii* / *Juniperus scopulorum* / *Arctostaphylos uva-ursi*) ecological community occurs on moderately steep south- or west-facing slopes in upper to mid positions. Soil texture is sandy and soils range from very poor to poor in nutrients. It typically has a very open canopy with multi-sized Douglas-fir and usually several large snags. Stunted aspen occur on some sites. Tree regeneration is sparse and occurs primarily in shaded areas but not directly under larger Douglas-fir trees. The undergrowth is sparse and dominated by kinnikinnick. Shrubs include Rocky Mountain juniper, birch-leaved spirea, prickly rose, saskatoon and soopolallie. It includes little moss or lichen cover. Exposed mineral soil is common.

![Photo © Ministry of Forests and Range](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFdk3/02</td>
<td>Central Cariboo</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quesnel</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

167.2 **MANAGEMENT DIRECTION**

Management direction for the Douglas-fir – Rocky Mountain juniper / kinnikinnick ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

167.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management affects the Douglas-fir – Rocky Mountain juniper / kinnikinnick ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.


167.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir – Rocky Mountain juniper / kinnikinnick ecological community.21

Overall Objective

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

- This community may have high mortality due to Douglas-fir Bark Beetle, in which case it is no longer in mature/old condition and harvesting is desirable to initiate new stand development.

Stand Level

Strategies to address known occurrences of this community are:

- For occurrences that do not have high tree morality, avoid all disturbance to the community plus a 150 m wide buffer.
- For occurrences that have high tree morality, and/or the 150 m buffer has high tree mortality, in consultation with an ecologist develop a salvage plan (including post-harvest silviculture) that meets the objectives of (1) minimizing short-term alterations to the community; and (2) achieving a long-term mature ecological community (trees and understory) with characteristics within the natural range of variation for the natural ecological community.
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community and the buffer. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS

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21 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

167.5 REFERENCES AND ADDITIONAL INFORMATION


168. DOUGLAS-FIR / ROCKY MOUNTAIN JUNIPER / PRAIRIE SAGEWORT

168.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Douglas-fir / Rocky Mountain juniper / prairie sagewort (Pseudotsuga menziesii / Juniperus scopulorum / Artemisia frigida) ecological community occurs on moderate and steep south- and west-facing slopes with medium- to fine-textured or sandy soils. These are relatively hot, very dry sites, and they are common. Tree cover is patchy, consisting of multi-sized Douglas-fir and occasional trembling aspen. Tree regeneration is sparse and primarily in the partial shade of larger trees. The under-growth is dominated by shrubs, including Rocky Mountain juniper, prairie sagewort, and saskatoon. Herbs are dominated by bluebunch wheatgrass. The forest floor is dry and discontinuous and much of the surface is exposed mineral soil. Moss cover is sparse.

Photo © Ministry of Forests and Range

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFdk4/03; IDFdk4/04; IDFxm/04</td>
<td>Central Cariboo</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

168.2 MANAGEMENT DIRECTION

Management direction for the Douglas-fir / Rocky Mountain juniper / prairie sagewort ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

168.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Douglas-fir / Rocky Mountain juniper / prairie sagewort ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
168.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir / Rocky Mountain juniper / prairie sagewort ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

- This community may have high mortality due to Douglas-fir Bark Beetle, in which case it is no longer desirable to initiate new stand development.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

Landscape Level
Species of Management Concern BCTS Cariboo Region

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

168.5 REFERENCES AND ADDITIONAL INFORMATION

169. DOUGLAS-FIR / ROCKY MOUNTAIN JUNIPER / SHRUBBY PENSTEMON

169.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Douglas-fir / Rocky Mountain juniper / shrubby penstemon (Pseudotsuga menziesii / Juniperus scopulorum / Penstemon fruticosus) ecological community occurs on upper south- and west-facing slopes and hilltops with shallow soils. Soil is coarse textured and very poor to rich in nutrients. It occurs on moderate to steep south- or west-facing slopes with sandy soils, and also on ridge and hill crests with shallow soils over bedrock. These are very dry sites with slow tree growth. **The forest canopy is characterized by patches or clumps of multi-sized Douglas-fir stems; in drier sites they may be mostly small.** A few small trembling aspen stems are often present. Open shrub- or grass-dominated areas occur between the clumps. Tree regeneration is typically sparse and occurs primarily in the shade (but not in the rainshadow directly beneath the canopy) of larger trees. **The undergrowth is relatively sparse and dominated by common juniper, Rocky Mountain juniper, kinnikinnick, bluebunch wheatgrass, dry-land forbs, and lichens.** The forest floor is discontinuous and much of the surface is exposed mineral soil.

![Photo © Ministry of Forests and Range](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFdk3/03; IDFdk4/02; IDFxm/02</td>
<td>Central Cariboo; Quesnel; Chilcotin</td>
<td>S3</td>
<td>Blue</td>
<td>Wildlife</td>
</tr>
</tbody>
</table>

169.2 MANAGEMENT DIRECTION

Management direction for the Douglas-fir / Rocky Mountain juniper / shrubby penstemon ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.
169.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Douglas-fir / Rocky Mountain juniper / shrubby penstemon ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.

<table>
<thead>
<tr>
<th>Relative Risk of Activities</th>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence</td>
<td>C = Biological Consequence</td>
<td>A x (B + C)</td>
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<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
<td>Bridge Installation</td>
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<tr>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
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<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

169.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir / Rocky Mountain juniper / shrubby penstemon ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

- This community may have high mortality due to Douglas-fir Bark Beetle, in which case it is no longer in mature/old condition and harvesting is desirable to initiate new stand development.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.

- Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

### 169.5 REFERENCES AND ADDITIONAL INFORMATION

170. HYBRID WHITE SPRUCE – PAPER BIRCH / DEVIL’S CLUB

170.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The hybrid white spruce – paper birch / devil's club (Picea engelmannii × glauca – Betula papyrifera / Oplopanax horridus) ecological community occurs in moist lower and toe seepage slopes on cool aspects, especially adjacent to small streams. Soils are generally medium to coarse textured. It occurs Seepage is evidenced in the soil by mottled and occasionally gleyed lower soil horizons. The forest canopy of mature stands is dominated by large, often widely spaced Hybrid White Spruce, Subalpine Fir, and Douglas-fir, but Black Cottonwood and Paper Birch frequently form a significant component of the stand. Mountain Alder, Devil’s Club and other tall shrubs dominate the undergrowth. Herbaceous vegetation covers the ground, including Enchanter’s Nightshade, Lady’s Fern and Stinging Nettle. Ostrich fern is not typically present, its listing in the site identification guide is an error (Ray Coupé, pers. comm.). The moss layer is typically poorly developed.

![Photo © Ministry of Forests and Range](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
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</table>

170.2 MANAGEMENT DIRECTION

Management direction for the hybrid white spruce – paper birch / devil's club ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

170.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the hybrid white spruce – paper birch / devil's club ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Up-slope harvesting and/or road construction may alter seepage patterns resulting from up-slope hydrology.
## Species of Management Concern BCTS Cariboo Region

### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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<td>Road Construction</td>
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</tr>
</tbody>
</table>

### 170.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of hybrid white spruce – paper birch / devil's club ecological community.

#### Overall Objective

Retain 70% of occurrences of this blue-listed species in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

#### Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches, old growth management areas, and any deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by considering measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high.
- Maintain the natural hydrological regime of this community; seepage is fundamental to the ecology of this ecosystem.
  - As a default measure, implement a 80 m no-road construction buffer on the upslope side, or all around if the occurrence is a depression on flat ground.
  - Alternatively a soil hydrologist or ecologist can develop a prescription to maintain the hydrological regime.
  - Prevent water or sediment inputs from ditches.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

- These become very brushy sites following harvesting and can be very difficult to regenerate without aggressive site preparation (Ray Coupé, pers. comm.). This will need to be considered when planning harvesting and conservation of these sites.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

**170.5 REFERENCES AND ADDITIONAL INFORMATION**


171. HYBRID WHITE SPRUCE / BLACK GOOSEBERRY

171.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The hybrid white spruce / black gooseberry (*Picea engelmannii* x *glauca / Ribes lacustre*) ecological community occurs on north- and east-facing slopes on mid, lower, and toe slope positions where soils are moistened by intermittent to permanent seepage. It often occurs along streams and where subsurface seepage is near the surface on valley slopes. Soil is fine textured (silty or clayey). The mature forest canopy is dominated by hybrid white spruce and subalpine fir with scattered lodgepole pine. Tree regeneration is predominantly subalpine fir. The undergrowth vegetation is characterised by the presence of black gooseberry and black twinberry as well as forbs indicative of moist sites.

171.2 MANAGEMENT DIRECTION

Management direction for the hybrid white spruce / black gooseberry ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

171.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the hybrid white spruce / black gooseberry ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
**171.4 MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of hybrid white spruce / black gooseberry ecological community.

**Overall Objective**

Retain 70% of occurrences of this blue-listed species in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches, old growth management areas, and any deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by considering measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high.
- Maintain the natural hydrological regime of this community; seepage is fundamental to the ecology of this ecosystem.
  - As a default measure, implement a 80 m no-road construction buffer on the upslope side, or all around if the occurrence is a depression on flat ground.
  - Alternatively a soil hydrologist or ecologist can develop a prescription to maintain the hydrological regime.
  - Prevent water or sediment inputs from ditches.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

171.5 REFERENCES AND ADDITIONAL INFORMATION


172. HYBRID WHITE SPRUCE / DEVIL’S CLUB / STEP MOSS

172.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The hybrid white spruce / devil’s club / step moss (Picea engelmannii x glauca / Oplopanax horridus / Hylocomium splendens) ecological community occurs on moist lower slopes where seepage water input is removed slowly and soil remains wet for a significant part of the growing season; seepage water input is more persistent than in the /06 ecological community. Soil is generally medium to fine textured. These are moist, rich, and very productive sites. The mature forest canopy is dominated by hybrid white spruce. There is abundant devil’s club (> 10% cover); other species most common in this ecological community are lady fern and three-leaved foamflower.

172.2 MANAGEMENT DIRECTION

Management direction for the hybrid white spruce / devil's club / step moss ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

172.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the hybrid white spruce / devil's club / step moss ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Up-slope harvesting and/or road construction may alter seepage patterns resulting from up-slope hydrology.
### 172.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of hybrid white spruce / devil's club / step moss ecological community.  

#### Overall Objective

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the hybrid white spruce / devil's club / step moss ecological community.

#### Stand Level

Strategies to address known occurrences of this community are:

- Maintain the ecological community in a natural state (i.e., same species composition, physical structure, tree composition and density, and ecological processes).
  - do not build roads or harvest in or adjacent to an occurrence.
  - The entire spruce component of this ecological community may have been attacked or killed by Spruce Bark Beetle; hence this ecological community and/or the adjacent area may be appropriate for salvage harvesting. In consultation with an ecologist develop a salvage plan (including post-harvest silviculture) that meets the objectives of (1) minimizing short-term alterations to the community; and (2) achieving a long-term mature ecological community (trees and understory) with characteristics within the natural range of variation for the natural ecological community.
- Maintain the natural hydrological regime. Seepage, fluctuating and seasonally high water tables are fundamental to the ecology of this wet ecosystem.
  - As a default measure, implement a 80 m no-road construction and no-harvesting buffer on the upslope side, or all around if the occurrence is a depression on flat ground.
  - alternatively a soil hydrologist or ecologist can develop a prescription to maintain the hydrological regime.
- Prevent physical disturbance.
- Prevent water or sediment inputs from ditches.

#### Landscape Level

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22 Based on the IWMS account for the hybrid white spruce / ostrich fern ecological community.
Strategies to address unrecorded occurrences of this community are:

- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

172.5 References and Additional Information


173. HYBRID WHITE SPRUCE / FOAM LICHENS

173.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The hybrid white spruce / foam lichens (*Picea engelmannii* x *glauca* / *Stereocaulon* spp.) ecological community is very rare and occurs on old lava flows. The Nazko site has a southern aspect and is on a gentle lower slope with steep sections closer to the source of the lava. The surface is very uneven ‘slag-like’ lava, with boulder-size pieces of lava derived from ‘lava boils’. Little or no mineral soil is present due to slow weathering. Soils are wet and nutrient poor. The vegetation is very sparse, and distinguished by abundant lichens, predominantly foam lichens. The tree layer consists of scattered, stunted black spruce and hybrid white spruce. The shrub layer consists of black gooseberry. There are very few herbs, though scattered violet species are present. Bushy-tailed packrat middens are common.

Its occurrence is the result of the lava flow, and only very secondarily due to the Biogeoclimatic variant. This ecological community is only known from a single record of occurrence on the lava flows of the Nazko Cone near Fishpot Lake. The community is visible on GoogleEarth at about 52° 55’ 26.7” N 123° 44’ 42” W. The hybrid white spruce / foam lichens ecological community is outside the normal MoF ecological community classification system. It is incorrectly listed by the CDC as being SBSdw2/00 – it is actually SBPSdc/00. It is not likely to occur elsewhere in the CCBA because it occupies more recent lava materials than the relatively old volcanic materials of the Itch/Ilgachus, and none were seen while sampling and mapping those areas (Ray Coupé, pers. comm.).

173.2 MANAGEMENT DIRECTION

Management direction for the hybrid white spruce / foam lichens ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

173.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the hybrid white spruce / foam lichens ecological community through road
construction. Timber values are too low for harvesting.

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<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
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<td>10</td>
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<td>2</td>
<td>3</td>
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</table>

### 173.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of hybrid white spruce / foam lichens ecological community.

**Overall Objective**

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

**Stand Level**

Strategies to address known occurrences of this community are:

- When road construction or harvesting is considered near a hybrid white spruce / foam lichens community occurrence, avoid all disturbance to the site plus a 30 m buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
  - A 30 m buffer is suggested as sufficient to minimize the risk of windthrow (minimal), interior forest condition (minimal), weed invasion (very dry and poor soils), road dust, road ditchwater (well drained site), and disturbance of wildlife species (few beyond invertebrates).

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the only known location of this ecological community as being at and adjacent to the lava rock mine west of Nazko.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 20 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

### 173.5 References and Additional Information


174. HYBRID WHITE SPRUCE / HARDHACK

174.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The hybrid white spruce / hardhack (*Picea engelmannii* x *glauc* / *Spirea douglasii*) ecological community is common in the Sundberg Lake and Umiti Creek areas on moist lower slopes, shallow depressions and poorly drained flats where cold air accumulates, primarily adjacent to wetlands and in low-relief basins. Soil texture is medium, Summer frost is frequent, and soils are relatively cold. The mature forest canopy is dominated by lodgepole pine or occasionally by hybrid white spruce. Tree regeneration is generally sparse. The undergrowth vegetation is distinguished by its vigorous shrub layer dominated by hardhack, willows, and black twinberry. Labrador tea is also frequently present. Common herbs and dwarf shrubs include bluejoint, creeping-snowberry, palmate coltsfoot, and twinflower. Moss cover is nearly continuous and often includes sphagnum mosses.

This community is called the hybrid white spruce / pink spirea community in the field guide to forest site identification and interpretation. Pink spirea is the name used for the interior subspecies of hardhack; “hardhack” applies to the species as a whole, and to just the coastal subspecies when referring to subspecies.

![Map of BCTS Cariboo Region with highlighted area](image)

<table>
<thead>
<tr>
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<td></td>
<td>Quesnel</td>
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174.2 MANAGEMENT DIRECTION

Management direction for the hybrid white spruce / hardhack ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

174.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the hybrid white spruce / hardhack ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-serial communities, and/or alteration of successional patterns.
174.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of hybrid white spruce / hardhack ecological community.  

Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

➢ This community may have high mortality due to Mountain Pine Bark Beetle, in which case it is no longer in mature/old condition and harvesting is desirable to initiate new stand development.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

• For occurrences that do not have high tree morality, avoid all disturbance to the community plus a 150 m wide buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
  ➢ Pine stands with low tree mortality will be extremely rare, and therefore any examples of this community where that is the case should be protected.
  ➢ Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.

• For occurrences that have high tree morality, and/or the 150 m buffer has high tree mortality, harvest is appropriate.
  ➢ Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

• Minimize long-term loss of harvested ecological community area during silviculture by:
  ➢ Minimizing use of site preparation practices that modify soil structure.

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23 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
Species of Management Concern BCTS Cariboo Region

- Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
- Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

Landscape Level

Strategies to address unrecorded occurrences of this community are:
- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

174.5 REFERENCES AND ADDITIONAL INFORMATION


175. HYBRID WHITE SPRUCE / HARDHACK / OAK FERN

175.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The hybrid white spruce / hardhack / oak fern (*Picea engelmannii* x *glauca* / *Spirea douglasii* / *Gymnocarpium dryopteris*) ecological community occurs on moist, cold air sites, such as in shallow depressions adjacent to wetlands, at a level, mid, lower or toe slope position. Soil texture is medium. The mature forest typically has a relatively open canopy dominated by hybrid white spruce and sparse tree regeneration. The undergrowth vegetation is distinguished by its vigorous low shrub layer, dominated by abundant hardhack and black twinberry. The herbaceous layer is diverse, containing many species with more than 1% ground cover. Knight’s plume moss covers most soil surfaces.

175.2 MANAGEMENT DIRECTION

Management direction for the hybrid white spruce / hardhack / oak fern ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

175.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the hybrid white spruce / hardhack / oak fern ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
175.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of hybrid white spruce / hardhack / oak fern ecological community.  

**Overall Objective**

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

- This community may have high mortality due to Spruce Bark Beetle, in which case it is no longer in mature/old condition and harvesting is desirable to initiate new stand development.

This objective can be monitored, because Terrestrial Ecosystem Mapping has been completed for most of the range of the ecological community.

**Stand Level**

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

24 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
Species of Management Concern BCTS Cariboo Region

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

175.5 REFERENCES AND ADDITIONAL INFORMATION


176. HYBRID WHITE SPRUCE / HORSETAILS – WESTERN MEADOWRUE

176.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The hybrid white spruce / horsetails – western meadowrue (Picea engelmannii x glauca / Equisetum spp. – Thalictrum occidentale) ecological community occurs on wet sites adjacent to stream channels where seepage water input is nearly continuous, resulting in moist, relatively nutrient-rich soils. The mature forest canopy is dominated by relatively large hybrid white spruce and occasional lodgepole pine. The undergrowth includes a moderate cover of shrubs, especially black twinberry. Herbs include relatively abundant bunchberry, western meadowrue, common mitrewort, soft-leaved sedge, trailing raspberry, palmate coltsfoot, and bluejoint, and a relatively small percent cover (<10%) of common horsetail. Leafy mosses are abundant.

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<tr>
<th>BGC Unit</th>
<th>Forest District</th>
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<td>SBPSdc/06; SBPSxc/06</td>
<td>Central Cariboo; Quesnel; Chilcotin</td>
<td>S3</td>
<td>Blue</td>
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</tbody>
</table>

176.2 MANAGEMENT DIRECTION

Management direction for the hybrid white spruce / horsetails – western meadowrue ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

176.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the hybrid white spruce / horsetails – western meadowrue ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Road Layout</td>
<td>Road</td>
<td></td>
</tr>
<tr>
<td>Harvest Area Layout</td>
<td>Road Construction</td>
<td>Road</td>
<td></td>
</tr>
<tr>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road</td>
<td></td>
</tr>
<tr>
<td>Road Deactivation</td>
<td>Road Installation</td>
<td>Bridge</td>
<td></td>
</tr>
<tr>
<td>Bridge Installation</td>
<td>Bridge Removal</td>
<td>Felling</td>
<td></td>
</tr>
<tr>
<td>Falling</td>
<td>Yarding</td>
<td>Skidding</td>
<td></td>
</tr>
<tr>
<td>Yarding</td>
<td>Forwarding</td>
<td>Loading</td>
<td></td>
</tr>
<tr>
<td>Forwarding</td>
<td>Processing</td>
<td>Handling</td>
<td></td>
</tr>
<tr>
<td>Processing</td>
<td>Site Preparation</td>
<td>Planning</td>
<td></td>
</tr>
<tr>
<td>Site Preparation</td>
<td>Vegetation Management</td>
<td>Density Management</td>
<td></td>
</tr>
</tbody>
</table>

### Relative Risk of Activities

- **Planning & Layout**: Planning, Harvest Area Layout
- **Roads, Bridges and Culverts**: Road Construction, Road Maintenance, Road Deactivation, Road Installation, Bridge Installation, Bridge Removal
- **Harvesting**: Felling, Yarding, Skidding, Forwarding, Loading, Processing, Handling
- **Silviculture**: Site Preparation, Planning, Vegetation Management, Density Management

### 176.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of hybrid white spruce / horsetails – western meadow rue ecological community.

#### Overall Objective

Retain 70% of occurrences of this blue-listed species in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

#### Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches, old growth management areas, and any deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by considering measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

#### Landscape Level

Strategies to address unrecorded occurrences of this community are:
• Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
• Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level’ section.
• Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

176.5 REFERENCES AND ADDITIONAL INFORMATION

177. HYBRID WHITE SPRUCE / HORSETAILS / LEAFY MOSES

177.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The hybrid white spruce / horsetails / leafy mosses (Picea engelmannii x glauca / Equisetum spp. / Mnium spp.) ecological community occurs on level or gently sloping sites with a near-surface (<50 cm) water table, primarily at the toe of slopes. Soils are medium to fine textured, very wet and poor to rich in nutrients. The mature forest canopy is predominantly hybrid white spruce with a few scattered subalpine fir and lodgepole pine. Trees are often rooted on raised microsites. Shrubs include Labrador tea, bog-laurel, and scrub birch. Herbs include >25% cover of common horsetail; also present are soft-leaved sedge, palmate coltsfoot, and fringed grass-of-Parnassus. Glow moss, leafy mosses, and sometimes sphagnum moss are present.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSdc2/08; MSxk3/09</td>
<td>Central Cariboo Chilcotin</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

177.2 MANAGEMENT DIRECTION

Management direction for the hybrid white spruce / horsetails / leafy mosses ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

177.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the hybrid white spruce / horsetails / leafy mosses ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
### 177.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of hybrid white spruce / horsetails / leafy mosses ecological community.  

#### Overall Objective

Retain 70% of occurrences of this blue-listed species in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.  

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.  

#### Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.  
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.  
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.  
- Maintain the natural hydrological regime. Seepage, fluctuating and seasonally high water tables are fundamental to the ecology of this wet ecosystem.  
  - As a default measure, implement a 80 m no-road construction buffer on the upslope side, or all around if the occurrence is a depression on flat ground.  
  - Alternatively a soil hydrologist or ecologist can develop a prescription to maintain the hydrological regime.  
- Minimize long-term loss of harvested ecological community area during silviculture by:  
  - Minimizing use of site preparation practices that modify soil structure.  

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25 Based on the IWMS account for the hybrid white spruce / ostrich fern ecological community.
Species of Management Concern BCTS Cariboo Region

- Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
- Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.
- Prevent physical disturbance.
- Prevent water or sediment inputs from ditches.

Landscape Level

Strategies to address unrecorded occurrences of this community are:
- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

177.5 REFERENCES AND ADDITIONAL INFORMATION


178. HYBRID WHITE SPRUCE / OSTRICH FERN

178.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The hybrid white spruce / ostrich fern (Picea engelmannii x glauca / Matteuccia struthiopteris) ecological community occurs in toe and level slope positions with medium-textured to somewhat fine-textured (sandy to loamy), fluvial deposits. Sites are usually on or near floodplains and subject to persistent seepage and periodic flooding. Soils are moist to very moist, and have a rich to very rich nutrient regime. This forested community has a fairly open canopy dominated by large hybrid white spruce, but also including subalpine fir, black cottonwood, and paper birch. Mountain alder, red-osier dogwood, red elderberry, and devil's-club dominate the vigorous shrub layer. The well-developed herb layer includes an abundance of ostrich fern, horsetails, stinging nettle, enchanter's-nightshade, northern golden-saxifrage, one-leaved foamflower, and large-leaved avens. Moss cover is low, and consists primarily of leafy mosses and feathermosses. It occurs as small patch forests (between 5 and 80 ha) and most typically as linear systems along creeks, streams, and floodplains of larger rivers. The SBSmh is a small subzone with a history of disturbance by humans and many productive forest sites have been logged; its high value as timber has resulted in serious depletion.

178.2 MANAGEMENT DIRECTION


178.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the hybrid white spruce / ostrich fern ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral...
communities, and/or alteration of successional patterns. Up-slope harvesting and/or road construction may alter seepage patterns resulting from up-slope hydrology.

### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

### 178.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of hybrid white spruce / ostrich fern ecological community.

**Overall Objective**

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

Implement the Identified Wildlife (2004) strategy at both the stand and landscape level.

**Stand Level**

Strategies to address known occurrences of this community are:

- Manage WHAs by following the Identified Wildlife Management Strategy, and the Section 7 Notice if issued.
- For occurrences that do not have high tree morality, avoid all disturbance to the community – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
- For occurrences that have high tree morality, and/or the 80 m buffer has high tree mortality, in consultation with an ecologist develop a salvage plan (including post-harvest silviculture) that meets the objectives of (1) minimizing short-term alterations to the community; and (2) achieving a long-term mature ecological community (trees and understory) with characteristics within the natural range of variation for the natural ecological community.
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community and the buffer. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Maintain the natural hydrological regime of this community; seepage is fundamental to the ecology of this ecosystem.
  - As a default measure, implement a 80 m no-road construction and no-harvesting buffer on the upslope side, or all around if the occurrence is a depression on flat ground.
  - Alternatively a soil hydrologist or ecologist can develop a prescription to maintain the hydrological regime.
  - Prevent water or sediment inputs from ditches.

**Landscape Level**
Species of Management Concern BCTS Cariboo Region

Strategies to address unrecorded occurrences of this community are:

• Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
• Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
• If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
• Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

In the long-term, multi-stakeholder landscape level planning should identify which stands (at least 20) of this ecological community should be managed for as Wildlife Habitat Areas, and which can be managed for forest harvesting.

178.5 References and Additional Information


**179. HYBRID WHITE SPRUCE / PINEGRASS / STEP MOSS**

### 179.1 Species Summary: Identification and Habitat

The hybrid white spruce / pinegrass / step moss (*Picea engelmannii x glauca / Calamagrostis rubescens / Hylocomium splendens*) ecological community occurs on mid and upper slope positions on **steep (>35%) north- and east-facing slopes**. Soils are medium textured and medium to rich in nutrients. These are moderately dry but cool sites with infrequent summer frost due to the steep slopes. The forest canopy of mature stands is dominated by Douglas-fir or lodgepole pine, with a significant component of **hybrid white spruce**, especially in the regeneration layers. Hybrid white spruce, or a hybrid white spruce and Douglas-fir mix, dominates in old stands. The undergrowth vegetation has a relatively sparse cover of shrubs and herbaceous plants but a **nearly continuous carpet of step moss and red-stemmed feathermoss**. A relatively small cover of pinegrass is usually present. This community usually occurs as small patches, less than 20 ha in size (Timberline Forest Inventory Consultants 2003a).

![Photo](image)

**BGC Unit** | **Forest District** | **BC Rank** | **BC List** | **Identified Wildlife**
---|---|---|---|---
SBPSmk/05 | Central Cariboo Quesnel; Chilcotin | S3 | Blue |

### 179.2 Management Direction

Management direction for the hybrid white spruce / pinegrass / step moss ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

### 179.3 Forest Management Issues and Risk Assessment

Forest management affects the hybrid white spruce / pinegrass / step moss ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
### 179.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of hybrid white spruce / pinegrass / step moss ecological community.  

#### Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

- This community may have high mortality due to Mountain Pine Bark Beetle, in which case it is no longer in mature/old condition and harvesting is desirable to initiate new stand development.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

#### Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

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26 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

179.5 REFERENCES AND ADDITIONAL INFORMATION

180. HYBRID WHITE SPRUCE / PRICKLY ROSE / LOW NORTHERN SEDGE

180.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The hybrid white spruce / prickly rose / low northern sedge (Picea engelmannii x glauca / Rosa acicularis / Carex concinna) ecological community occurs on gentle north-facing slopes at mid to lower slope positions. It occurs down slope of the zonal site series but on soils without significant seepage inputs except early in the growing season and following heavy rains. The forest canopy is typically closed, and dominated by a mixture of hybrid white spruce and Douglas-fir. Lodgepole pine and paper birch are also often present. Undergrowth vegetation is dominated by pinegrass, northern low sedge, red-stemmed feathermoss, twinflower, and prickly rose but may also include scattered moist-site indicators such as black twin-berry, red-osier dogwood, and bunchberry. It is distinguished from the zonal site series by the presence of these moist-site species and from wetter sites by the low abundance of these species and wetter-site species such as sarsaparilla, highbush-cranberry, black gooseberry, horsetails, and leafy mosses.

180.2 MANAGEMENT DIRECTION

Management direction for the hybrid white spruce / prickly rose / low northern sedge ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

180.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the hybrid white spruce / prickly rose / low northern sedge ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Up-slope harvesting and/or road construction may alter seepage patterns resulting from up-slope hydrology.
180.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the hybrid white spruce / prickly rose / low northern sedge ecological community. 27

Overall Objective

Retain 70% of occurrences of this blue-listed species in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches, old growth management areas, and any deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by considering measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high.
- Maintain the natural hydrological regime of this community; seepage is fundamental to the ecology of this ecosystem.
  - As a default measure, implement a 80 m no-road construction buffer on the upslope side, or all around if the occurrence is a depression on flat ground.
  - Alternatively a soil hydrologist or ecologist can develop a prescription to maintain the hydrological regime.
  - Prevent water or sediment inputs from ditches.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.

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27 Based on the IWMS account for the hybrid white spruce / ostrich fern ecological community.
Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.

Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

180.5 REFERENCES AND ADDITIONAL INFORMATION


181. **HYBRID WHITE SPRUCE / PRICKLY ROSE / PALMATE COLTSFOOT**

181.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The hybrid white spruce / prickly rose / palmate coltsfoot (*Picea engelmannii x glauca / Rosa acicularis / Petasites frigidus var. palmatus*) ecological community occurs on wet toe slope sites that receive seepage and depressions where a water table is present within 100 cm of the surface throughout the growing season. It is often associated with fluvial parent material along intermittent or permanent streams. Soil texture is coarse to medium. The **forest canopy is moderately open and dominated by hybrid white spruce and may have scattered large Douglas-fir**. Tree growth is vigorous. The shrub layer has red-osier dogwood, black twinberry, common snowberry, prickly rose, and highbush cranberry. There are wet-site herbaceous species such as common horsetail, palmate coltsfoot, common mitrewort, sweet-scented bedstraw, and star-flowered false Solomon's seal. The moss layer is dominated by red-stemmed feathermoss, but often includes step moss and leafy mosses.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFxm/08</td>
<td>Central Cariboo Quesnel; Chilcotin</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

181.2 **MANAGEMENT DIRECTION**

Management direction for the hybrid white spruce / prickly rose / palmate coltsfoot ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

181.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management affects the hybrid white spruce / prickly rose / palmate coltsfoot ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Up-slope harvesting and/or road construction may alter seepage patterns resulting from up-slope hydrology.
181.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of hybrid white spruce / prickly rose / palmate coltsfoot ecological community. 28

**Overall Objective**

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

**Stand Level**

Strategies to address known occurrences of this community are:

- For occurrences that do not have high tree morality, avoid all disturbance to the community – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
- For occurrences that have high tree morality, and/or the 80 m buffer has high tree mortality, in consultation with an ecologist develop a salvage plan (including post-harvest silviculture) that meets the objectives of (1) minimizing short-term alterations to the community; and (2) achieving a long-term mature ecological community (trees and understory) with characteristics within the natural range of variation for the natural ecological community.
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community and the buffer. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Maintain the natural hydrological regime of this community; seepage is fundamental to the ecology of this ecosystem.
  - As a default measure, implement a 80 m no-road construction and no-harvesting buffer on the upslope side, or all around if the occurrence is a depression on flat ground.
  - Alternatively a soil hydrologist or ecologist can develop a prescription to maintain the hydrological regime.
  - Prevent water or sediment inputs from ditches.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

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28 Based on the IWMS account for the hybrid white spruce / ostrich fern ecological community.
• Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
• Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
• Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

181.5 References and Additional Information


182. HYBRID WHITE SPRUCE / PRICKLY ROSE / WILD SARSAPARILLA

182.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The hybrid white spruce / prickly rose / wild sarsaparilla (*Picea engelmannii* x *glauca* / *Rosa acicularis* / *Aralia nudicaulis*) ecological community occurs on moist lower and toe slope positions. Soils are moist throughout the growing season due to intermittent seepage inputs following snowmelt and summer precipitation. The forest canopy is closed, and dominated by a mixture of hybrid white spruce and Douglas-fir, often with scattered lodgepole pine, paper birch, and aspen in the lower canopy. Shrub cover is greater than on drier sites and includes highbush-cranberry, prickly rose, black twinberry, black huckleberry, and soopolallie. Several forb and grass species, including pinegrass, wild sarsaparilla, bunchberry, and twinflower, make up the productive herb layer. Moss cover is nearly continuous.

![Photo © Ministry of Forests and Range](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
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<td>IDFdk3/08</td>
<td>Central Cariboo Quesnel</td>
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</tbody>
</table>

182.2 MANAGEMENT DIRECTION

Management direction for the hybrid white spruce / prickly rose / wild sarsaparilla ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.
182.3  **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management affects the hybrid white spruce / prickly rose / wild sarsaparilla ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Up-slope harvesting and/or road construction may alter seepage patterns resulting from up-slope hydrology.

### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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<tr>
<td>2</td>
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<td>2</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

182.4  **MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the hybrid white spruce / prickly rose / wild sarsaparilla ecological community.

### Overall Objective

Retain 70% of occurrences of this blue-listed species in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

### Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches, old growth management areas, and any deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by considering measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high.
- Maintain the natural hydrological regime of this community; seepage is fundamental to the ecology of this ecosystem.
  - As a default measure, implement a 80 m no-road construction buffer on the upslope side, or all

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29 Based on the IWMS account for the hybrid white spruce / ostrich fern ecological community.
around if the occurrence is a depression on flat ground.

- Alternatively a soil hydrologist or ecologist can develop a prescription to maintain the hydrological regime.
- Prevent water or sediment inputs from ditches.

- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

### 182.5 REFERENCES AND ADDITIONAL INFORMATION


183. HYBRID WHITE SPRUCE / RED-STEMMED FEATHERMOSS – RAGGED-MOSSES

183.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The hybrid white spruce / red-stemmed feathermoss – ragged-mosses (Picea engelmannii x glauca / Pleurozium schreberi – Brachythecium spp.) ecological community occurs on moist lower and toe slopes, often along stream channels. It generally does not occur adjacent to non-forested wetlands and shrub-carrs. The forest canopy is moderately closed, and dominated by hybrid white spruce, with scattered Douglas-fir, lodgepole pine, and aspen. The undergrowth is diverse and distinguished by abundant pinegrass, palmate coltsfoot, and star-flowered false Solomon’s-seal.

183.2 MANAGEMENT DIRECTION

Management direction for the hybrid white spruce / red-stemmed feathermoss – ragged-mosses ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

183.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the hybrid white spruce / red-stemmed feathermoss – ragged-mosses ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Up-slope harvesting and/or road construction may alter seepage patterns resulting from up-slope hydrology.
183.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the hybrid white spruce / red-stemmed feathermoss – ragged-mosses ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed species in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches, old growth management areas, and any deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by considering measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high.
- Maintain the natural hydrological regime of this community; seepage is fundamental to the ecology of this ecosystem.
  - As a default measure, implement a 80 m no-road construction buffer on the upslope side, or all around if the occurrence is a depression on flat ground.
  - Alternatively a soil hydrologist or ecologist can develop a prescription to maintain the hydrological regime.
  - Prevent water or sediment inputs from ditches.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.

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Based on the IWMS account for the hybrid white spruce / ostrich fern ecological community.
Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.

Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

**183.5 REFERENCES AND ADDITIONAL INFORMATION**


184. **LODGEPOLE PINE – BLACK SPRUCE / RED-STEMMED FEATHERMOSS**

184.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The lodgepole pine – black spruce / red-stemmed feathermoss (*Pinus contorta – Picea mariana / Pleurozium schreberi*) ecological community occurs as a pine- and/or black spruce-dominated forest on moderately well to imperfectly drained valley-bottom lower slopes and flats where cold air accumulates and soils are relatively cold. Soils cold compared to adjacent areas, and is medium textured and nutrient poor. **The canopy is dominated by lodgepole pine, black spruce, and hybrid white spruce. Black spruce often forms a lower canopy layer and a large proportion of the tree regeneration.** The undergrowth is dominated by feathermosses and a sparse to moderate cover of low herbaceous species. These sites are distinguished from drier sites by palmete coltsfoot and black spruce and more abundant pinegrass, and from wetter sites by the absence of horsetails, leafy mosses, and golden fuzzy fen moss and by their smaller cover of black twinberry.

It most frequently occurs in the Baker Creek and Snaking River basins, but also occurs elsewhere.

184.2 **MANAGEMENT DIRECTION**

Management direction for the lodgepole pine – black spruce / red-stemmed feathermoss ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

184.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management affects the lodgepole pine – black spruce / red-stemmed feathermoss ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Summer frost and cold soil conditions may slow regeneration, contributing to higher vulnerability.
Species of Management Concern BCTS Cariboo Region

<table>
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<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Relative Risk of Activities</th>
</tr>
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<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
</tr>
<tr>
<td>6</td>
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<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

184.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of the lodgepole pine – black spruce / red-stemmed feathermoss ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed species in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches, old growth management areas, and any deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by considering measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.
- Prevent water or sediment inputs from ditches.

Landscape Level

Strategies to address unrecorded occurrences of this community are:
Species of Management Concern BCTS Cariboo Region

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

184.5 References and Additional Information


185. LODGEPOLE PINE / ALTAI FESCUE / FOAM LICHENS

185.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The lodgepole pine / Altai fescue / foam lichens (*Pinus contorta* / *Festuca altaica* / *Stereocaulon spp.*) ecological community occurs on level to gently sloping well drained sites from upper to lower positions. Soil is coarse textured (sandy or loamy sand) and is very nutrient poor. Mature forest canopy is open lodgepole pine; with scattered lodgepole pine regeneration. There is a sparse shrub layer of scattered soopolallie and common juniper. The herb layer is also sparse, with Altai fescue and kinnikinnick. There is a high cover of ground lichens, especially foam lichens, *Cladina* lichens and *Cladonia* lichens.

This ecological community is only known from records in the Upper Chilcotin River and Itcha Lake areas. The ecological community has been found in 6 locations, but some may have been harvested (Cadrin 2004a).

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<tr>
<th>BGC Unit</th>
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<td></td>
<td>Quesnel; Chilcotin</td>
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</table>

185.2 MANAGEMENT DIRECTION

Management direction for the lodgepole pine / Altai fescue / foam lichens ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

185.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the lodgepole pine / Altai fescue / foam lichens ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Conditions such as summer frosts and moisture deficits limit regeneration and recovery after disturbance (Cadrin 2004a).
Species of Management Concern BCTS Cariboo Region

<table>
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<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
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<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
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<td></td>
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<tr>
<td>Risk Ranking = A * (B + C)</td>
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<tr>
<td>6</td>
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<td>1</td>
<td>2</td>
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</table>

185.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of lodgepole pine / Altai fescue / foam lichens ecological community. 31

Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- Preferably avoid all disturbance to the community plus a 150 m wide buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes). For this community, although blue-listed, mature/old stands will have suffered high losses through the mountain pine beetle epidemic and associated harvesting.
  - Pine stands with low tree mortality will be rare, and therefore any examples of this community where that is the case should be protected.
  - Pine stands with high tree mortality should preferably also not be harvested. They are likely to have some existing natural regeneration, and the sites should naturally adequately in-fill from seeds. The sandy soil is easily disturbed by harvesting, potentially permanently altering the site conditions sufficiently to prevent regeneration of this mature ecological community (Ray Coupé, pers. comm.).
  - Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- If harvesting does occur,
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area,

31 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

**185.5 REFERENCES AND ADDITIONAL INFORMATION**


186. LODGEPOLE PINE / BLACK HUCKLEBERRY – VELVET-LEAVED BLUEBERRY

186.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The lodgepole pine / black huckleberry – velvet-leaved blueberry (*Pinus contorta* / *Vaccinium membranaceum* – *Vaccinium myrtilloides*) ecological community occurs on level to gently sloping (occasionally steep), dry sandy soils, usually glaciofluvial terraces and outwash, as well as on dry upper and crest slope positions where soils are shallow. Soil gravel contents are usually very high. The mature forest canopy is typically dominated by lodgepole pine with an understory of subalpine fir and hybrid white spruce. In areas of cold air accumulation, black spruce is occasional. The undergrowth vegetation is distinguished by the presence of *velvet-leaved blueberry*, which, together with black huckleberry, bunchberry, and twinflower, typically dominates the undergrowth. Black gooseberry is absent. Felt mosses are abundant, and cladonia and cladina lichens cover only a very small portion of the surface.

![Image of lodgepole pine and black huckleberry ecosystem]

Photo © Ministry of Forests and Range

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
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<td>Blue</td>
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</table>

186.2 MANAGEMENT DIRECTION

Management direction for the lodgepole pine / black huckleberry – velvet-leaved blueberry ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

186.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the lodgepole pine / black huckleberry – velvet-leaved blueberry ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
### 186.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of lodgepole pine / black huckleberry – velvet-leaved blueberry ecological community.

#### Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

- This community may have high mortality due to Mountain Pine Bark Beetle, in which case it is no longer in mature/old condition and harvesting is desirable to initiate new stand development.

This objective can be monitored, because Terrestrial Ecosystem Mapping has been completed for most of the range of the ecological community.

#### Stand Level

Strategies to address known occurrences of this community are:

- For occurrences that do not have high tree morality, avoid all disturbance to the community plus a 150 m wide buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
  - Pine stands with low tree mortality will be extremely rare, and therefore any examples of this community where that is the case should be protected.
  - Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- For occurrences that have high tree morality, and/or the 150 m buffer has high tree mortality, harvest is appropriate.
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.

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32 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
Species of Management Concern BCTS Cariboo Region

- Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
- Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

**186.5 REFERENCES AND ADDITIONAL INFORMATION**


187. LODGEPOLE PINE / BLACK HUCKLEBERRY / REINDEER LICHENS

187.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The lodgepole pine / black huckleberry / reindeer lichens (Pinus contorta / Vaccinium membranaceum / Cladina spp.) ecological community occurs on upper slopes and crests where bedrock is close to the surface. Soils range from very poor to rich in nutrients and are gravelly loamy in texture. These are small, localized sites with a vegetation distinguished by abundant ground lichens, Cladina species and Dicranum fuscescens. The mature forest canopy is typically dominated by lodgepole pine or subalpine fir. Low shrubs, especially black huckleberry and dwarf blueberry, are abundant, but the herbaceous layer is typically sparse. Moss cover is relatively patchy, occurring mostly on microsites with deep soils.

Photo © Ministry of Forests and Range

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
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<td>Central Cariboo</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

187.2 MANAGEMENT DIRECTION

Management direction for the lodgepole pine / black huckleberry / reindeer lichens ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

187.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the lodgepole pine / black huckleberry / reindeer lichens ecological community through harvesting, road construction, site preparation, and silviculture activities that result in
loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.

<table>
<thead>
<tr>
<th>Relative Risk of Activities</th>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A x (B + C)</td>
<td>Planning</td>
<td>Roads Layout</td>
<td>Road Layout</td>
<td>Road Construction</td>
</tr>
<tr>
<td>Planning &amp; Layout</td>
<td>A x (B + C)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

### 187.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of lodgepole pine / black huckleberry / reindeer lichens ecological community.

**Overall Objective**

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

- This community may have high mortality due to Mountain Pine Bark Beetle, in which case it is no longer in mature/old condition and harvesting is desirable to initiate new stand development.

This objective can be monitored, because Terrestrial Ecosystem Mapping has been completed for most of the range of the ecological community.

**Stand Level**

Strategies to address known occurrences of this community are:

- **For occurrences that do not have high tree morality, avoid all disturbance to the community plus a 150 m wide buffer — maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree d**
- **Pine stands (or the subalpine fir form of the community) with low tree mortality will be rare, and therefore any examples of this community where that is the case should be protected.**
- **Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.**

- **For occurrences that have high tree morality, and/or the 150 m buffer has high tree mortality, harvest is appropriate.**
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
  - Minimize long-term loss of harvested ecological community area during silviculture by:

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33 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
Species of Management Concern BCTS Cariboo Region

- Minimizing use of site preparation practices that modify soil structure.
- Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
- Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

**187.5 REFERENCES AND ADDITIONAL INFORMATION**


188. **LODGEPOLE PINE / CLAD LICHENS – JUNIPER HAIRCAP MOSS**

188.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The lodgepole pine / clad lichens – juniper haircap moss (*Pinus contorta / Cladonia spp. – Polytrichum juniperinum*) ecological community occurs on the crests and upper slopes of hills and ridges where bedrock is near the surface (<50cm); soil is coarse textured and poor to rich in nutrients. The mature forest canopy is dominated by lodgepole pine, usually with an open, patchy canopy cover. Douglas-fir may be present. Tree regeneration is sparse to moderate and predominantly subalpine fir. The undergrowth is dominated by dryland shrubs, patches of mosses, and cladonia and cladina lichens. **Abundant cladonia and cladina lichens distinguish the vegetation.** Grasses and forbs have a relatively low cover, and exposed mineral soil and rock is common. Principal shrubs are common juniper, saskatoon, black huckleberry, soopolallie, and birch-leaved spirea. Principal mosses are haircap moss and wavy-leaved moss.

![Photo © Ministry of Forests and Range](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBPSmk/02; SBSmc1/02</td>
<td>Central Cariboo</td>
<td></td>
<td>S2S3</td>
<td>Blue</td>
</tr>
<tr>
<td></td>
<td>Quesnel; Chilcotin</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

188.2 **MANAGEMENT DIRECTION**

Management direction for the lodgepole pine / clad lichens – juniper haircap moss ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

188.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management affects the lodgepole pine / clad lichens – juniper haircap moss ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

#### 188.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of lodgepole pine / clad lichens – juniper haircap moss ecological community.

**Overall Objective**

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

- This community may have high mortality due to Mountain Pine Bark Beetle, in which case it is no longer in mature/old condition and harvesting is desirable to initiate new stand development.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this community are:

- For occurrences that do not have high tree morality, avoid all disturbance to the community plus a 150 m wide buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
  - Pine stands (or the subalpine fir form of the community) with low tree mortality will be rare, and therefore any examples of this community where that is the case should be protected.
  - Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.

- For occurrences that have high tree mortality, and/or the 150 m buffer has high tree mortality, harvest is appropriate.
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.

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34 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
Species of Management Concern BCTS Cariboo Region

- Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
- Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

Landscape Level

Strategies to address unrecorded occurrences of this community are:
- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

188.5 REFERENCES AND ADDITIONAL INFORMATION


189. LODGEPOLE PINE / COMMON JUNIPER / ROUGH‐LEAVED RICEGRASS

189.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The lodgepole pine / common juniper / rough‐leaved ricegrass (*Pinus contorta / Juniperus communis / Oryzopsis asperifolia*) ecological community occurs as an open lodgepole pine forest on shallow soils over bedrock. The shrub layer is dominated by common juniper and soopolallie. The herb layer is poorly to well developed, with kinnikinnick and ricegrass. Moss/lichen layer dominated by Cladonia, Cladina, and pelt lichens.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBSdk/02</td>
<td>Quesnel</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

189.2 MANAGEMENT DIRECTION

Management direction for the lodgepole pine / common juniper / rough‐leaved ricegrass ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no‐harvest areas.

189.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the lodgepole pine / common juniper / rough‐leaved ricegrass ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Forest regeneration will be very difficult.
### 189.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of lodgepole pine / common juniper / rough-leaved ricegrass ecological community.\(^\text{35}\)

#### Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

- This community may have high mortality due to Mountain Pine Bark Beetle, in which case it is no longer in mature/old condition and harvesting is desirable to initiate new stand development.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

#### Stand Level

Strategies to address known occurrences of this community are:

- For occurrences that do not have high tree morality, avoid all disturbance to the community plus a 150 m wide buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
  - Pine stands (or the subalpine fir form of the community) with low tree mortality will be rare, and therefore any examples of this community where that is the case should be protected.
  - Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.

- For occurrences that have high tree morality, and/or the 150 m buffer has high tree mortality, harvest is appropriate.
  - Minimize long-term loss of ecological community area by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.

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\(^\text{35}\) Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.

Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

### 189.5 REFERENCES AND ADDITIONAL INFORMATION


190. LODGEPOLE PINE / KRUCKEBERG'S HOLLY FERN – INDIAN'S-DREAM

190.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The lodgepole pine / Kruckeberg's holly fern – Indian's-dream (Pinus contorta / Polystichum kruckebergii – Aspidotis densa) ecological community occurs on a south-facing subxeric, steep, extrusive basic basalt serpentine (ultramafic) geological formation on Sovereign Mountain. The presence of ultramafic materials suggests that this ecological community is quite unusual and possibly endemic. This ecological community is noted by the presence of several unusual ferns: Kruckeberg’s holly fern, the rare fern Indian's dream, and northern maidenhair fern, which are outliers from their normal distribution. The only trees found in this ecological community are lodgepole pine and subalpine fir. Shrubs include common juniper, black huckleberry, dwarf blueberry, birch-leaved spirea and saskatoon. Additional ferns present include parsley fern, bracken fern, northern holly fern, compact selaginella, and Wallace’s selaginella. Other herbs include lance-leaved stonecrop, Sitka columbine, alpine willowherb, pinesap, bluejoint reedgrass, Ross’ sedge, and short-awned ricegrass. The well-developed moss layer includes red-stemmed feathermoss, juniper haircap moss, grey rock moss and nodding thread-moss. NOTE: Scattered plants of Kruckeberg's holly fern occur outside this ecological community, hence it is important to confirm the presence of the other indicator species and community characteristics. Only one occurrence of this ecological community is confirmed, just south of Sovereign Mountain near Sovereign Creek. A few other potential sites are known to occur in the vicinity.

![Map of Lodgepole Pine / Kruckeberg's Holly Fern - Indian's-Dream ecological community]

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBSmw/00</td>
<td>Central Cariboo</td>
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<td>Red</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quesnel</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

190.2 MANAGEMENT DIRECTION

Management direction for the lodgepole pine / Kruckeberg's holly fern – Indian's-dream ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.
190.3 Forest Management Issues and Risk Assessment

Forest management affects the lodgepole pine / Kruckeberg's holly fern – Indian's-dream ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.

<table>
<thead>
<tr>
<th>Risk Ranking - A</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
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<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
<td>Harvesting</td>
<td>Silviculture</td>
</tr>
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<td>10</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

190.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of lodgepole pine / Kruckeberg's holly fern – Indian's-dream ecological community.

Overall Objective

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

Stand Level

Strategies to address known occurrences of this community are:

- Avoid all disturbance to the community – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
  - The IWMS strategy for the Douglas-fir / Common Juniper / Cladonia, on which these strategies are based, is for a 150 m buffer. This is reduced to 80 m for this community because the shorter trees and more restrictive growing conditions require less buffering.
  - For occurrences that have high tree mortality, avoid harvesting the site and let natural ecological processes continue. The community is extremely rare, and there are at least two rare plants that live in the habitat as well (and perhaps others that have not yet been recorded).

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the
community can be tracked.

190.5 REFERENCES AND ADDITIONAL INFORMATION


191. LODGEPOLE PINE / TRAPPER'S TEA / CROWBERRY

191.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The lodgepole pine / trapper's tea / crowberry (Pinus contorta / Ledum glandulosum / Empetrum nigrum) ecological community occurs on gentle to moderate north- and east-facing slopes in mid slope positions. It occurs predominantly on well- to moderately well-drained loamy poor to rich soils on gentle to moderate north- and east-facing slopes. The mature forest canopy is dominated by lodgepole pine but occasionally includes hybrid white spruce and subalpine fir, which are the principal trees of regeneration. The undergrowth is dominated by low shrubs, dwarf shrubs, and mosses, and is distinguished by abundant trapper's tea. Other principal species include grouseberry, crowberry, and red-stemmed feathermoss.

It has a localized distribution, confined primarily to the vicinity of the Vedan, Wales, and Piltz mountains in the South Chilcotin – as a result it is not listed as occurring in the Quesnel Forest District.

191.2 MANAGEMENT DIRECTION

Management direction for the lodgepole pine / trapper's tea / crowberry ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

191.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the lodgepole pine / trapper's tea / crowberry ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
191.4 **Management Strategy**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of lodgepole pine / trapper's tea / crowberry ecological community.

**Overall Objective**

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

- This community may have high mortality due to Mountain Pine Beetle, in which case it is no longer in mature/old condition and harvesting is desirable to initiate new stand development.

**Stand Level**

Strategies to address known occurrences of this community are:

- For occurrences that do not have high tree mortality, avoid all disturbance to the community plus a 150 m wide buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
- For occurrences that have high tree mortality, and/or the 150 m buffer has high tree mortality, in consultation with an ecologist develop a salvage plan (including post-harvest silviculture) that meets the objectives of (1) minimizing short-term alterations to the community; and (2) achieving a long-term mature ecological community (trees and understory) with characteristics within the natural range of variation for the natural ecological community.
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community and the buffer. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.
191.5 REFERENCES AND ADDITIONAL INFORMATION


192. TREMBLING ASPEN / SPREADING NEEDLEGRASS – OLD MAN'S WHISKERS

192.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The trembling aspen / spreading needlegrass – old man's whiskers (Populus tremuloides / Achnatherum richardsonii – Geum triflorum) ecological community tends to occur in the transition zone between grassland and forests, as subhygric aspen groves. The community is characterized by a trembling aspen tree layer, and spreading needlegrass and old man's whiskers in the herbaceous layer. This small patch community is rare within a narrow range and is threatened by development and land use practices which affect the hydrological regime that maintains this community.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGxw2/00; IDFxm/00</td>
<td>Central Cariboo Quesnel; Chilcotin</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

192.2 MANAGEMENT DIRECTION

Management direction for the trembling aspen / spreading needlegrass – old man's whiskers ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

192.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the trembling aspen / spreading needlegrass – old man's whiskers ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. The community can be permanently lost through conversion to conifer-leading stands. Up-slope harvesting and/or road construction may alter seepage patterns resulting from up-slope hydrology.
192.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of trembling aspen / spreading needlegrass - old man's whiskers ecological community. 36

Overall Objective

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

Stand Level

Strategies to address known occurrences of this community are:

- Maintain the ecological community in a natural state (i.e., same species composition, physical structure, tree composition and density, and ecological processes).
  - do not build roads or harvest in or adjacent to an occurrence.
- Maintain the natural hydrological regime of this community; seepage is fundamental to the ecology of this ecosystem.
  - As a default measure, approximately 80 m on the uphill side of the boundary of the occurrence should be protected from road development.
  - Alternatively a soil hydrologist or ecologist can develop a prescription to maintain the hydrological regime.
  - Prevent water or sediment inputs from ditches.

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

36 Based on the IWMS account for the hybrid white spruce / ostrich fern ecological community.
192.5 **REFERENCES AND ADDITIONAL INFORMATION**

193. WESTERN HEMLOCK [– DOUGLAS-FIR] / COMMON JUNIPER – FALSEBOX

193.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The correct name for this community is western hemlock – Douglas-fir / common juniper – falsebox (Tsuga heterophylla – Pseudotsuga menziesii / Juniperus communis – Paxistima myrsinites). It occurs on hill crests and steep upper slopes with thin, often gravelly soils and frequently exposed bedrock. Soil parent materials are derived from acidic rocks and consequently have relatively poor nutrient status. Tree productivity is generally poor. The mature forest canopy is open and dominated by western hemlock. Lodgepole pine typically dominates seral stands. Tree regeneration is predominantly western hemlock and redcedar of poor vigour. The cover of undergrowth vascular species is sparse, and lichens are frequently abundant.

193.2 MANAGEMENT DIRECTION

Management direction for the western hemlock / common juniper – falsebox ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

193.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the western hemlock / common juniper – falsebox ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.

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37 The CDC lists this community as western hemlock / common juniper – falsebox. They omitted “Douglas-fir” from the name.
### 193.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of western hemlock / common juniper – falsebox ecological community.

#### Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

This objective can be monitored, because Terrestrial Ecosystem Mapping has been completed for most of the range of the ecological community.

#### Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

#### Landscape Level

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Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.

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Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

193.5 REFERENCES AND ADDITIONAL INFORMATION


194. WESTERN HEMLOCK – WESTERN REDCEDAR / CLAD LICHENS

194.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The western hemlock – western redcedar / clad lichens (Tsuga heterophylla – Thuja plicata / Cladonia spp.) ecological community occurs on hill crests and steep upper slopes. Soils are often gravelly and shallow, derived from acidic bedrock; very poor to poor in nutrients. Bedrock is frequently exposed and tree productivity is poor. The mature forest canopy is open and dominated by western hemlock, with earlier seral stands dominated by lodgepole pine. Tree regeneration is western hemlock and western redcedar, generally with poor vigour. Shrub and herb layers in the understorey are generally sparse; mostly black huckleberry and a few low forbs. Velvet-leaved blueberry may be present. Clad lichens are abundant.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICHwk2/02; ICHwk4/02</td>
<td>Central Cariboo Quesnel</td>
<td>S3</td>
<td>Blue</td>
</tr>
</tbody>
</table>

194.2 MANAGEMENT DIRECTION

Management direction for the western hemlock – western redcedar / clad lichens ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

194.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the western hemlock – western redcedar / clad lichens ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Forest regeneration will be difficult.
194.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of western hemlock – western redcedar / clad lichens ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

- This community may have high mortality due to Mountain Pine Bark Beetle, in which case it is no longer in mature/old condition and harvesting is desirable to initiate new stand development.

This objective can be monitored, because Terrestrial Ecosystem Mapping has been completed for most of the range of the ecological community.

Stand Level

Strategies to address known occurrences of this community are:

- For occurrences that do not have high tree morality, avoid all disturbance to the community plus a 150 m wide buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
  - Pine stands (or the mature western hemlock form of the community) with low tree mortality will be rare, and therefore any examples of this community where that is the case should be protected.
  - Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.

- For occurrences that have high tree morality, and/or the 150 m buffer has high tree mortality, harvest is appropriate.
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.

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39 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
Species of Management Concern BCTS Cariboo Region

- Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
- Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:
- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

**194.5 REFERENCES AND ADDITIONAL INFORMATION**


195. WESTERN REDCEDAR / FALSEBOX

195.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The western redcedar / falsebox (Thuja plicata / Paxistima myrsinites) ecological community occurs in the ICHmk3 on gentle to moderately sloping terrain with deep, medium-textured soils; in the ICHwk4 it occurs on hill crests and steep upper slopes on base-rich or calcareous bedrock with thin soil. Late seral and climax stands have closed canopies dominated by western redcedar and subalpine fir. Hybrid white spruce or western hemlock may be scattered throughout the stand. A very dense cover of redcedar and subalpine fir regeneration is a characteristic. In the ICHmk3, seral stands are frequently dominated by Douglas-fir and lodgepole pine, and paper birch is frequently present in seral stands and occasionally forms nearly pure stands. In the ICHmk3, the undergrowth, except for the dense regeneration layer, contains a moderate to sparse cover of falsebox and black huckleberry as well as several forbs including wild sarsaparilla, foamflower, queen's cup, bunchberry, twinflower, and five-leaved bramble. In the ICHwk4, velvet-leaved blueberry and black huckleberry are frequently present. Ferns are generally lacking. The moss layer is nearly continuous and dominated by red-stemmed feathermoss, step moss, and knight's plume. In the ICHwk4, there may be abundant lichens.

This community occurs on two very different types of sites – mesic deep-soil sites in the ICHmk3, thin-soil bedrock sites in the ICHwk4. Silviculture strategies will be very different for each of these; however the conservation strategies are the same.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICHmk3/01; ICHwk4/03</td>
<td>Central Cariboo</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

195.2 MANAGEMENT DIRECTION

Management direction for the western redcedar / falsebox ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.
195.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management affects the western redcedar / falsebox ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning, Harvest Area Layout, Road Construction, Road Maintenance, Road Deactivation, Bridge Installation, Bridge Removal, Falling, Yarding, Skidding, Forwarding, Loading, Processing, Handling, Site Preparation, Planting, Vegetation Management, Density Management</td>
<td>Road Layout, Road Construction, Road Maintenance, Road Deactivation, Bridge Installation, Bridge Removal, Falling, Yarding, Skidding, Forwarding, Loading, Processing, Handling, Site Preparation, Planting, Vegetation Management, Density Management</td>
<td>Harvesting, Silviculture</td>
<td>Silviculture</td>
<td>Density Management</td>
</tr>
<tr>
<td>A = Probability of Interaction</td>
<td>Planning, Harvest Area Layout, Road Construction, Road Maintenance, Road Deactivation, Bridge Installation, Bridge Removal, Falling, Yarding, Skidding, Forwarding, Loading, Processing, Handling, Site Preparation, Planting, Vegetation Management, Density Management</td>
<td>Road Layout, Road Construction, Road Maintenance, Road Deactivation, Bridge Installation, Bridge Removal, Falling, Yarding, Skidding, Forwarding, Loading, Processing, Handling, Site Preparation, Planting, Vegetation Management, Density Management</td>
<td>Harvesting, Silviculture</td>
<td>Silviculture</td>
<td>Density Management</td>
</tr>
<tr>
<td>B = Legal Consequence of Interaction</td>
<td>Planning, Harvest Area Layout, Road Construction, Road Maintenance, Road Deactivation, Bridge Installation, Bridge Removal, Falling, Yarding, Skidding, Forwarding, Loading, Processing, Handling, Site Preparation, Planting, Vegetation Management, Density Management</td>
<td>Road Layout, Road Construction, Road Maintenance, Road Deactivation, Bridge Installation, Bridge Removal, Falling, Yarding, Skidding, Forwarding, Loading, Processing, Handling, Site Preparation, Planting, Vegetation Management, Density Management</td>
<td>Harvesting, Silviculture</td>
<td>Silviculture</td>
<td>Density Management</td>
</tr>
<tr>
<td>C = Biological Consequence of Interaction</td>
<td>Planning, Harvest Area Layout, Road Construction, Road Maintenance, Road Deactivation, Bridge Installation, Bridge Removal, Falling, Yarding, Skidding, Forwarding, Loading, Processing, Handling, Site Preparation, Planting, Vegetation Management, Density Management</td>
<td>Road Layout, Road Construction, Road Maintenance, Road Deactivation, Bridge Installation, Bridge Removal, Falling, Yarding, Skidding, Forwarding, Loading, Processing, Handling, Site Preparation, Planting, Vegetation Management, Density Management</td>
<td>Harvesting, Silviculture</td>
<td>Silviculture</td>
<td>Density Management</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

195.4 **MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of western redcedar / falsebox ecological community. 40

**Overall Objective**

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

This objective can be monitored, because Terrestrial Ecosystem Mapping has been completed for most of the range of the ecological community.

**Stand Level**

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to

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40 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.

- Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

**195.5 REFERENCES AND ADDITIONAL INFORMATION**


196. WESTERN REDCEDAR / OAK FERN / ELECTRIFIED CAT’S-TAIL MOSS

196.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The western redcedar / oak fern / electrified cat's-tail moss (Thuja plicata / Gymnocarpium dryopteris / Rhytidiadelphus triquetrus) ecological community occurs on moist, mid and lower slope positions where it receives low volumes of intermittent seepage. Soils are frequently mottled and forest floors are relatively thick. The forest canopy is moderately closed and dominated by western redcedar, with subalpine fir and hybrid white spruce in the lower canopy. Regeneration is dominated by redcedar and is often moderately dense. In addition to species common on zonal sites, characteristic species on these sites include scattered devil’s club, oak fern, rosy twistedstalk, and sweet-scented bedstraw. The moss layer is typically well developed and dominated by electrified cat's-tail moss, woodsly ragged moss, and leafy mosses.

![Photo](image)

Photo © Ministry of Forests and Range

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICHmk3/04</td>
<td>Central Cariboo</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quesnel</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

196.2 MANAGEMENT DIRECTION

Management direction for the western redcedar / oak fern / electrified cat's-tail moss ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

196.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Douglas-fir / red-stemmed feathermoss – step moss ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Up-slope harvesting and/or road construction may alter seepage patterns resulting from up-slope hydrology.
196.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of western redcedar / oak fern / electrified cat's-tail moss ecological community. 41

Overall Objective

Retain 70% of occurrences of this blue-listed species in mature/old condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Maintain the natural hydrological regime. Seepage, fluctuating and seasonally high water tables are fundamental to the ecology of this wet ecosystem.
  - as a default measure, approximately 80 m on the uphill side (or 80 m all around if the occurrence is a depression in flat ground) of the boundary of the occurrence should be protected from road development
  - alternatively a soil hydrologist or ecologist can develop a prescription to maintain the hydrological regime.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.

41 Based on the IWMS account for the hybrid white spruce / ostrich fern ecological community.
Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.

- Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.
- Prevent physical disturbance.
- Prevent water or sediment inputs from ditches.

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

196.5 REFERENCES AND ADDITIONAL INFORMATION


5. FORESTED ECOSYSTEMS – CWHds1, IDFww, and CMA

The CWHds1 variant has a forest canopy dominated by Douglas-fir, western hemlock and to a lesser extent western redcedar. The understorey is composed with a poorly developed shrub and herb layer and a well developed moss layer dominated by step moss and electrified cat’s-tail moss. There is only a very small area of the CWHds1 in the CCBA, and most is within a park. There are 8 red-listed and 4 blue-listed site series of this BGC variant that are listed by the CDC for the CCBA, but one clearly does not occur in the area.

The IDFww variant has a forest canopy dominated by Douglas-fir, with low vigour western hemlock and western redcedar. The understorey is composed of a well developed and diverse array of shrubs. The moss layer is dominated by step moss and electrified cat’s-tail moss. There is only a very small area of the IDFww in the CCBA. There are 1 red-listed and 2 blue-listed site series of this BGC variant that are potentially in the CCBA.

The CMAun is a subalpine unit that occurs above the CWHds1. There is a considerable area of this BCG unit, but harvesting is unlikely.

Harvesting in these BGC variants that are on the extreme west edge of the CCBA is unlikely, and some of the ecological communities listed here may not actually occur in this geographic area. For example, beaked hazelnut or vine maple may not actually be present; hence the communities characterized by those species may not be present. The mapping and classification in the adjacent Coast Region is currently being re-evaluated and re-mapped (Ray Coupé, pers. comm.). Hence the red-list and blue-list communities from this area are grouped together in this section. The site series of concern are listed below.

<table>
<thead>
<tr>
<th>Red-list Site Series</th>
<th>Blue-list Site Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>CWHds1/01</td>
<td>CWHds1/03</td>
</tr>
<tr>
<td>CWHds1/02</td>
<td>CWHds1/09</td>
</tr>
<tr>
<td>CWHds1/04; IDFww/04</td>
<td>CWHds1/10</td>
</tr>
<tr>
<td>CWHds1/05</td>
<td>CWHds1/12</td>
</tr>
<tr>
<td>CWHds1/06</td>
<td>IDFww/01</td>
</tr>
<tr>
<td>CWHds1/07</td>
<td>IDFww/05</td>
</tr>
<tr>
<td>CWHds1/08 – not in CCBA (more coastal)</td>
<td></td>
</tr>
<tr>
<td>CMAun</td>
<td></td>
</tr>
</tbody>
</table>

The general reference for these site series is:

197. BLACK COTTONWOOD – RED ALDER / SALMONBERRY

197.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The black cottonwood – red alder / salmonberry (Populus balsamifera ssp. trichocarpa – Alnus rubra / Rubus spectabilis) ecological community occurs on soil that is generally coarse-loamy and medium to very nutrient rich. The trees are black cottonwood, red alder, big leaf maple and western red cedar. The shrub layer is salmonberry, red elderberry, common snowberry, black twinberry and red-osier dogwood. Herbs include star-flowered Solomon's-seal, blue wildrye, false lily-of-the-valley and common horsetail.

There is only four tiny fragments of the CWHds1 outside park area. The fragments, plus immediately adjacent park areas, should be assessed for the occurrence of any of the rare plant communities before any operations within or adjacent to the CWHds1.

197.2 MANAGEMENT DIRECTION

Management direction for the black cottonwood – red alder / salmonberry cabbage ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

197.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the black cottonwood – red alder / salmonberry ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Conversion to conifer forest is a significant risk.
197.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of black cottonwood – red alder / salmonberry ecological community. 42

Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

Landscape Level

42 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

197.5 REFERENCES AND ADDITIONAL INFORMATION


198. BLACK COTTONWOOD / WILLOWS DRY SUBMARITIME

198.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The black cottonwood / willows Dry Submaritime (Populus balsamifera ssp. trichocarpa / Salix spp. Dry Submaritime) ecological community occurs in valley bottom positions. Soils range from coarse textured and sandy to silty and are medium to very rich in nutrients. The tree layer is black cottonwood and red alder, and shrubs are red-osier dogwood and willows. Herbs are scouring rush and horsetails. Mosses are absent.

There is only four tiny fragments of the CWHds1 outside park area. The fragments, plus immediately adjacent park areas, should be assessed for the occurrence of any of the rare plant communities before any operations within or adjacent to the CWHds1.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>CWHds1/10</td>
<td>Chilcotin</td>
<td>S2S3</td>
<td>Blue</td>
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</tr>
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</table>

198.2 MANAGEMENT DIRECTION

Management direction for the black cottonwood / willows Dry Submaritime ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

198.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the black cottonwood / willows Dry Submaritime ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Conversion to conifer forest is a significant risk.
Species of Management Concern BCTS Cariboo Region

<table>
<thead>
<tr>
<th>Risk Ranking</th>
<th>Planning Layout</th>
<th>Roads, Bridges Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Density Management</th>
</tr>
</thead>
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<td>C</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Probability of Interaction</td>
<td>Legal Consequence of Interaction</td>
<td>Biological Consequence of Interaction</td>
<td>Probability of Interaction</td>
<td>Legal Consequence of Interaction</td>
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</tr>
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</table>

198.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of black cottonwood / willows Dry Submaritime ecological community. 43

Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

Landscape Level

Strategies to address unrecorded occurrences of this community are:

43 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
• Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
• Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
• Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

198.5 REFERENCES AND ADDITIONAL INFORMATION


199. **DOUGLAS-FIR – LODGEPOLE PINE / KINNIKINNICK DRY SUBMARITIME (CWHds1/02)**

199.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The Douglas-fir – lodgepole pine / kinnikinnick Dry Submaritime (*Pseudotsuga menziesii* – *Pinus contorta* / *Arctostaphylos uva-ursi* Dry Submaritime) ecological community occurs on dry crests and upper slopes on various aspects. Soil texture is sandy or loamy and soils range from very poor to poor in nutrients. It is forested with Douglas-fir, western red cedar, and lodgepole pine; shrubs are Douglas maple, prince’s pine, kinnikinnick and some common snowberry and false box; and the herb layer has Queen’s cup, sword fern, one-leafed foamflower, wild ginger, oak fern, and some bunchberry and lady fern. Mosses are electrified cat’s tail moss, step moss, pipecleaner moss, red-stemmed feathermoss. Lichens are freckled lichen and Cladonia.

There is only four tiny fragments of the CWHds1 outside park area. The fragments, plus immediately adjacent park areas, should be assessed for the occurrence of any of the rare plant communities before any operations within or adjacent to the CWHds1.

### Table: BGC Unit, Forest District, BC Rank, BC List, Identified Wildlife

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
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</thead>
<tbody>
<tr>
<td>CWHds1/02</td>
<td>Chilcotin</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

199.2 **MANAGEMENT DIRECTION**

Management direction for the Douglas-fir – lodgepole pine / kinnikinnick Dry Submaritime ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

199.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management affects the Douglas-fir – lodgepole pine / kinnikinnick Dry Submaritime ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
### 199.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir – lodgepole pine / kinnikinnick Dry Submaritime ecological community.

#### Overall Objective

Retain 100% of occurrences of this red-listed species in healthy condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

#### Stand Level

Strategies to address known occurrences of this community are:

- Do not build roads, harvest or salvage in or within 150 m of this ecological community, except if high tree mortality has occurred.
  - The entire lodgepole pine or Douglas-fir component of this ecological community may have been attacked or killed by mountain pine beetle or Douglas-fir beetle; hence this ecological community and/or the adjacent area may be a priority for salvage harvesting. In consultation with an ecologist develop a salvage plan (including post-harvest silviculture) that meets the objectives of (1) minimizing short-term alterations to the community; and (2) achieving a long-term mature ecological community (trees and understory) with characteristics within the natural range of variation for the natural ecological community.

#### Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

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**Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.**
199.5 REFERENCES AND ADDITIONAL INFORMATION


200.  DOUGLAS-FIR – WESTERN HEMLOCK / FALSEBOX

200.1  SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Douglas-fir – western hemlock / falsebox (*Pseudotsuga menziesii* – *Tsuga heterophylla* / *Paxistima myrsinites*) ecological community occurs in major drainages and river valleys. Soils are medium textured and range from very poor to medium in nutrients. The canopy is dominated by Douglas-fir, western redcedar, and western hemlock; there may be small amounts of lodgepole pine. Shrubs include salal, falsebox, Douglas maple, tall Oregon-grape, and dull Oregon-grape. Herbs are sparse, primarily prince’s pine. The moss layer is moderately well developed, with step moss, electrified cat’s-tail moss, red-stemmed feathermoss and pipecleaner moss.

There is only four tiny fragments of the CWHds1 outside park area. The fragments, plus immediately adjacent park areas, should be assessed for the occurrence of any of the rare plant communities before any operations within or adjacent to the CWHds1.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
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<td>CWHds1/03</td>
<td>Chilcotin</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

200.2  MANAGEMENT DIRECTION

Management direction for the Douglas-fir – western hemlock / falsebox ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

200.3  FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Douglas-fir – western hemlock / falsebox ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
200.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir – western hemlock / falsebox ecological community. 45

**Overall Objective**

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

**Landscape Level**

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45 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

200.5  REFERENCES AND ADDITIONAL INFORMATION


201. DOUGLAS-FIR – WESTERN REDCEDAR / BEAKED HAZELNUT

201.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Douglas-fir – western redcedar / beaked hazelnut (\textit{Pseudotsuga menziesii} – \textit{Thuja plicata} / \textit{Corylus cornuta}) ecological community occurs in major drainages and river valleys. Soils are medium textured and range from very poor to medium in nutrients. The canopy is dominated by Douglas-fir, with minor amounts of low vigour western redcedar, and western hemlock. The shrub layer is diverse, and includes saskatoon, falsebox, tall Oregon-grape, dull Oregon-grape, birch-leaved spirea, baldhip rose, beaked hazelnut, and western trumpet honeysuckle. Herbs are sparse, primarily prince’s pine. The moss layer is dominated by step moss and electrified cat’s-tail moss.

There is only one tiny fragment of the IDFww in the CCBA. The fragments should be assessed for the occurrence of any of the three rare plant communities before any operations within or adjacent to the IDFww.

![Map of IDFww/01 in the Chilcotin area]

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFww/01</td>
<td>Chilcotin</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

201.2 MANAGEMENT DIRECTION

Management direction for the Douglas-fir – western redcedar / beaked hazelnut ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC \textit{Biodiversity Guidebook} (1995) and the CCLUP \textit{Biodiversity Conservation Strategy} (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

201.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Douglas-fir – western redcedar / beaked hazelnut ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
201.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir – western redcedar / beaked hazelnut ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

Landscape Level

608 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

201.5 REFERENCES AND ADDITIONAL INFORMATION


202. DOUGLAS-FIR / DOUGLAS MAPLE / HOOKER'S FAIRYBELLS

202.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Douglas-fir / Douglas maple / Hooker's fairybells (*Pseudotsuga menziesii / Acer glabrum / Prosartes hookeri*) ecological community occurs in major drainages and river valleys. Soils are rich to very rich, and moisture is moderately dry. The canopy is dominated by Douglas-fir. The shrub layer has Douglas maple and falsebox the most abundant; also includes saskatoon, common snowberry, oceanspray, and tall Oregon-grape. Herbs are primarily Hooker's fairybells with a little prince's pine. Mosses are step moss, electrified cat's tail moss, and some red-stemmed feathermoss.

There is only four tiny fragments of the CWHds1 outside park area. The fragments, plus immediately adjacent park areas, should be assessed for the occurrence of any of the rare plant communities before any operations within or adjacent to the CWHds1. There is only one tiny fragment of the IDFww in the CCBA. The fragments should be assessed for the occurrence of any of the three rare plant communities before any operations within or adjacent to the IDFww.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
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</thead>
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<td>Chilcotin</td>
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<td>Red</td>
<td></td>
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</tbody>
</table>

202.2 MANAGEMENT DIRECTION

Management direction for the Douglas-fir / Douglas maple / Hooker's fairybells ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

202.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Douglas-fir / Douglas maple / Hooker's fairybells ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
### 202.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Douglas-fir / Douglas maple / Hooker’s fairybells ecological community.

#### Overall Objective

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

#### Stand Level

Strategies to address known occurrences of this community are:

- Avoid all disturbance to the community plus a 100 m wide buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community and the buffer. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

#### Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 100 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

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47 Based on the IWMS account for the Western hemlock – Douglas-fir / electrified cat's-tail moss Dry Submaritime 1 ecological community.
202.5 REFERENCES AND ADDITIONAL INFORMATION


203. **PURPLE REEDGRASS HERBACEOUS VEGETATION**

203.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The purple reedgrass Herbaceous Vegetation (*Calamagrostis purpurascens* Herbaceous Vegetation) ecological community is floristically rich. In addition to purple reedgrass are single-spike sedge, alpine fescue, sandwort, mountain locoweed, and diverse-leaved cinquefoil. Other herbs include Lyall’s goldenweed, spiked wood-rush, spike trisetum, and umber pussytoes. Dwarf alpine woody plants are less common and include dwarf snow willow. Juniper haircap moss is the most commonly encountered moss; lichens are also present. The subalpine grasslands that form the early successional stage may last a century or more are less complex communities dominated by purple reedgrass. The grass grows on sandy to coarse textured soils. It mostly occurs on basic soils and will tolerate mildly saline sites and drought conditions.

In BC, this ecological community is known from Snowy Mountain in the eastern North Cascades Range; it may occur in other alpine areas as listed by the Conservation Data Centre, with some variation in the details of the ecological community.

![Map of BC showing the range of purple reedgrass ecological community](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
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</thead>
<tbody>
<tr>
<td>CMAun</td>
<td>Chilcotin</td>
<td>S2</td>
<td>Red</td>
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</table>

203.2 **MANAGEMENT DIRECTION**

Management direction for the purple reedgrass Herbaceous Vegetation ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

203.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management issues for purple reedgrass Herbaceous Vegetation ecological community are limited to road construction, followed by weed invasion.
Species of Management Concern BCTS Cariboo Region

Total Risk Ranking
A = Probability of Interaction
B = Legal Consequence of Interaction
C = Biological Consequence of Interaction
Risk Ranking = A * (B + C)

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
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</tbody>
</table>

203.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of purple reedgrass Herbaceous Vegetation ecological community. 48

Overall Objective

Retain 100% of occurrences of this red-listed community in climax condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

Stand Level

Strategies to address known occurrences of this community are:
- When road construction or harvesting is considered near a community occurrence, avoid all disturbance to the site plus a 50 m width surrounding it.

Landscape Level

Strategies to address unrecorded occurrences of this community are:
- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

203.5 REFERENCES AND ADDITIONAL INFORMATION


48 Based on the IWMS account for the Vasey’s big sagebrush / pinegrass ecological community.
Species of Management Concern BCTS Cariboo Region

204. WESTERN HEMLOCK – DOUGLAS-FIR / ELECTRIFIED CAT’S-TAIL MOSS DRY SUBMARITIME 1

204.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The western hemlock – Douglas-fir / electrified cat's-tail moss Dry Submaritime 1 (Tsuga heterophylla – Pseudotsuga menziesii / Rhytidiadelphus triquetrus Dry Submaritime 1) ecological community occurs on middle slopes or higher terraces, with soils generally coarse-loamy and very poor to medium in nutrients. It occurs on a variety of surficial deposits and on moderately well drained soils with a range of textures, but tending to coarse-loamy rather than fine-loamy. The canopy is composed primarily of western hemlock and Douglas-fir, with a lesser component of western redcedar. The shrub layer is rather sparse and not vigorous, with low cover of falsebox, red huckleberry, black huckleberry, baldhip rose, and sometimes dull Oregon-grape. Twinflower, queen's cup, and prince's pine dominate the moderately diverse herb layer. Other common herbs include rattlesnake-plantain, pink wintergreen, one-sided wintergreen, sword fern, and bracken fern. The moss layer is dominated by step moss, pipecleaner moss, electrified cat’s-tail moss, and red-stemmed feathermoss.

There is only four tiny fragments of the CWHds1 outside park area. The fragments, plus immediately adjacent park areas, should be assessed for the occurrence of any of the rare plant communities before any operations within or adjacent to the CWHds1.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>CWHds1/01</td>
<td>Chilcotin</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

204.2 MANAGEMENT DIRECTION


204.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the western hemlock – Douglas-fir / electrified cat's-tail moss Dry Submaritime 1 ecological community through harvesting, road construction, site preparation, and
silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
</tr>
<tr>
<td></td>
<td>Harvest Area Layout</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

### 204.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of western hemlock – Douglas-fir / electrified cat's-tail moss Dry Submaritime 1 ecological community.

Implement the Identified Wildlife (2004) strategy at both the stand and landscape level.

#### Overall Objective

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

#### Stand Level

Strategies to address known occurrences of this community are:
- Manage WHAs by following the Identified Wildlife Management Strategy, and the Section 7 Notice if issued.
- Avoid all disturbance to the community plus a 100 m wide buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community and the buffer. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

#### Landscape Level

Strategies to address unrecorded occurrences of this community are:
- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 100 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.
In the long-term, multi-stakeholder landscape level planning should identify which stands (at least 20 over its range) of this ecological community, through its entire range, should be managed for as Wildlife Habitat Areas, and which can be managed for forest harvesting.

204.5 REFERENCES AND ADDITIONAL INFORMATION


205. WESTERN HEMLOCK / QUEEN'S CUP

205.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The western hemlock / queen's cup (Tsuga heterophylla / Clintonia uniflora) ecological community has soils very poor to medium. The canopy trees are western hemlock, Douglas-fir, and western red cedar. Shrubs are sparse with some Douglas maple and Alaskan blueberry. The herb layer has Queen’s cup, bunchberry, one-leafed foamflower, and oak fern; some three-leaved foamflower, one-sided wintergreen, and rosy twistedstalk also occur. Mosses are electrified cat’s tail moss, step moss, pipe cleaner moss, lanky moss and some red-stemmed feather moss.

There is only four tiny fragments of the CWHds1 outside park area. The fragments, plus immediately adjacent park areas, should be assessed for the occurrence of any of the rare plant communities before any operations within or adjacent to the CWHds1.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>CWHds1/06</td>
<td>Chilcotin</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

205.2 MANAGEMENT DIRECTION

Management direction for the western hemlock / queen's cup ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

205.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the western hemlock / queen's cup ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Risk Ranking A</th>
<th>Probability of Interaction</th>
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</thead>
<tbody>
<tr>
<td>10</td>
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<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Road Layout</td>
<td>Road</td>
<td>Site Preparation</td>
</tr>
<tr>
<td>Harvest Area</td>
<td>Construction</td>
<td>Maintenance</td>
<td>Planning</td>
</tr>
<tr>
<td>Road Construction</td>
<td>Road Deactivation</td>
<td>Bridge</td>
<td>Vegetation Management</td>
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<tr>
<td></td>
<td>Bridge Installation</td>
<td>Installation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bridge Removal</td>
<td>Falling</td>
<td>Density Management</td>
</tr>
<tr>
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<td>Yarding</td>
<td>Skidding</td>
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<td>Foreforwarding</td>
<td>Loading</td>
<td></td>
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<tr>
<td></td>
<td>Processing</td>
<td>Handling</td>
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</table>

<table>
<thead>
<tr>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
</tr>
<tr>
<td>B = Legal Consequence</td>
</tr>
<tr>
<td>C = Biological Consequence</td>
</tr>
<tr>
<td>Risk Ranking = A * (B + C)</td>
</tr>
</tbody>
</table>

### 205.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of western hemlock / queen's cup ecological community.

#### Overall Objective

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

#### Stand Level

Strategies to address known occurrences of this community are:

- Avoid all disturbance to the community plus a 100 m wide buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community and the buffer. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

#### Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 100 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

### 205.5 REFERENCES AND ADDITIONAL INFORMATION


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\[49\] Based on the IWMS account for the Western redcedar – Douglas-fir / vine maple ecological community.
Species of Management Concern BCTS Cariboo Region


206. WESTERN HEMLOCK / VINE MAPLE – FALSEBOX

206.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The western hemlock / vine maple – falsebox (Tsuga heterophylla / Acer circinatum – Paxistima myrsinites) ecological community occurs in major drainages and river valleys. Soils are rich to very rich, and moisture is moderately dry. The canopy is dominated by Douglas-fir and western redcedar, with some western hemlock and paper birch. The shrub layer is diverse, and dominated by vine maple and dull Oregon-grape; also includes saskatoon, falsebox, Douglas maple, thimbleberry, tall Oregon-grape, oceanspray, birch-leaved spirea, baldhip rose, beaked hazelnut, and western trumpet honeysuckle. Herbs are primarily Hooker’s fairybells, with some vanilla-leaf. Mosses are step moss and electrified cat’s tail moss.

There is only one tiny fragment of the IDFww in the CCBA. The fragments should be assessed for the occurrence of any of the three rare plant communities before any operations within or adjacent to the IDFww.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFww/05</td>
<td>Chilcotin</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

206.2 MANAGEMENT DIRECTION

Management direction for the western hemlock / vine maple – falsebox ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

206.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the western hemlock / vine maple – falsebox ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
206.4 **Management Strategy**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of western hemlock / vine maple – falsebox ecological community.  

### Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

### Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

### Landscape Level

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50 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

206.5 REFERENCES AND ADDITIONAL INFORMATION


207. WESTERN REDCEDAR – DOUGLAS-FIR / VINE MAPLE

207.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The western redcedar – Douglas-fir / vine maple (Thuja plicata – Pseudotsuga menziesii / Acer circinatum) ecological community occurs at low elevations, on lower or level positions, and on colluvial fans, on fluvial/colluvial fans and upper fluvial terraces, and sometimes on morainal deposits. Soils are moderately well drained but sometimes exhibit seepage or fluctuating water tables, and are sandy or loamy, frequently with lots of coarse fragments. Sites are slightly dry to fresh, and nutrient conditions are rich to very rich. This forest community has a canopy of western redcedar and Douglas-fir. Western hemlock is usually present, but with low cover and as a subcanopy or suppressed tree, and Pacific yew can be present, also with low cover. Black cottonwood and red alder can persist in mature seral stands. The shrub layer is usually sparse except for regeneration of redcedar and western hemlock, but vine maple is locally frequent and often abundant in the south. The herb layer is diverse and characterized by false Solomon’s-seal, clasping twistedstalk, queen’s cup, wild ginger, and one-leaved foamflower; rattlesnake-plantain and broadleaved starflower are common. Sword fern and spiny wood fern are often abundant. The moss layer is dominated by step moss, coastal leafy moss, Oregon beaked moss, and electrified cat’s-tail moss; frequently also pipecleaner moss.

There is only four tiny fragments of the CWHds1 outside park area. The fragments, plus immediately adjacent park areas, should be assessed for the occurrence of any of the rare plant communities before any operations within or adjacent to the CWHds1.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>CWHds1/05</td>
<td>Chilcotin</td>
<td>S1S2</td>
<td>Red</td>
<td>Y (Jun 2006)</td>
</tr>
</tbody>
</table>

207.2 MANAGEMENT DIRECTION

207.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management affects the western redcedar - Douglas-fir/vine maple ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Up-slope harvesting and/or road construction may alter seepage patterns resulting from up-slope hydrology.

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>Planning</td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

**207.4 MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of western redcedar - Douglas-fir/vine maple ecological community.

Implement the Identified Wildlife (2004) strategy at both the stand and landscape level.

**Overall Objective**

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

**Stand Level**

Strategies to address known occurrences of this community are:

- Manage WHAs by following the Identified Wildlife Management Strategy, and the Section 7 Notice if issued.
- For occurrences that are not WHAs and do not have high tree morality, avoid all disturbance to the community plus a 100 m wide buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
- For occurrences that are not WHAs and have high tree mortality, and/or the 100 m buffer has high tree mortality, in consultation with an ecologist develop a salvage plan (including post-harvest silviculture) that meets the objectives of (1) minimizing short-term alterations to the community; and (2) achieving a long-term mature ecological community (trees and understory) with characteristics within the natural range of variation for the natural ecological community.
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community and the buffer. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:
• Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
• Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 100 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
• Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

In the long-term, multi-stakeholder landscape level planning should identify which stands (at least 20 over its range) of this ecological community should be managed for as Wildlife Habitat Areas, and which can be managed for forest harvesting.

207.5 REFERENCES AND ADDITIONAL INFORMATION


208. WESTERN REDCEDAR – SITKA SPRUCE / SKUNK CABBAGE

208.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The western redcedar – Sitka spruce / skunk cabbage (*Thuja plicata* – *Picea sitchensis* / *Lysichiton americanus*) ecological community occurs in major drainages and river valleys. Soils are medium textured and rich to very rich in nutrients. The canopy is dominated by western redcedar, with some lodgepole pine. The shrub layer lacks diversity, and is dominated by devil’s club and red elderberry. Herbs are one-leaved foamflower, lady fern, enchanter’s nightshade, and skunk cabbage. Mosses are limited to coastal leafy moss.

There is only four tiny fragments of the CWHds1 outside park area. The fragments, plus immediately adjacent park areas, should be assessed for the occurrence of any of the rare plant communities before any operations within or adjacent to the CWHds1.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>CWHds1/12</td>
<td>Chilcotin</td>
<td>S3?</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

208.2 MANAGEMENT DIRECTION

Management direction for the western redcedar – Sitka spruce / skunk cabbage ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

208.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the western redcedar – Sitka spruce / skunk cabbage ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns.
### 208.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of western red cedar – Sitka spruce / skunk cabbage ecological community.  

#### Overall Objective

Retain 70% of occurrences of this blue-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status. This objective cannot be fully monitored, because there will never be a complete inventory of occurrences of the community. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

#### Stand Level

Strategies to address known occurrences of this community are:

- Minimize immediate loss of ecological community area, by focusing wildlife tree patches and deferred harvest areas on the ecological community.
- Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.
- Minimize degradation of ecological community area adjacent to harvest areas, by implementing measures to reduce the windthrow risk of the ecological community where windthrow risk is moderate to high. The windfirming measures can be within the ecological community, subject to the other strategies.
- Minimize long-term loss of harvested ecological community area during silviculture by:
  - Minimizing use of site preparation practices that modify soil structure.
  - Relying on natural regeneration, or by planting a mix of tree species in proportions similar to the harvested stand. Consider natural ingress when deciding on the proportion of tree species to plant, and choose tree priorities during thinning so as to achieve the natural mature/old climax tree composition.
  - Minimizing use of vegetation management practices that may alter the entire vegetation community, such as broadcast herbicide application.

#### Landscape Level

51 Based on the IWMS account for the Douglas-fir / common juniper / clad lichens ecological community.
Species of Management Concern BCTS Cariboo Region

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

208.5 REFERENCES AND ADDITIONAL INFORMATION


209. **WESTERN REDCEDAR / DEVIL'S CLUB**

209.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The western redcedar / devil's club (*Thuja plicata / Oplopanax horridus*) ecological community occurs on lower or level slope positions; and on fluvial, colluvial, and sometimes morainal deposits. Soils are moderately well drained but often exhibit seepage, and are loamy or sandy, frequently with many coarse fragments. Sites are moist to very moist (relative within subzone), and nutrient conditions are rich to very rich. **The canopy is dominated by western redcedar and western hemlock**, often accompanied by Douglas-fir. **Devil's-club characterizes the rather sparse shrub layer**. The herb layer is dominated by queen'scup, lady fern, spiny wood fern, rosy twistedstalk, and oak fern. Step moss, electrified cat's-tail moss, coastal leafy moss, and lanky moss are common mosses.

There is only four tiny fragments of the CWHds1 outside park area. The fragments, plus immediately adjacent park areas, should be assessed for the occurrence of any of the rare plant communities before any operations within or adjacent to the CWHds1.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>CWHds1/07</td>
<td>Chilcotin</td>
<td>S1S2</td>
<td>Red</td>
<td>Y (Jun 2006)</td>
</tr>
</tbody>
</table>

209.2 **MANAGEMENT DIRECTION**


209.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management affects the western redcedar / devil's club ecological community through harvesting, road construction, site preparation, and silviculture activities that result in loss of the pre-climax or climax community, alteration of the soil characteristics, alteration of early or mid-seral communities, and/or alteration of successional patterns. Up-slope harvesting and/or road construction may alter seepage patterns resulting from up-slope hydrology.
209.4 **Management Strategy**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of western redcedar / devil's club ecological community.

Implement the Identified Wildlife (2004) strategy at both the stand and landscape level.

**Overall Objective**

Retain 100% of occurrences of this red-listed community in mature/old condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

**Stand Level**

Strategies to address known occurrences of this community are:

- Manage WHAs by following the Identified Wildlife Management Strategy, and the Section 7 Notice if issued.
- For occurrences that are not WHAs and do not have high tree mortality, avoid all disturbance to the community plus a 100 m wide buffer – maintain the ecological community in a natural state (i.e., same species composition, physical structure, including tree composition and density, and ecological processes).
- For occurrences that are not WHAs and have high tree mortality, and/or the 100 m buffer has high tree mortality, in consultation with an ecologist develop a salvage plan (including post-harvest silviculture) that meets the objectives of (1) minimizing short-term alterations to the community; and (2) achieving a long-term mature ecological community (trees and understory) with characteristics within the natural range of variation for the natural ecological community.
  - Minimize long-term loss of ecological community area, by locating roads, landings, and bladed trails outside the ecological community and the buffer. If roads must be within the ecological community area, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Where possible, rehabilitate and replant roads, landings and bladed trails.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 100 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the...
community can be tracked.

In the long-term, multi-stakeholder landscape level planning should identify which stands (at least 20 over its range) of this ecological community should be managed for as Wildlife Habitat Areas, and which can be managed for forest harvesting.

**209.5 REFERENCES AND ADDITIONAL INFORMATION**


6. SHRUBLAND ECOSYSTEMS
210. **BIG SAGEBRUSH / BLUEBUNCH WHEATGRASS**

210.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The big sagebrush / bluebunch wheatgrass (*Artemisia tridentata* / *Pseudoroegneria spicata*) ecological community occurs on lower to upper slopes and on river valley terraces. It occurs on gentle to steep, usually middle slopes of all aspects. Soils may have calcareous or saline properties, and are fine to medium textured, very poor to very rich, and moisture is submesic to subxeric. The ecological community typically occurs between 400-600 metres but extends higher on steep south-facing slopes. It is non-forested; **big sage is the most visible plant species but bluebunch wheatgrass is actually the dominant species**. Bluebunch wheatgrass tends to grow beneath the canopy of big sage, leaving the gaps between shrubs fairly bare. **There may be scattered Douglas-fir.** Some rabbit-brush and pasture sage may also be present. Other perennial grasses and forbs are sparse and consist of Sandberg’s bluegrass, slender hawksbeard, largefruited desert-parsley, and long-leaved phlox. Lichens and moss are scarce, consisting of pebbled pixi-cup, peg-leg soldiers, sidewalk moss and brook-mosses. In late seral and climax sites, the lichen community is diverse and forms a well developed crust on the soil. With heavy grazing, bluebunch wheatgrass declines in abundance while big sage increases along with exotic invasives.

![Map of the Cariboo Region](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGxh3/01; BGxw2/00</td>
<td>Central Cariboo</td>
<td>S2</td>
<td>Red</td>
<td>Wildlife</td>
</tr>
<tr>
<td></td>
<td>Chilcotin</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

210.2 **MANAGEMENT DIRECTION**

Management direction for the big sagebrush / bluebunch wheatgrass ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

210.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management issues for big sagebrush / bluebunch wheatgrass ecological community are limited to road construction, followed by weed invasion.
210.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of big sagebrush / bluebunch wheatgrass ecological community.

Overall Objective

Retain 100% of occurrences of this red-listed community in climax condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

Stand Level

Strategies to address known occurrences of this community are:
• When road construction or harvesting is considered near a community occurrence, avoid all disturbance to the site plus a 50 m width surrounding it.

Landscape Level

Strategies to address unrecorded occurrences of this community are:
• Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
• Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
• Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

210.5 REFERENCES AND ADDITIONAL INFORMATION


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52 Based on the IWMS account for the Vasey’s big sagebrush / pinegrass ecological community.
211. DRUMMOND'S WILLOW / BLUEJOINT REEDGRASS

211.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Drummond's willow / bluejoint reedgrass (Salix drummondiana / Calamagrostis canadensis) ecological community occurs along small, low-gradient streams. The sites can be deeply flooded during spring run-off, but are well elevated above the mid-season watertable. Soils are silty to fine-sandy textured Cumilic Regosols. Drummond's willow forms a continuous canopy, with other shrubs such as black twinberry occurring in the understory. Hardhack may co-dominate in some sites, in wetter climates. The herb layer has a high cover of bluejoint reedgrass, but is otherwise variably developed, often with open patches of recently deposited fluvial materials.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBPSdc/Fi05</td>
<td>Central Cariboo</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quesnel; Chilcotin</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

211.2 MANAGEMENT DIRECTION

Management direction for the Drummond's willow / bluejoint reedgrass ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

211.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management issues for Drummond's willow / bluejoint reedgrass ecological community are limited to road construction, especially stream crossings.
## 211.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Drummond's willow / bluejoint reedgrass ecological community.

### Overall Objective

Retain 70% of occurrences of this blue-listed community in climax condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because even when Terrestrial Ecosystem Mapping has been done, classification of wetlands and other non-forested habitats was incomplete. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

### Stand Level

Strategies to address known occurrences of this community are:
- When road construction or harvesting is considered near a community occurrence, minimize disturbance to the site plus a 50 m width surrounding it.

### Landscape Level

Strategies to address unrecorded occurrences of this community are:
- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

### REFERENCES AND ADDITIONAL INFORMATION


http://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh52.pdf.
212. MOUNTAIN ALDER / COMMON HORSETAIL

212.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The mountain alder / common horsetail (*Alnus incana / Equisetum arvense*) ecological community occurs on gravel or sand bars adjacent to relatively high-gradient streams that can have a “flashy” flood regime. Flood events are short during annual spring flooding and occur occasionally during summer storms. Soils are coarse-textured, often gravelly, Cumulic Regosols and Rego Gleysols. **Mountain alder is the dominant shrub and forms a continuous canopy on most sites**; twinberry may also be present. The understorey can be well developed or sparse, depending on recent flood history, but **common horsetail usually persists**; lady fern, oak fern and cow-parsnip may be present. **The moss layer is often very sparse or absent because of high litter fall and recurring sediment deposition**; ragged mosses and leafy mosses may be present.

![Map of the Cariboo Region showing distribution of mountain alder and common horsetail](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSxv/FI01</td>
<td>Central Cariboo Quesnel; Chilcotin</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

212.2 MANAGEMENT DIRECTION

Management direction for the mountain alder / common horsetail ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

212.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management issues for mountain alder / common horsetail ecological community are limited to road construction, especially stream crossings.
212.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of mountain alder / common horsetail ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed community in climax condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because even when Terrestrial Ecosystem Mapping has been done, classification of wetlands and other non-forested habitats was incomplete. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- When road construction or harvesting is considered near a community occurrence, minimize disturbance to the site plus a 50 m width surrounding it.

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

212.5 REFERENCES AND ADDITIONAL INFORMATION

http://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh52.pdf.
213. MOUNTAIN ALDER / RED-OISIER DOGWOOD / LADY FERN

213.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The mountain alder / red-osier dogwood / lady fern (Alnus incana / Cornus stolonifera / Athyrium filix-femina) ecological community is a flood ecosystem that occurs along streams, creek gullies and low-gradient floodplains with loamy or fine-textured soils and moderate duration of flooding. Soils are very moist and rich to very rich in nutrients. Mountain alder dominates the canopy; red-osier dogwood, twinberry and red elderberry are also present and may be abundant. The understory is diverse and lush with an abundance of large ferns, especially lady fern. Other herbs include ostrich fern, common horsetail, stinging nettle and cow-parsnip. The moss layer is usually very sparse, with ragged-mosses and leafy-mosses.

![Map of BCTS Cariboo Region]

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICHwk4/FI02; SBSdk/FI02; SBSwk1/FI02</td>
<td>Central Cariboo Quesnel</td>
<td>S3 Blue</td>
<td></td>
</tr>
</tbody>
</table>

213.2 MANAGEMENT DIRECTION

Management direction for the mountain alder / red-osier dogwood / lady fern ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

213.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management issues for mountain alder / red-osier dogwood / lady fern ecological community are limited to road construction, especially stream crossings.
Species of Management Concern BCTS Cariboo Region

Total Risk Ranking  | Planning & Layout | Roads, Bridges and Culverts | Harvesting | Silviculture
---|---|---|---|---
Risk Ranking = A * (B + C) | A = Probability of Interaction | B = Legal Consequence of Interaction | C = Biological Consequence of Interaction | Planning | Harvest Area Layout | Road Construction | Road Maintenance | Road Deactivation | Bridge Installation | Bridge Removal | Falling | Yarding | Skidding | Forwarding | Loading | Processing | Handling | Site Preparation | Planning | Vegetation Management | Density Management
6 | 2 | 1 | 2 | 2 | 0 | 2 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0

213.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of mountain alder / red-osier dogwood / lady fern ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed community in climax condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because even when Terrestrial Ecosystem Mapping has been done, classification of wetlands and other non-forested habitats was incomplete. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- When road construction or harvesting is considered near a community occurrence, minimize disturbance to the site plus a 50 m width surrounding it.

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

213.5 REFERENCES AND ADDITIONAL INFORMATION

214. NARROW-LEAF WILLOW SHRUBLAND

214.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The narrow-leaf willow Shrubland (*Salix exigua* Shrubland) ecological community occurs along very large river systems on sandy lateral bars that receive prolonged spring flooding by powerful currents. It sometimes also occurs along large lakes on wave-washed shores. It is dominated by narrow-leaf willow, with a scattering of other species such as balsam poplar or mountain alder in drier areas. Scouring-rush is common in the understory; annual weeds may seed in on exposed mineral soil. Plant diversity is low.

This is called the sandbar willow community in the Wetlands of BC book. It is common in many BGC variants, but is rare in the BGxh3.

![Map of BGC Unit BGxh3/F06 in Central Cariboo]

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGxh3/F06</td>
<td>Central Cariboo</td>
<td>S2 Red</td>
<td></td>
</tr>
</tbody>
</table>

214.2 MANAGEMENT DIRECTION

Management direction for the narrow-leaf willow Shrubland ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

214.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management will not affect the narrow-leaf willow Shrubland ecological community, due to its location below the high water mark of large rivers and lakes.
### Total Risk Ranking

- **A** = Probability of Interaction
- **B** = Legal Consequence of Interaction
- **C** = Biological Consequence of Interaction

\[
\text{Risk Ranking} = A \times (B + C)
\]

### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Planning</td>
<td>Road Construction</td>
<td>Road Deactivation</td>
<td>Bridge Installation</td>
</tr>
<tr>
<td>Harvest Area Layout</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
<td>Bridge Installation</td>
</tr>
<tr>
<td>Road Layout</td>
<td>Bridge Construction</td>
<td>Bridge Installation</td>
<td>Bridge Removal</td>
</tr>
<tr>
<td>Road Construction</td>
<td>Bridge Construction</td>
<td>Bridge Installation</td>
<td>Falling</td>
</tr>
<tr>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
<td>Bridge Installation</td>
<td>Yarding</td>
</tr>
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<td>Road Deactivation</td>
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<td>Yarding</td>
</tr>
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<td>Skidding</td>
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<td>Road Deactivation</td>
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<td>Forwarding</td>
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<td>Road Maintenance</td>
<td>Bridge Installation</td>
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<td>Processing</td>
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<td>Bridge Removal</td>
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<td>Bridge Removal</td>
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<td>Bridge Removal</td>
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</tr>
<tr>
<td>Road Deactivation</td>
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<td>Bridge Removal</td>
<td>Vegetation Management</td>
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<td>Bridge Installation</td>
<td>Bridge Removal</td>
<td>Density Management</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planning</td>
<td>Roads, Bridges and Culverts</td>
<td>Harvesting</td>
<td>Silviculture</td>
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<td>Road Planning</td>
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<td>Road Deactivation</td>
<td>Bridge Installation</td>
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<td>Harvest Area Layout</td>
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<td>Road Layout</td>
<td>Bridge Construction</td>
<td>Bridge Installation</td>
<td>Bridge Removal</td>
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<td></td>
<td>Road Construction</td>
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<td>Bridge Installation</td>
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<tr>
<td></td>
<td>Road Maintenance</td>
<td>Bridge Construction</td>
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<td></td>
<td>Road Deactivation</td>
<td>Bridge Construction</td>
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<td></td>
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<td>Bridge Construction</td>
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<td>Road Maintenance</td>
<td>Bridge Construction</td>
<td>Bridge Installation</td>
<td>Bridge Removal</td>
</tr>
</tbody>
</table>

#### 214.4 Management Strategy

None required.

#### 214.5 References and Additional Information

215. VASEY’S BIG SAGEBRUSH / PINEGRASS

215.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Vasey’s big sagebrush / pinegrass \( (Artemisia tridentata \text{ var. vaseyana} / Calamagrostis rubescens) \) ecological community occurs over morainal and colluvial blankets, on generally warm aspects, and on middle to upper slopes with steep to gentle gradients. Soils have fine to medium textures, are subxeric to submesic, and have medium to very rich nutrient regimes. Soils are occasionally shallow and rocky in the ESSFxc. This shrub-steppe community has a shrub cover of Vasey’s big sagebrush over a herb layer often dominated by Idaho fescue, and/or pinegrass depending on the location. Western meadowrue and wild strawberry commonly occur in this community. Arctic lupine, silky lupine, sandworts, old man’s whiskers, junegrass, bluebunch wheatgrass, and fescue grasses can also be found in this community, but with low cover. It is known from higher elevations in the southern and central interior. It occurs as small patches sparsely distributed within a very limited range.

This ecological community has not been observed in the CCBA, and some of the species mentioned in the ecological community description do not occur this far north (e.g. silky lupine).

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSxk3/04</td>
<td>Central Cariboo</td>
<td>S1</td>
<td>Red</td>
<td>Y (Jun 2006)</td>
</tr>
</tbody>
</table>

215.2 MANAGEMENT DIRECTION


215.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects on the Vasey’s big sagebrush / pinegrass ecological community are limited to road construction, followed by weed invasion. Fire prevention and suppression result in ingress of young conifers.
Species of Management Concern BCTS Cariboo Region

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Relative Risk of Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning &amp; Layout</td>
<td>Roads, Bridges and Culverts</td>
</tr>
<tr>
<td>Risk ranking = A * (B + C)</td>
<td>A = Probability of Interaction</td>
</tr>
<tr>
<td>10</td>
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</tr>
<tr>
<td>2</td>
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<td>0</td>
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</tr>
</tbody>
</table>

215.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Vasey's big sagebrush / pinegrass ecological community.

Implement the Identified Wildlife (2004) strategy at both the stand and landscape level.

Overall Objective

Retain 100% of occurrences of this red-listed community in climax condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

Stand Level

Strategies to address known occurrences of this community are:

- Manage WHAs by following the Identified Wildlife Management Strategy, and the Section 7 Notice if issued.
- For a Vasey's big sagebrush / pinegrass community occurrence that is not a WHA, avoid all disturbance to the site plus a 50 m wide buffer surrounding it.

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 150 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

215.5 REFERENCES AND ADDITIONAL INFORMATION


http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Plant%20Communities/vaseysbigagebrushpinegrass.pdf


Species of Management Concern BCTS Cariboo Region

216. WATER BIRCH / ROSES

216.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The water birch / roses (*Betula occidentalis / Rosa* spp.) ecological community occurs in the CCBA on cool, moist, gently to moderately sloping lower slopes in gullies. Soils are moist throughout the growing season, often being fed by subsurface spring-fed seepage water. Late seral/climax vegetation is characterized by a dense cover of water birch or occasionally tall willows or mountain alder. Due to a dense tall shrub overstory the herb layer is relatively sparse and is made up of a variety of moist forbs and grasses. In the southern portion of the BGxh3 poison ivy frequently occurs in this site series. There is no forest cover. Most sites belonging to this site series often contain a scattering of weedy species such as burdock, sweet clover, salsify and Canada goldenrod.

This community is also known as the water birch / red-osier dogwood (*Betula occidentalis / Cornus stolonifera*) ecological community (CDC), although this "lumping" may change over the next year.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGxh3/Fl07 (= BGxh3/Gd/03)</td>
<td>Central Cariboo Quesnel; Chilcotin</td>
<td>S1</td>
<td>Red</td>
<td>2006</td>
</tr>
</tbody>
</table>

216.2 MANAGEMENT DIRECTION


216.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the water birch / roses ecological community through road construction adjacent to, or across, gullies or the riparian zone of ponds, lakes, and streams.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Activity</th>
<th>Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td></td>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Layout</td>
<td>Road Construction</td>
</tr>
<tr>
<td>B = Legal Consequence of Interaction</td>
<td>10</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>C = Biological Consequence of Interaction</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Risk Ranking</strong> = A * (B + C)</td>
<td>10</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### 216.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of water birch / roses ecological community.

#### Overall Objective

Retain 100% of occurrences of this red-listed community in climax condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

#### Stand Level

Strategies to address known occurrences of this community are:

- Manage established WHAs according to the associated "Orders".
- Avoid all disturbance to the site plus a 100 m wide buffer surrounding it – maintain the ecological community in a natural state (i.e., same species composition, physical structure, tree composition and density, and ecological processes).
  - do not build roads in an occurrence, or within a 100 m buffer.
- Maintain the natural hydrological regime. High water tables are fundamental to the ecology of this wet ecosystem.
  - as a default measure, approximately 100 m on the uphill side of the boundary of the occurrence should be protected from harvesting and road development.
  - The critical source of moisture is from the water feature, not from upslope. Hence a wide buffer is not required to maintain water input to the community.
- Prevent physical disturbance.
- Prevent water or sediment inputs from ditches.

#### Landscape Level

To address unrecorded occurrences of the water birch / roses ecological community:

- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 100 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.
216.5 REFERENCES AND ADDITIONAL INFORMATION


7. HERBACEOUS ECOSYSTEMS

The grassland ecosystem classification for the former Cariboo Forest Region is under development, but has not been released yet. It is scheduled for release in 2009. As a result there will be revisions to the list of red-list and blue-list grassland and associated ecological communities in the next year or two.
217. BLUEBUNCH WHEATGRASS – ARROWLEAF BALSAMROOT

217.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The bluebunch wheatgrass – arrowleaf balsamroot (Pseudoroegneria spicata – Balsamorhiza sagittata) ecological community occurs on south aspect, gentle to steep, middle to upper slopes. It has soils medium to coarse texture, medium to rich, and mesic to submesic moisture. It is non-forested (some short (15-23m tall) Douglas-fir may be present); shrubs are sparse pasture sage, common snowberry, prickly rose and birch-leaved spirea; and the herb layer is bluebunch wheatgrass, arrowleaf balsamroot, Sandberg’s bluegrass, yarrow, and junegrass. Moss cover is sparse and patchy. This community will likely be removed from the list for the CCBA, once the new grassland classification is released.

217.2 MANAGEMENT DIRECTION

Management direction for the bluebunch wheatgrass – arrowleaf balsamroot ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

217.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the bluebunch wheatgrass – arrowleaf balsamroot ecological community through road construction, and weed invasion associated with road construction.
### Species of Management Concern BCTS Cariboo Region

#### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
<th>Vegetation Management</th>
<th>Density Management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>10</td>
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<td>2</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

#### 217.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of bluebunch wheatgrass – arrowleaf balsamroot ecological community.

**Overall Objective**

Retain 100% of occurrences of this red-listed community in climax condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

**Stand Level**

Strategies to address known occurrences of this community are:

- When road construction or harvesting is considered near a community occurrence, avoid all disturbance to the site plus a 50 m wide buffer surrounding it.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

#### 217.5 REFERENCES AND ADDITIONAL INFORMATION


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53 Based on the IWMS account for the Vasey’s big sagebrush / pinegrass ecological community.

218. **BLUEBUNCH WHEATGRASS – JUNEGRASS**

218.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The bluebunch wheatgrass – junegrass (*Pseudoroegneria spicata* – *Koeleria macrantha*) ecological community generally occurs on gentle to steep, middle slopes; in the MSxk it is found on very dry ridge crests, hilltops and steep south-facing slopes. Soils are medium textured. It is nonforested (scattered Douglas-fir may be present); shrubs are sparse, common juniper, pasture sage, and rabbit-brush may be present. The herb layer is dominated by bluebunch wheatgrass and junegrass; needle-and-thread grass, yarrow, parsnip-flowered buckwheat, fescues and old man’s whiskers may also be present. Some lichens (*Cladonia*) and moss are usually present.

![Map of BCTC Cariboo Region](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGxh3/00; BGxw2/01; IDFdk3/00; IDFxm/00; MSxk3/03</td>
<td>Central Cariboo Quesnel; Chilcotin</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

218.2 **MANAGEMENT DIRECTION**

Management direction for the bluebunch wheatgrass – junegrass ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

218.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management affects the bluebunch wheatgrass – junegrass ecological community through road construction, and weed invasion associated with road construction.
### Species of Management Concern BCTS Cariboo Region

#### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

### 218.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of bluebunch wheatgrass – junegrass ecological community, \(^{54}\)

#### Overall Objective

Retain 100% of occurrences of this red-listed community in climax condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

#### Stand Level

Strategies to address known occurrences of this community are:

- When road construction or harvesting is considered near a community occurrence, avoid all disturbance to the site plus a 50 m wide buffer surrounding it.

#### Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

### 218.5 REFERENCES AND ADDITIONAL INFORMATION


\(^{54}\) Based on the IWMS account for the Vasey’s big sagebrush / pinegrass ecological community.

219. NORTHERN WORMWOOD / SHORT-AWNED PORCUPINEGRASS

219.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The northern wormwood / short-awned porcupinegrass (*Artemisia campestris - Hesperostipa curtiseta*) ecological community occurs on middle and upper valley slopes on gentle to steep south- and west-facing slopes. Soil is fine to coarse textured. **It is a non-forested, open grassland that is dominated by northern wormwood and short-awned porcupine grass.** It is the “upper grassland” zonal community in the Cariboo Region. Shrubs include Rocky Mountain juniper, common juniper and saskatoon. Herbs include northern wormwood, short-awned porcupine grass, spreading needlegrass, and bluebunch wheatgrass. Lichens and mosses are cladonia lichens, pelt lichens and sidewalk moss. Forest encroachment is a major concern for this community, due to wildfire suppression.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFxm/00</td>
<td>Central Cariboo</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quesnel; Chilcotin</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

219.2 MANAGEMENT DIRECTION

Management direction for the northern wormwood / short-awned porcupinegrass ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

219.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the northern wormwood / short-awned porcupinegrass ecological community through road construction, and weed invasion associated with road construction. Forest encroachment is a major concern for this community.
219.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of northern wormwood / short-awned porcupine grass ecological community.  

Overall Objective

Retain 100% of occurrences of this red-listed community in climax condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

Stand Level

Strategies to address known occurrences of this community are:

- When road construction or harvesting is considered near a community occurrence, avoid all disturbance to the site plus a 50 m wide buffer surrounding it.
- If forest encroachment into the community has occurred, consider developing a tree-removal plan in consultation with an ecologist, with the objective of restoring the natural non-forested community.

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

219.5 REFERENCES AND ADDITIONAL INFORMATION


55 Based on the IWMS account for the Vasey’s big sagebrush / pinegrass ecological community.
220. SAND DROPSEED – NEEDLE-AND-THREAD GRASS

220.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The sand dropseed – needle-and-thread grass (*Sporobolus cryptandrus* – *Hesperostipa comata*) ecological community occurs on gentle to moderate, warm, usually middle slopes on coarse textured soils of eolian lenses or glaciofluvial deposits (such as sand dunes). BGxh3/00 occurs along hill crests and steep slopes; BGxw2/00 occurs on steep slopes and moderate south- and west-facing slopes; IDFxm/00 is found on steep valley slopes and gentle slopes with sandy soils. Shrubs are limited to big sagebrush, and may entirely absent. The moderate herb layer is dominated by sand dropseed, needle-and-thread grass and bluebunch wheatgrass. Other common species include Indian ricegrass, brittle prickly-pear cactus and needle-and-thread grass. Mosses and lichens are usually absent.

![Map](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGxh3/00; BGxw2/00; IDFxm/00</td>
<td>Central Cariboo Quesnel; Chilcotin</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

220.2 MANAGEMENT DIRECTION

Management direction for the sand dropseed – needle-and-thread grass ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

220.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management issues for sand dropseed – needle-and-thread grass ecological community are limited to road construction, followed by weed invasion.
Species of Management Concern BCTS Cariboo Region

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

**220.4 MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of sand dropseed - needle-and-thread grass ecological community.  

**Overall Objective**

Retain 100% of occurrences of this red-listed community in climax condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

**Stand Level**

Strategies to address known occurrences of this community are:
- When road construction or harvesting is considered near a community occurrence, avoid all disturbance to the site plus a 50 m width surrounding it.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:
- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

**220.5 REFERENCES AND ADDITIONAL INFORMATION**


http://www.for.gov.bc.ca/ftp/RSI/external/?publish/Dennis%20Lloyd%20BEC%20Materials/

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56 Based on the IWMS account for the Vasey’s big sagebrush / pinegrass ecological community.
221. SANDBERG'S BLUEGRASS – SLENDER WHEATGRASS

221.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Sandberg's bluegrass – slender wheatgrass (Poa secunda ssp. secunda – Elymus trachycaulus) ecological community is restricted to south or southwest facing slopes that are level to moderate. This grassland develops on morainal or lacustrine blankets with fine textured, moderately well drained soils. Soil moisture is submesic to mesic (relative within subzone) and nutrient regime is rich to very rich.

There is a well-developed and diverse herb layer, dominated by Sandberg’s bluegrass, interior bluegrass, slender wheatgrass, and sometimes spreading needlegrass. Other grass species are junegrass, blue wildrye, and false melic. Purple peavine and fireweed are common forbs. In the eastern portion of its range western meadowrue may be a dominant forb. Many other forb and grass species also occur in this ecological community. The moss layer is generally poorly developed or entirely lacking.

The ecological community can be confused with early seral plant communities that can occupy the same sites as this ecological community but differ in species composition and structure. Notable differences are the presence and dominance of introduced species such as Kentucky bluegrass and common timothy, and a corresponding reduction of native grasses and forbs.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBSdk/82; SBSmc2</td>
<td>Quesnel</td>
<td>S1</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

221.2 MANAGEMENT DIRECTION

Management direction for the Sandberg's bluegrass – slender wheatgrass ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

221.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management issues for Sandberg's bluegrass – slender wheatgrass ecological community are limited to road construction, followed by weed invasion.
### 221.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Sandberg's bluegrass – slender wheatgrass ecological community.

**Overall Objective**

Retain 100% of occurrences of this red-listed community in climax condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

**Stand Level**

Strategies to address known occurrences of this community are:

- When road construction or harvesting is considered near a community occurrence, avoid all disturbance to the site plus a 50 m width surrounding it.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

### 221.5 References and Additional Information


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57 Based on the IWMS account for the Vasey’s big sagebrush / pinegrass ecological community.


222. SASKATOON / SLENDER WHEATGRASS

222.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The saskatoon / slender wheatgrass (*Amelanchier alnifolia / Elymus trachycaulus*) ecological community occurs on southwest-facing slopes with gradients greater than 25 percent that have significantly warm aspects. It is often found on dry rocky ridges and on colluvial veneers or morainal materials below such ridges that are base-rich. The community is a mosaic of shrub and grassland patches. Common shrubs are saskatoon, common snowberry, prickly rose, and choke cherry. The forb layer is diverse and well developed. Common species are slender wheatgrass, interior bluegrass, spreading needlegrass, purple peavine, and northern bedstraw. Many other forb species also occur in this ecological community. The moss layer is poorly developed and generally consists of low cover of sidewalk moss.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBSdk/81</td>
<td>Quesnel</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

222.2 MANAGEMENT DIRECTION

Management direction for the saskatoon / slender wheatgrass ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

222.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the saskatoon / slender wheatgrass ecological community through road construction, and weed invasion associated with road construction.
222.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of saskatoon / slender wheatgrass ecological community. 58

Overall Objective

Retain 100% of occurrences of this red-listed community in climax condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

Stand Level

Strategies to address known occurrences of this community are:

• When road construction or harvesting is considered near a community occurrence, avoid all disturbance to the site plus a 50 m wide buffer surrounding it.

Landscape Level

Strategies to address unrecorded occurrences of this community are:

• Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.

• Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.

• Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

222.5 REFERENCES AND ADDITIONAL INFORMATION


58 Based on the IWMS account for the Vasey’s big sagebrush / pinegrass ecological community.
223. SPREADING NEEDLEGRASS HERBACEOUS VEGETATION

223.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The spreading needlegrass Herbaceous Vegetation (Achnatherum richardsonii Herbaceous Vegetation) ecological community occurs on level to gently sloping sites; on steeper east and northwest aspects in the BGxw2 subzone; on steep south-facing slopes and hill crests in IDFdk4 and on cool, north aspects and along forest edges in the IDFxm subzone. Soils are fine to coarse textured and medium to rich in nutrients. It is non-forested grassland dominated by spreading needlegrass, with scattered Douglas-fir and lodgepole pine. Scattered shrubs include common juniper, Rocky Mountain juniper, saskatoon and prickly rose. Other herbs include bluebunch wheatgrass, needle-and-thread grass and porcupine grass. Cladonia lichens and pelt lichens are present.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGxw2/00; IDFdk4/00; IDFxm/00</td>
<td>Central Cariboo, Quesnel, Chilcotin</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

223.2 MANAGEMENT DIRECTION

Management direction for the spreading needlegrass Herbaceous Vegetation ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

223.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management issues for spreading needlegrass Herbaceous Vegetation ecological community are limited to road construction, followed by weed invasion.
### 223.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of spreading needlegrass Herbaceous Vegetation ecological community.

#### Overall Objective

Retain 70% of occurrences of this blue-listed community in climax condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because even when Terrestrial Ecosystem Mapping has been done, classification of wetlands and other non-forested habitats was incomplete. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

#### Stand Level

Strategies to address known occurrences of this community are:
- When road construction or harvesting is considered near a community occurrence, minimize disturbance to the site plus a 50 m width surrounding it.

#### Landscape Level

Strategies to address unrecorded occurrences of this community are:
- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

### References and Additional Information


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59 Based on the IWMS account for the Vasey’s big sagebrush / pinegrass ecological community.
http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Plant%20Communities/pc_vaseysbigagebrushpinegrass.pdf

8. WETLAND AND TRANSITION ECOSYSTEMS
224. **AWNED SEDGE FEN – MARSH**

### 224.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The awned sedge Fen – Marsh (Carex atherodes Fen – Marsh) ecological community occurs in the dry climates of the Central Interior at low to mid-elevations. **It is an open marsh that is most commonly a small pothole surrounded by forest, with relatively shallow and constant water levels.** It is always dominated by awned sedge, but other species may also be abundant – common hookmoss, verticillate water-milfoil, little meadow-foxtail, and beaked sedge. Standing water is slightly alkaline; rooting substrates are fine-textured mineral or shallow sedge-derived peat. Common soil types are Humisols and Humic Gleysols.

### 224.2 MANAGEMENT DIRECTION

Management direction for the awned sedge Fen – Marsh ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

### 224.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the awned sedge Fen – Marsh ecological community, through harvesting and road construction. It is generally surrounded by forest; hence windthrow into the wetland may alter the ecological community. Changes in water table and road ditches causing water diversion into or out of the wetland may change the hydrology of the community. Sediment from ditch water, especially likely if the wetland is small enough to not have a mandatory riparian management requirement, may change the substrate characteristics and water quality. Up-slope harvesting and/or road construction may alter water inflow resulting from up-slope hydrology.
224.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of awned sedge Fen – Marsh ecological community. 60

Overall Objective

Retain 100% of occurrences of this red-listed community in climax condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

Stand Level

Strategies to address known occurrences of this community are:

- Maintain the ecological community in a natural state (i.e., same species composition, physical structure, tree composition and density of adjacent forest, and ecological processes).
  - do not build roads or harvest adjacent to an occurrence.
- Maintain the natural hydrological regime.
  - as a default measure, approximately 80 m on the uphill side (or 80 m all around if the occurrence is a depression in flat ground) of the boundary of the occurrence should be protected from harvesting and road development
  - alternatively a soil hydrologist or ecologist can develop a prescription to maintain the hydrological regime of the ecosystem.
- Prevent physical disturbance.
- Prevent water and sediment inputs from ditches.

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

60 Based on the IWMS account for the hybrid white spruce / ostrich fern ecological community.
224.5 REFERENCES AND ADDITIONAL INFORMATION


225. BALTIC RUSH – FIELD SEDGE

225.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Baltic rush – field sedge (Juncus balticus – Carex praegracilis) ecological community occurs as extensive meadows in seasonally flooded, moderately alkaline depressions or in smaller peripheral communities in the drawdown zone around permanent ponds. There is a brief early-season inundation followed by a dropping of the watertable below the surface. Soils are fine textured slightly alkaline Gleysols or gleyed Brunissols developed in imperfectly drained lacustrine materials, with up to 10 cm of surface organic accumulation. It is dominated by field sedge, with lesser amounts of Baltic rush and Kentucky bluegrass. Sites usually have no shrubs and little moss development.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG/Gs03; IDFdk3/Gs03; IDFdk3/W3; IDFdk4/Gs03; IDFdw/Gs03; SBPSdc/Gs03; SBPSxc/Gs03; SBPSxc/W2</td>
<td>Central Cariboo Quesnel; Chilcotin</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

225.2 MANAGEMENT DIRECTION

Management direction for the Baltic rush – field sedge ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

225.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Baltic rush – field sedge ecological community, through road construction.
### 225.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Baltic rush – field sedge ecological community.

**Overall Objective**

Retain 70% of occurrences of this blue-listed community in climax condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because even when Terrestrial Ecosystem Mapping has been done, classification of wetlands and other non-forested habitats was incomplete. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this community are:

- When road construction is considered near a community occurrence, minimize disturbance to the site plus a 50 m width surrounding it.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

### REFERENCES AND ADDITIONAL INFORMATION


226. BEBB'S WILLOW / BLUEJOINT REEDGRASS

226.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Bebb's willow / bluejoint reedgrass (Salix bebbiana / Calamagrostis canadensis) ecological community occurs on lake flats, pond margins, fluvial terraces, seasonal creeks, and palustrine basins. Early season water draws down to very moist conditions by late growing season. Soils are fine-textured Gleysols, often with veneers of woody peat. Bebb's willow forms a tall, open canopy, often with a significant component of mountain alder and sometimes scattered hybrid white spruce. Other shrubs include red-osier dogwood and twinberry honeysuckle. Herbs are bluejoint reedgrass, horsetails and beaked sedge. A low cover of leafy mosses may be present. Sites can often have distinctive mounds (created from fallen trees) interspersed with sparsely vegetated pools of water.

226.2 MANAGEMENT DIRECTION

Management direction for the Bebb's willow / bluejoint reedgrass ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

226.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Bebb's willow / bluejoint reedgrass ecological community, through road construction and stream crossings.
226.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Bebb’s willow / bluejoint reedgrass ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed community in climax condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because even when Terrestrial Ecosystem Mapping has been done, classification of wetlands and other non-forested habitats was incomplete. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- When road construction is considered near a community occurrence, minimize disturbance to the site plus a 50 m width surrounding it.

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

226.5 REFERENCES AND ADDITIONAL INFORMATION

227. BLACK SPRUCE / CREEPING-SNOWBERRY / PEAT-MOSSES

227.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The black spruce / creeping-snowberry / peat-mosses (Picea mariana / Gaultheria hispidula / Sphagnum spp.) ecological community typically occur in closed basins or peripheral areas of larger peatlands where there is little groundwater influence. Soils are Mesisols and Fibrisols with a poorly decomposed, acidic peat-moss surface layer. Black spruce and Labrador tea are always present, usually growing on raised microsites. Dwarf woody plants are common and few minerotrophic species are present. Creeping-snowberry is always present and often prominent. There is a wide diversity of mosses, with common brown peat-moss and common red peat-moss usually dominant; in areas with high tree cover feathermosses can be dominant.

227.2 MANAGEMENT DIRECTION

Management direction for the black spruce / creeping-snowberry / peat-mosses ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

227.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

There are no forest management issues for the black spruce / creeping-snowberry / peat-mosses ecological community; forest operations will not affect it.
### 227.4 Management Strategy

None required.

### 227.5 References and Additional Information


228. BUCKBEAN – SLENDER SEDGE

228.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The buckbean – slender sedge (*Menyanthes trifoliata* – *Carex lasiocarpa*) ecological community occurs on floating mats adjacent to small lakes and peatland ponds, or in elongated wet depressions (flarks) of patterned fens where there is permanent surface saturation and shallow inundation. Sites are on deep sedge peat, often floating. Sites are often slightly hummocked, with buckbean in the depressions and slender sedge, hookmosses and other mosses on the mounds. Hookmosses are usually the most common moss, but peat-mosses or yellow star-moss may dominate at some sites.

![Map of Buckbean - Slender Sedge](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBSdk/Wf06</td>
<td>Quesnel</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

228.2 MANAGEMENT DIRECTION

Management direction for the a buckbean – slender sedge ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

228.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

There are no forest management issues for the buckbean – slender sedge ecological community – the habitat will not be affected by forest operations.
Species of Management Concern BCTS Cariboo Region

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk Ranking = A × (B + C)</td>
<td>Planning Area Layout</td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
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<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

228.4 **Management Strategy**

None required.

228.5 **References and Additional Information**


229. COMMON CATTAIL MARSH

229.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The common cattail Marsh (*Typha latifolia Marsh*) ecological community is common throughout much of BC, but is uncommon within the IDFdk3 on level to gently rolling landscapes on the plateau. It occurs most commonly in protected lake embayments and potholes, and even roadside ditches, where the surface substrate remains saturated for most of the growing season. There is often an organic veneer of well-decomposed, odiferous muck. Spring water depth can be up to 1m, but recedes in late summer, sometimes to the surface. **Common cattail forms a continuous stand.** Occasionally there is significant cover of hard-stemmed bulrush and beaked sedge.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFdk3/Wm05</td>
<td>Central Cariboo Quesnel</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

229.2 MANAGEMENT DIRECTION

Management direction for the common cattail Marsh ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

229.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the common cattail Marsh ecological community through road construction, especially stream crossings.
229.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of common cattail Marsh ecological community.

**Overall Objective**

Retain 70% of occurrences of this blue-listed community in climax condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because even when Terrestrial Ecosystem Mapping has been done, classification of wetlands and other non-forested habitats was incomplete. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this community are:

- In the IDFdk3 minimize impacts of road construction on the community by locating roads well back from the edge of the water feature, and where feasible locate non-bridge stream crossings at another site.

**Landscape Level**

- The probability of interaction with this community is sufficiently low that the objective can be met without further measures.

229.5 REFERENCES AND ADDITIONAL INFORMATION


230. COMMON SPIKE-RUSH

230.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The common spike-rush (*Eleocharis palustris* Herbaceous Vegetation) ecological community is a widely distributed and common marsh in the interior, but is uncommon in the BGxw2, IDFxm and SBSdk. It occurs along lakeshores, larger potholes, oxbows and slow-moving rivers where there is weak water-flow or wave action. Areas are shallowly flooded in the spring, but in some locations may drop to the surface later in the summer. Plant diversity is low, with common spike-rush dominates and is often the only emergent species with significant cover; submerged and floating aquatics may be common. This community occurs in more BGC units than listed by the CDC; two have been added to the table and map below based on information from Ray Coupé (pers. comm.).

![Map of BGC units](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGxw2/Wm04; IDFdk3/Wm04;</td>
<td>Central Cariboo</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
<tr>
<td>IDFdk4/Wm04; IDFxm/Wm04;</td>
<td>Quesnel; Chilcotin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SBPSxc/Wm04; SBSdk/Wm04</td>
<td>Central Cariboo</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

230.2 MANAGEMENT DIRECTION

Management direction for the common spike-rush ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

230.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

There are no forest management issues for the common spike-rush ecological community – the habitat will not be affected by forest operations.
### 230.4 MANAGEMENT STRATEGY

None required.

### 230.5 REFERENCES AND ADDITIONAL INFORMATION

231. FEW-FLOWERED SPIKE-RUSH / HOOK-MOSSES

231.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The few-flowered spike-rush / hook-mosses (Eleocharis quinqueflora / Drepanoclados spp.) ecological community occurs on small sloping peatlands at mid- to high elevations, in slope positions with continual slow surface seepage. Plant diversity is low; few-flowered spike-rush is dominant, with lesser amounts of shore sedge, narrow-leaved cotton-grass, and other species sometimes present. Various hook-mosses dominate the moss layer, but other brown mosses can also be common. Peat forms as a characteristically dense and tenacious mesic peat. Peat depths are frequently shallow, but can be up to 2 m. Terric Mesisols and Humisols are common soil types.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSFxv1/Wf09; MSxv/Wf09; SBPSxc/Wf09; SBSmc2/Wf09</td>
<td>Central Cariboo Quesnel; Chilcotin</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

231.2 MANAGEMENT DIRECTION

Management direction for the few-flowered spike-rush / hook-mosses ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

231.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the few-flowered spike-rush / hook-mosses ecological community, through harvesting and road construction. Windthrow into the edges of the wetland may alter the ecological community. Changes in water table and road ditches causing water diversion into or out of the wetland may change the hydrology of the community. Sediment from ditch water, especially likely if the wetland is small enough to not have a mandatory riparian management requirement, may change the substrate characteristics and water quality. Roads may be constructed through sites with shallower peat depth.
231.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of few-flowered spike-rush / hook-mosses ecological community.

Overall Objective

Retain 100% of occurrences of this red-listed community in climax condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

Stand Level

Strategies to address known occurrences of this community are:
- Maintain the ecological community in a natural state (i.e., same species composition, physical structure, tree composition and density of adjacent forest, and ecological processes).
  - do not build roads adjacent to an occurrence.
- Maintain the natural hydrological regime.
- Prevent physical disturbance.
- Prevent water and sediment inputs from ditches.

Landscape Level

Strategies to address unrecorded occurrences of this community are:
- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

231.5 REFERENCES AND ADDITIONAL INFORMATION

232. HARD-STEMMED BULRUSH DEEP MARSH

232.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The hard-stemmed bulrush Deep Marsh (Schoenoplectus acutus Deep Marsh) ecological community is widespread in subzones with warm and dry summers; but it is uncommon in the IDFdk3 and SBPSdc/mc/xc. This community occurs in more BGC units than listed by the CDC or mapped below (Ray Coupé, pers. comm.). It occurs on wave-exposed lake embayments with significant water movement, or grassland potholes with occasional substrate exposure. Soils are mineral and high in nutrients. In pothole sites the marshes may flood to 1.5 m in spring, and then drop to the soil surface later in summer. Abundant soil aeration and limited organic accumulation is characteristic. Hard-stemmed bulrush is always dominant; duckweed, floating liverwort and northern spiked water-milfoil may be present.

![Map of BGC Unit](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFdk3/W14; SBPSdc/W15; SBPScmc/W15; SBPSxc/W15 [W15 = Wm06 of Wetlands of BC]</td>
<td>Central Cariboo Quesnel; Chilcotin</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

232.2 MANAGEMENT DIRECTION

Management direction for the hard-stemmed bulrush Deep Marsh ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

232.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

There are no forest management issues for the common spike-rush ecological community – the habitat will not be affected by forest operations.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
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### Relative Risk of Activities

<table>
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<th>Silviculture</th>
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<tbody>
<tr>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
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<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

232.4 **Management Strategy**

None required.

232.5 **References and Additional Information**


233. HUDSON BAY CLUBRUSH / RUSTY HOOK-MOSS

233.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Hudson Bay clubrush / rusty hook-moss (Trichophorum alpinum / Scopodium revolvens) ecological community occurs where the watertable is relatively stagnant and at or slightly above the peat surface for much of the growing season, commonly around small peatland lakes and ponds. It also occurs in elongated wet depressions (flarks) in patterned peatlands, with the long axis in the direction of waterflow. Many sites are underlain by calcareous marl, and the peat water is usually neutral to alkaline. Hudson Bay clubrush dominates, but there is usually a diversity of other peatland species such as bog-rosemary, water sedge, creeping sedge, slender sedge, mud sedge, great sundew, buckbean, small cranberry and sticky tofieldia. The moss layer is dominated by brown mosses and various alkaline-associated species, including straw-like feather moss, yellow-starry feather moss, Scopodium mosses, sphagnum mosses and tomentypnum moss.

233.2 MANAGEMENT DIRECTION

Management direction for the Hudson Bay clubrush / rusty hook-moss ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

233.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management does not affect the Hudson Bay clubrush / rusty hook-moss ecological community, the habitat will not be affected.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Construction</td>
<td>Bridge Installation</td>
<td>Falling</td>
<td>Bridge Removal</td>
</tr>
<tr>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
<td>Yarding</td>
<td>Road Maintenance</td>
</tr>
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<td>Road Construction</td>
<td>Road Deactivation</td>
<td>Forwarding</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Road Construction</td>
<td>Bridge Installation</td>
<td>Loading</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Road Construction</td>
<td>Road Deactivation</td>
<td>Processing</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Road Construction</td>
<td>Road Deactivation</td>
<td>Handling</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Road Construction</td>
<td>Road Deactivation</td>
<td>Site Preparation</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Road Construction</td>
<td>Road Deactivation</td>
<td>Planning</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Road Construction</td>
<td>Road Deactivation</td>
<td>Vegetation Management</td>
<td>Road Deactivation</td>
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<tr>
<td>Road Construction</td>
<td>Road Deactivation</td>
<td>Density Management</td>
<td>Road Deactivation</td>
</tr>
</tbody>
</table>

### 233.4 MANAGEMENT STRATEGY

None required.

### 233.5 REFERENCES AND ADDITIONAL INFORMATION

234. LABRADOR TEA / PEAT-MOSSES

234.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Labrador tea / peat-mosses (*Ledum groenlandicum / Sphagnum spp.*) ecological community occurs on the leeward side of mountain ranges in areas where the rainshadow effect is most pronounced. It is a sphagnum bog with abundant cover of Labrador tea and various amounts of other ericaceous shrubs, sedges and scattered spruce trees.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBPSx/W9 [no equivalent in Wetlands of BC]</td>
<td>Central Cariboo Quesnel; Chilcotin</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

234.2 MANAGEMENT DIRECTION

Management direction for the Labrador tea / peat-mosses ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

234.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

There are no forest management issues for Labrador tea / peat-mosses ecological community; the habitat will not be affected.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Risk Ranking</th>
<th>A = Probability of Interaction</th>
<th>B = Legal Consequence of Interaction</th>
<th>C = Biological Consequence of Interaction</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1</td>
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<tr>
<td>2</td>
<td>0</td>
<td>0</td>
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</tr>
</tbody>
</table>

### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning Area Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Road Layout</td>
<td>Road Bridge Installation</td>
<td>Bridge Removal</td>
<td>Bridge Sinking</td>
</tr>
<tr>
<td>Road Construction</td>
<td>Road Falling</td>
<td>Yarding</td>
<td>Forwarding</td>
</tr>
<tr>
<td>Road Maintenance</td>
<td>Road Loading</td>
<td>Processing</td>
<td>Handling</td>
</tr>
<tr>
<td>Road Deactivation</td>
<td>Road Site Preparation</td>
<td>Planning</td>
<td>Vegetation Management</td>
</tr>
<tr>
<td>Road Bridge Installation</td>
<td>Bridge Processing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bridge Removal</td>
<td>Bridge Handling</td>
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</tr>
<tr>
<td>Bridge Sinking</td>
<td>Bridge Site Preparation</td>
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<tr>
<td>Bridge Installation</td>
<td>Bridge Planning</td>
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<tr>
<td>Bridge Removal</td>
<td>Bridge Vegetation Management</td>
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<tr>
<td>Bridge Sinking</td>
<td>Bridge Density Management</td>
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<td>Bridge Installation</td>
<td>Bridge Silviculture</td>
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<td>Bridge Removal</td>
<td>Bridge Site Preparation</td>
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<td>Bridge Sinking</td>
<td>Bridge Planning</td>
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<td>Bridge Site Preparation</td>
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<tr>
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<tr>
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<td>Bridge Planning</td>
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<td>Bridge Removal</td>
<td>Bridge Vegetation Management</td>
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<tr>
<td>Bridge Sinking</td>
<td>Bridge Density Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bridge Installation</td>
<td>Bridge Silviculture</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 234.4 MANAGEMENT STRATEGY

None required.

#### 234.5 REFERENCES AND ADDITIONAL INFORMATION

235. LODGEPOLE PINE / FEW-FLOWERED SEDGE / PEAT-MOSSES

235.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The lodgepole pine / few-flowered sedge / peat-mosses (Pinus contorta / Carex pauciflora / Sphagnum spp.) ecological community is a peat bog occurring in small stands in frost-prone basins or on gradual slopes. Surfaces are usually saturated from seepage and soils are wet and nutrient poor. Lodgepole pine is always present as a sparse stand of small, well formed trees that are not rooted on raised microsites. The shrub layer is mostly stunted conifers. Few-flowered sedge dominates the herb layer, but there are many other herbs and bog dwarf shrubs. The moss layer is usually a continuous layer of poor fen peat-moss. The wetland surface is smooth and saturated at the surface.

235.2 MANAGEMENT DIRECTION

Management direction for the lodgepole pine / few-flowered sedge / peat-mosses ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

235.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management issues for lodgepole pine / few-flowered sedge / peat-mosses ecological community are harvesting of the climax community. Secondary risks are alteration of the soil characteristics, drainage, early or mid-seral communities, and/or successional pattern through road construction, site preparation, silviculture, or harvesting.
235.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of lodgepole pine / few-flowered sedge / peat-mosses ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed community in climax condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

- This forested wetland type is unlikely to be proposed for harvesting due to it being a wetland, as well as the trees being low density and small diameter. These sites could only be harvested from off site or by driving the frost into them in winter; they have extremely low productivity and are very difficult to regenerate.

This objective cannot be fully monitored, because even when Terrestrial Ecosystem Mapping has been done, classification of wetlands and other non-forested habitats was incomplete. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- Maintain the ecological community in a natural state (i.e., same species composition, physical structure, tree composition and density of adjacent forest, and ecological processes).
  - do not build roads adjacent to an occurrence.
  - do not harvest within the community.
- Maintain the natural hydrological regime.
- Prevent physical disturbance.
- Minimize water and sediment inputs from ditches.

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the
community can be tracked.

235.5 REFERENCES AND ADDITIONAL INFORMATION

236. LODGEPOLE PINE / WATER SEDGE / PEAT-MOSSES

236.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The lodgepole pine / water sedge / peat-mosses (Pinus contorta / Carex aquatilis / Sphagnum spp.) ecological community is a peat bog or poor fen. It occurs in closed basins or in peripheral areas of larger peatlands where there is some groundwater influence. Lodgepole pine, hybrid white spruce, and balsam fir are all common tree species. Labrador tea and scrub birch are generally abundant shrubs. Water sedge is abundant, with various other bog-affiliated species on hummocks. Sphagnum mosses such as poor-fen peat-moss and common red peat-moss form a nearly continuous layer. A similar, but common, wetland type is the black spruce / water sedge / peat-moss ecological community, in which the dominant tree is black spruce rather than lodgepole pine.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICHmk3/08; ICHmk3/Wb07; ICHwk2/09; ICHwk2/Wb07; MSxk3/10; MSxk3/Wb07</td>
<td>Central Cariboo; Quesnel</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

236.2 MANAGEMENT DIRECTION

Management direction for the lodgepole pine / water sedge / peat-mosses ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

236.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management issues for lodgepole pine / water sedge / peat-mosses ecological community are harvesting of the climax community. Secondary risks are alteration of the soil characteristics, drainage, early or mid-seral communities, and/or successional pattern through road construction, site preparation, silviculture, or harvesting. This forested wetland type is unlikely to be proposed for harvesting due to it being a wetland, as well as the trees being low density and small diameter.
### 236.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of lodgepole pine / water sedge / peat-mosses ecological community.

#### Overall Objective

Retain 70% of occurrences of this blue-listed community in climax condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because even when Terrestrial Ecosystem Mapping has been done, classification of wetlands and other non-forested habitats was incomplete. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

#### Stand Level

Strategies to address known occurrences of this community are:

- Maintain the ecological community in a natural state (i.e., same species composition, physical structure, tree composition and density of adjacent forest, and ecological processes).
  - do not build roads adjacent to an occurrence.
  - do not harvest within the community.
- Maintain the natural hydrological regime.
- Prevent physical disturbance.
- Minimize water and sediment inputs from ditches.

#### Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.
236.5 REFERENCES AND ADDITIONAL INFORMATION

237. **MACCALLA'S WILLOW / BEAKED SEDGE**

237.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The MacCalla's willow / beaked sedge (*Salix maccalliana / Carex utriculata*) ecological community is a swamp/fen that occurs in basins, hollows and streamside areas that become shallowly flooded in the early season by slow flowing waters. Soils are variable, from deep mesic peat to thin layers of humic muck; medium in nutrients and wet to very wet in moisture. It occurs in the IDFdk3 and IDFdk4 in gentle rolling landscapes and large river valleys, in the SBPSSmk on rolling terrain, and in the SBPSxc on leeward slopes in areas where the rainshadow is most pronounced. It is dominated by a tall stand of **MacCalla's willow with beaked sedge and water sedge dominating the understorey**. A diversity of species may occur due to a complex microtopography; the willow roots on elevated hummocks, and the sedges in hollows with standing water. The moss layer is moderately developed. Other shrubs include scrub birch and grey-leaved willow; bluejoint reedgrass may be present, and mosses include ribbed bog moss, hook-mosses and leafy mosses.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFdk3/Ws05; IDFdk4/Ws05; SBPSSmk/Ws05; SBPSxc/Ws05; SBSdk/Ws05</td>
<td>Central Cariboo; Quesnel; Chilcotin</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

237.2 **MANAGEMENT DIRECTION**

Management direction for the MacCalla's willow / beaked sedge ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

237.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

Forest management affects the MacCalla's willow / beaked sedge ecological community, through road construction especially stream crossings.
Species of Management Concern BCTS Cariboo Region

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Layout</td>
<td>Road Construction</td>
</tr>
<tr>
<td>Risk Ranking = A*(B+C)</td>
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</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

**237.4 MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of MacCalla's willow / beaked sedge ecological community.

**Overall Objective**

Retain 70% of occurrences of this blue-listed community in climax condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because even when Terrestrial Ecosystem Mapping has been done, classification of wetlands and other non-forested habitats was incomplete. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this community are:

- Maintain the ecological community in a natural state (i.e., same species composition, physical structure, tree composition and density of adjacent forest, and ecological processes).
  - do not build roads in or adjacent to an occurrence.
- Maintain the natural hydrological regime.
- Prevent physical disturbance.
- Minimize water and sediment inputs from ditches.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.
237.5 REFERENCES AND ADDITIONAL INFORMATION


238. **NARROW-LEAVED COTTON-GRASS – SHORE SEDGE**

238.1 **SPECIES SUMMARY: IDENTIFICATION AND HABITAT**

The narrow-leaved cotton-grass – shore sedge (*Eriophorum angustifolium* – *Carex limosa*) ecological community occurs in depressions or gradual seepage slopes where standing water persists for most of the growing season. It is **dominated by narrow-leaved cotton-grass and usually shore sedge**; sometimes poor sedge is present instead of shore sedge. Grasses such as bluejoint and mountain hairgrass, and the forb white mountain marsh-marigold, are commonly abundant. The moss layer is diverse and well developed. Soils are deep peat deposits of fibric or mesic cotton-grass remains. Typic Mesisols and Fibrisols are common soil types.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
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<tr>
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<td>Central Cariboo</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chilcotin</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

238.2 **MANAGEMENT DIRECTION**

Management direction for the narrow-leaved cotton-grass - shore sedge ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

238.3 **FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT**

There are no forest management issues for narrow-leaved cotton-grass – shore sedge ecological community; the potential locations are right on the CCBA boundary in subalpine areas where timber harvesting is very unlikely.
### Total Risk Ranking

- **Risk Ranking** = \( A \times (B + C) \)
- **A** = Probability of Interaction
- **B** = Legal Consequence of Interaction
- **C** = Biological Consequence of Interaction

<table>
<thead>
<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Bridge Installation</td>
</tr>
<tr>
<td>Harvest Area Layout</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
<td>Yarding</td>
</tr>
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<td>Bridge Installation</td>
<td>Bridge Deactivation</td>
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</tr>
<tr>
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<td>Bridge Removal</td>
<td>Forwarding</td>
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<tr>
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<td>Road Deactivation</td>
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<td>Bridge Installation</td>
<td>Bridge Installation</td>
<td>Bridge Installation</td>
<td>Site Preparation</td>
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</tr>
<tr>
<td>Bridge Installation</td>
<td>Bridge Installation</td>
<td>Bridge Deactivation</td>
<td>Density Management</td>
</tr>
</tbody>
</table>

### 238.4 MANAGEMENT STRATEGY

None required.

### 238.5 REFERENCES AND ADDITIONAL INFORMATION

239. NORTHERN MANNAGRASS FEN

239.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The northern mannagrass Fen (*Glyceria borealis* Fen) ecological community occurs in shallow standing water at the margins of lakes, ponds, and slow-moving streams. The soil may be fine-textured mineral soils or well humified organic deposits. It is consists of a nearly continuous cover of northern mannagrass, sometimes mixed with spike-rush or swamp horsetail. Water starwort and pondweed are frequently present. Common hookmoss may be present.

![Map of Northern Mannagrass Fen]

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<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSxv; SBPSx [= W10 in Roberts (1984); no code on p.117 of Wetlands of BC]</td>
<td>Central Cariboo; Quesnel; Chilcotin</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

239.2 MANAGEMENT DIRECTION

Management direction for the northern mannagrass Fen ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

239.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the northern mannagrass Fen ecological community, through road construction including stream crossings.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Layout</td>
<td>Road Construction</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### Relative Risk of Activities

239.4 **Management Strategy**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of northern manna grass Fen ecological community.

**Overall Objective**

Retain 70% of occurrences of this blue-listed community in climax condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because even when Terrestrial Ecosystem Mapping has been done, classification of wetlands and other non-forested habitats was incomplete. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this community are:

- Maintain the ecological community in a natural state (i.e., same species composition, physical structure, tree composition and density of adjacent forest, and ecological processes).
  - do not build roads in or adjacent to an occurrence.
- Maintain the natural hydrological regime.
- Prevent physical disturbance.
- Minimize water and sediment inputs from ditches.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.
239.5 REFERENCES AND ADDITIONAL INFORMATION


240. NUTTALL'S ALKALIGRASS – FOXTAIL BARLEY

240.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Nuttall's alkaligrass – foxtail barley (*Puccinellia nuttalliana* – *Hordeum jubatum*) ecological community is a meadow type transitional between wetland and terrestrial habitats. It occurs in the seasonally flooded riparian zone of alkaline small potholes and shallow lakes. Brief flooding in the spring is followed by merely moist conditions in the summer. Soils are moist to very moist. There is a high overall cover of grasses; Nuttall's alkaligrass is dominant, foxtail barley is usually scattered throughout but may become dominant in disturbed soil sites. Trees, shrubs and mosses are absent. Soils are often fine textured, alkali or saline-alkali Gleysols or Solonetzs on poorly to imperfectly drained materials.

### BGC Unit

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFdk3/Gs02; IDFdk4/Gs02; IDFdw/Gs02; MSc2/Gs02; MSdv/Gs02; MSxv/Gs02; SBPSdc/Gs02; SBPSxc/Gs02</td>
<td>Central Cariboo Quesnel; Chilcotin</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

240.2 MANAGEMENT DIRECTION

Management direction for the Nuttall's alkaligrass – foxtail barley ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

240.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the Nuttall's alkaligrass – foxtail barley ecological community, through road construction.
### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking</td>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
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</tr>
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</tr>
</tbody>
</table>

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### 240.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Nuttall's alkaligrass – foxtail barley ecological community. 61

#### Overall Objective

Retain 100% of occurrences of this red-listed community in climax condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

#### Stand Level

Strategies to address known occurrences of this community are:

- Avoid all road construction or harvesting disturbance to the site plus a 50 m wide buffer surrounding it.
- Maintain the natural hydrological regime.
- Prevent physical disturbance.
- Prevent water and sediment inputs from ditches.

#### Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

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61 Based on the IWMS account for the Vasey’s big sagebrush / pinegrass ecological community.
240.5 REFERENCES AND ADDITIONAL INFORMATION


241. SCHEUCHZERIA / PEAT-MOSSES

241.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The scheuchzeria / peat-mosses (*Scheuchzeria palustris / Sphagnum spp.*) ecological community is an uncommon bog in sub-boreal and boreal forests below 1000 m. It usually occurs as small inclusions in larger peatlands on floating mats with continually saturated peat and restricted water movements. Vegetation is characterized by species tolerant of permanent saturation but intolerant of deep flooding. *Scheuchzeria* is always prominent, and shore sedge usually occurs. *Sphagnum* ‘Group 1’ peat-moss species are dominant mosses. Dwarf shrubs are frequent – bog-rosemary, western bog-laurel, bog cranberry, and sometimes low bog willow. Soils are mostly fibric peat-moss peat, and can be floating mats. The water table is at the surface but does not flood more than several cm above the soil surface. The water is very stagnant and low in dissolved oxygen.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
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</thead>
<tbody>
<tr>
<td>ICHmk3/Wb12; SBSmc2/Wb12</td>
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<tr>
<td></td>
<td>Quesnel</td>
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</tbody>
</table>

241.2 MANAGEMENT DIRECTION

Management direction for the scheuchzeria / peat-mosses ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

241.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

There are no forest management affects on the scheuchzeria / peat-mosses ecological community; forest operations will not interact with the habitat.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Risk</th>
<th>A = Probability of Interaction</th>
<th>B = Legal Consequence</th>
<th>C = Biological Consequence</th>
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</tbody>
</table>

### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Planning</td>
<td>Harvesting</td>
<td>Silviculture</td>
</tr>
<tr>
<td>Harvest Area Layout</td>
<td>Harvest Area Layout</td>
<td>Planning</td>
<td>Silviculture</td>
</tr>
<tr>
<td>Road Layout</td>
<td>Road Layout</td>
<td>Harvesting</td>
<td>Silviculture</td>
</tr>
<tr>
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<td>Harvesting</td>
<td>Silviculture</td>
</tr>
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<td>Road Maintenance</td>
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<td>Silviculture</td>
</tr>
<tr>
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<td>Silviculture</td>
</tr>
<tr>
<td>Bridge Installation</td>
<td>Bridge Installation</td>
<td>Harvesting</td>
<td>Silviculture</td>
</tr>
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<td>Bridge Removal</td>
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<td>Silviculture</td>
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<td>Silviculture</td>
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</tr>
<tr>
<td>Processing</td>
<td>Processing</td>
<td>Harvesting</td>
<td>Silviculture</td>
</tr>
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<td>Handling</td>
<td>Harvesting</td>
<td>Silviculture</td>
</tr>
<tr>
<td>Site Preparation</td>
<td>Site Preparation</td>
<td>Harvesting</td>
<td>Silviculture</td>
</tr>
<tr>
<td>Planning</td>
<td>Planning</td>
<td>Harvesting</td>
<td>Silviculture</td>
</tr>
<tr>
<td>Vegetation Management</td>
<td>Vegetation Management</td>
<td>Harvesting</td>
<td>Silviculture</td>
</tr>
<tr>
<td>Density Management</td>
<td>Density Management</td>
<td>Harvesting</td>
<td>Silviculture</td>
</tr>
</tbody>
</table>

241.4 **Management Strategy**

None required.

241.5 **References and Additional Information**

242. SCRUB BIRCH / SEDGES / PEAT-MOSSES

242.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The scrub birch / sedges / peat-mosses (Betula nana / Carex spp. / Sphagnum spp.) ecological community is a fen or bog that occurs on gently rolling terrain and plateaus, with cold-air ponding or drainage. Soil is organic and texture is humic; very poor to rich in nutrients. Seepage is commonly present above 20cm. There is sparse (< 5%) lodgepole pine cover. Shrub cover is low to moderate, consisting of scrub birch, black twinberry, willows, and Labrador tea. Herb cover is high, including sedges, common horsetail, arrow-leaved groundsel, creeping snowberry, pink wintergreen and twinflower. The moss layer is well developed, dominated by sphagnum mosses, red-stemmed feathermoss and glow moss.

242.2 MANAGEMENT DIRECTION

Management direction for the scrub birch / sedges / peat-mosses ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

242.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the scrub birch / sedges / peat-mosses ecological community, through road construction. Changes in water table and road ditches causing water diversion into or out of the wetland may change the hydrology of the community. Sediment from ditch water, especially likely if the wetland is small enough to not have a mandatory riparian management requirement, may change the substrate characteristics and water quality. Up-slope road construction may alter water inflow resulting from up-slope hydrology.
242.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of scrub birch / sedges / peat-mosses ecological community.

Overall Objective

Retain 100% of occurrences of this red-listed community in climax condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

Stand Level

Strategies to address known occurrences of this community are:
- Maintain the ecological community in a natural state (i.e., same species composition, physical structure, tree composition and density of adjacent forest, and ecological processes).
- Maintain the natural hydrological regime.
- Prevent water and sediment inputs from ditches.

Landscape Level

Strategies to address unrecorded occurrences of this community are:
- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the 'Stand Level' section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

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62 Based on the IWMS account for the hybrid white spruce / ostrich fern ecological community.
242.5 REFERENCES AND ADDITIONAL INFORMATION

http://www.env.gov.bc.ca/wld/frpa/lwms/documents/Plant%20Communities/pc_hybridwhitespruceostrichfern.pdf


http://www.for.gov.bc.ca/hfd/pubs/docs/Lmh/Lmh51.pdf
243. SEASIDE ARROW-GRASS MARSH

243.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The seaside arrow-grass Marsh (*Triglochin maritima Marsh*) ecological community is usually small and occurs most commonly around alkaline potholes. Soils are generally alkaline (> 8.5 pH) and may also be saline. Sites are seasonally inundated, with standing water sometimes persisting well into the summer. Soils are fine-textured Gleysols with thin, well-humified organic layers, with poor drainage. Occurs in small patches on the edge of wetlands, often between open water or cattail marsh and drier shrub communities at the periphery of wetlands. Frequently seaside arrow-grass is the only plant present, but bladderwort and mares-tail may also occur.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFdk3; MSxv; SBPSxc [W12 of Steen and Roberts (1988); no code p. 118 in Wetlands of BC]</td>
<td>Central Cariboo</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

243.2 MANAGEMENT DIRECTION

Management direction for the seaside arrow-grass Marsh ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

243.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations affects the seaside arrow-grass Marsh through road construction.
### 243.4 Management Strategy

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of seaside arrow-grass Marsh ecological community.

**Overall Objective**

Retain 100% of occurrences of this red-listed community in climax condition. Each loss of part or all of an occurrence of this community will significantly worsen the conservation status.

**Stand Level**

Strategies to address known occurrences of this community are:

- Avoid all road construction or harvesting disturbance to the site plus a 50 m wide buffer.
- Prevent physical disturbance.
- Prevent water and sediment inputs from ditches.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

### 243.5 References and Additional Information


244. SHORE SEDGE – BUCKBEAN / HOOK-MOSSES

244.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The shore sedge – buckbean / hook-mosses (Carex limosa – Menyanthes trifoliata / Drepanocladus spp.) ecological community is a sedge dominated fen occurring on pond-side floating mats or in elongated wet depressions (flarks) in patterned peatlands where prolonged shallow flooding is no more than several centimetres. Peat deposits are shallow (0.5 m) to very deep (> 6 m), fibric or mesic, and derived from fine sedges and brown mosses. Fibrisols are the most common soil type. Shore sedge rooted in shallow water is always dominant; buckbean is usually present but may be very sparse or absent. A diversity of species tolerant of permanent saturation commonly occur with low cover – such as cordroot sedge, swamp horsetail, and bog-rosemary.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSFwc3/Wf08</td>
<td>Central Cariboo</td>
<td>S3</td>
<td>Blue</td>
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<td>ESSFxv1/Wf08</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSxv/Wf08</td>
<td>Chilcotin</td>
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<td>SBPSdc/Wf08</td>
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<td>SBSwk1/Wf08</td>
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</table>

244.2 MANAGEMENT DIRECTION

Management direction for the shore sedge – buckbean / hook-mosses ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

244.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not affect the shore sedge - buckbean / hook-mosses ecological community. There are no trees to harvest, hydrology is not likely to be significantly affected by adjacent harvesting, and roads will not be built through the ecological community.
## Total Risk Ranking

<table>
<thead>
<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>A = Probability of Interaction</td>
<td>B = Legal Consequence of Interaction</td>
<td>C = Biological Consequence of Interaction</td>
</tr>
<tr>
<td>0</td>
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</tbody>
</table>

### 244.4 MANAGEMENT STRATEGY

None required.

### 244.5 REFERENCES AND ADDITIONAL INFORMATION

245. SHORE SEDGE – BUCKBEAN / PEAT-MOSSES

245.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The shore sedge – buckbean / peat-mosses (Carex limosa – Menyanthes trifoliata / Sphagnum spp.) ecological community occurs as a component of larger acidic peatlands, occupying the central, wettest portions of a peatland as either grounded, highly saturated peat blankets or as floating mats. Species tolerant of acidic, continually saturated conditions and lack of oxygen are prominent, such as shore sedge, great sundew, buckbean, western bog-laurel – all of which can be abundant, sparse or absent. Poor-fen peat-moss, Megallanic peat-moss, or common brown peat-moss often form a continuous lawn, or there may be a mix of species in hummock-hollow patterns. Soils are deep sedge-derived Mesisols with a surface tier of poorly decomposed peat-moss peat. The water table is typically at or near the surface but there is little standing water.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICHwk2/Wb13</td>
<td>Central Cariboo</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

245.2 MANAGEMENT DIRECTION

Management direction for the shore sedge – buckbean / peat-mosses ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

245.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not affect the shore sedge - buckbean / peat-mosses ecological community. There are no trees to harvest, hydrology is not likely to be significantly affected by adjacent harvesting, and roads will not be built through the ecological community.
## 245.4 MANAGEMENT STRATEGY

None required.

## 245.5 REFERENCES AND ADDITIONAL INFORMATION

246. SITKA WILLOW / SITKA SEDGE

246.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Sitka willow / Sitka sedge (*Salix sitchensis / Carex sitchensis*) ecological community is a swamp that occurs usually associated with fluvial sites adjacent to flowing streams, subject to flooding and sedimentation, or linked basins, and have prolonged saturation and brief early-season flooding. Sitka willow dominates, with the herb layer dominated by Sitka sedge and common horsetail. Other large sedges and forbs are also common. On shaded sites small-flowered bulrush may replace the Sitka sedge. There is little moss. Glysols from fluvial materials are the most common soil type; sedge peat layered with fluvial deposits occurs on some sites.

![Map of Sitka Willow / Sitka Sedge Distribution](image)

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBSwk1/Ws06</td>
<td>Central Quesnel</td>
<td>CaribooS3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

246.2 MANAGEMENT DIRECTION

Management direction for the Sitka willow / Sitka sedge ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

246.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management issues for the Sitka willow / Sitka sedge ecological community are impacts from road construction, primarily crossing sites.
246.4 **MANAGEMENT STRATEGY**

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of Sitka willow / Sitka sedge ecological community.

**Overall Objective**

Retain 70% of occurrences of this blue-listed community in climax condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because even when Terrestrial Ecosystem Mapping has been done, classification of wetlands and other non-forested habitats was incomplete. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this community are:
- Maintain the ecological community in a natural state (i.e., same species composition, physical structure, tree composition and density of adjacent forest, and ecological processes).
  - do not build roads in or adjacent to an occurrence.
- Maintain the natural hydrological regime.
- Prevent physical disturbance.
- Minimize water and sediment inputs from ditches.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:
- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.
246.5 REFERENCES AND ADDITIONAL INFORMATION

247. SLENDER SEDGE / COMMON HOOK-MOSS

247.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The slender sedge / common hook-moss (Carex lasiocarpa / Drepanocladus aduncus) ecological community is a fen that occurs on peat flats around small lakes and ponds, or in infilled palustrine basins. Prolonged shallow surface flooding and continual surface peat saturation are typical. Slender sedge and common hook-moss are always dominant; other large water sedges, such as water sedge and beaked sedge, are common. There can be a very sparse shrub cover of bog willow, sage willow, or scrub birch. The moss layer is usually well developed, but occasionally absent. Hook-mosses usually dominate, with occasional inclusions of other brown mosses. Deep peat deposits are common but some sites may occur on thin organic veneers. Mesisols are most common soil type, but Humisols and Fibrisols also occur.

247.2 MANAGEMENT DIRECTION

Management direction for the slender sedge / common hook-moss ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

247.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not affect the slender sedge / common hook-moss ecological community. There are no trees to harvest, hydrology is not likely to be strongly affected by adjacent harvesting, and roads are not likely to be built through the ecological community.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>A = Probability of Interaction</th>
<th>B = Legal Consequence of Interaction</th>
<th>C = Biological Consequence of Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Harvest Area Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Road Layout</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Road Construction</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Road Maintenance</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Road Deactivation</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Bridge Installation</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Bridge Removal</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Falling</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Yarding</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Skidding</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Forwarding</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Loading</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Processing</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Handling</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Site Preparation</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Planning</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Vegetation Management</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
<tr>
<td>Density Management</td>
<td>Road Construction</td>
<td>Road Maintenance</td>
<td>Road Deactivation</td>
</tr>
</tbody>
</table>

### 247.4 MANAGEMENT STRATEGY

None required.

### 247.5 REFERENCES AND ADDITIONAL INFORMATION


248. **SWAMP HORSETAIL – BEAKED SEDGE**

### 248.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The swamp horsetail – beaked sedge (*Equisetum fluviatile* – *Carex utriculata*) ecological community is a marsh occurring in back-levee depressions along sediment-laden, low gradient streams, protected bays of large lakes or flooded fens. Soils are silty or fine-sandy and rich to very rich in nutrients. It is dominated by swamp horsetail, with beaked sedge sometimes co-dominating. There are often scattered aquatics such as pondweeds and water-milfoils. It may be found in other BEC subzones in the CCBA.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSFmw/Wm02; ICHwk4/Wm02; MSdc2/Wm02; Central Cariboo</td>
<td>CaribooS3</td>
<td>Blue</td>
<td>Quesnel; Chilcotin</td>
<td></td>
</tr>
<tr>
<td>MSxk3/Wm02; MSxv/Wm02; SBPSdc/Wm02; SBSmk/Wm02; SBPSxc/Wm02; SBSdk/Wm02; SBSwk1/Wm02</td>
<td>Quesnel</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 248.2 MANAGEMENT DIRECTION

Management direction for the swamp horsetail – beaked sedge ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

### 248.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest operations will not affect the swamp horsetail – beaked sedge ecological community. There are no trees to harvest, hydrology is not likely to be strongly affected by adjacent harvesting, and roads are not likely to be built through the ecological community.
### 248.4 MANAGEMENT STRATEGY

None required.

### 248.5 REFERENCES AND ADDITIONAL INFORMATION

249. **TALL WILLOWS / SARTWELL'S SEDGE**

### 249.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The tall willows / Sartwell's sedge (*Salix* spp. / *Carex sartwellii*) ecological community is a fen that occurs along streams or rivers at level slope positions. Soils are variable in texture and very moist. It has tall willows on hummocks with depressed areas in between that support a high cover of sedges; grasses are commonly present. Willow species include grey-leaved willow, tea-leaved willow, Mackenzie's willow and MacCalla's willow; sedge species include beaked sedge, water sedge, Sartwell's sedge. Other herbs include pink wintergreen, small bedstraw, rush aster and fowl mannagrass. The moss layer is diverse and moderately well developed, and includes ribbed bog moss, hook-mosses and leafy mosses.

The tall willows / Sartwell's sedge (Salix spp. / Carex sartwellii) ecological community is a fen that occurs along streams or rivers at level slope positions. Soils are variable in texture and very moist. It has tall willows on hummocks with depressed areas in between that support a high cover of sedges; grasses are commonly present. Willow species include grey-leaved willow, tea-leaved willow, Mackenzie's willow and MacCalla's willow; sedge species include beaked sedge, water sedge, Sartwell's sedge. Other herbs include pink wintergreen, small bedstraw, rush aster and fowl mannagrass. The moss layer is diverse and moderately well developed, and includes ribbed bog moss, hook-mosses and leafy mosses.

### 249.2 MANAGEMENT DIRECTION

Management direction for the tall willows / Sartwell's sedge ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC *Biodiversity Guidebook* (1995) and the CCLUP *Biodiversity Conservation Strategy* (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

### 249.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the tall willows / Sartwell's sedge ecological community, through road construction, especially stream crossings.
### Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Layout</td>
<td>Road Construction</td>
</tr>
<tr>
<td>Risk Ranking = A * (B + C)</td>
<td>Planning</td>
<td>Harvest Area Layout</td>
<td>Road Layout</td>
<td>Road Construction</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

#### 249.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of tall willows / Sartwell's sedge ecological community.

**Overall Objective**

Retain 70% of occurrences of this blue-listed community in climax condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because even when Terrestrial Ecosystem Mapping has been done, classification of wetlands and other non-forested habitats was incomplete. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this community are:

- Maintain the ecological community in a natural state (i.e., same species composition, physical structure, and ecological processes).
  - do not build roads or stream crossing structures in or adjacent to an occurrence.
- Maintain the natural hydrological regime.
- Prevent physical disturbance.
- Minimize water and sediment inputs from ditches.

**Landscape Level**

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

#### 249.5 REFERENCES AND ADDITIONAL INFORMATION

http://www.for.gov.bc.ca/hfd/pubs/Docs/Mr/Lmr/Lmr055.pdf.
250. TUFTED CLUBRUSH / GOLDEN STAR-MOSS

250.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The tufted clubrush / golden star-moss (Trichophorum cespitosum / Campylium stellatum) ecological community occurs scattered throughout the Interior at middle to subalpine elevations, most commonly in regions underlain with base-rich parent materials. These fens occur on level and gently sloping groundwater-fed peatlands that are permanently saturated but rarely inundated. Sites have smooth, ribbed, or slightly hummocked topography and any depressions are water-filled. Tufted clubrush and star moss are always dominant and occur mainly on drier microsites; buckbean and calcium-crusted rusty hook-moss occur in very shallow pools. Most sites have a distinct and tenacious turfy peat. Deep peat is typical (to 5 m) but occasionally thin peat veneers occur. Fibrisols and Mesisols are typical soil types.

250.2 MANAGEMENT DIRECTION

Management direction for the tufted clubrush / golden star-moss ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

250.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management affects the tufted clubrush / golden star-moss ecological community through road construction.
### Total Risk Ranking

<table>
<thead>
<tr>
<th>Activity</th>
<th>Risk Ranking</th>
<th>Relative Risk of Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Probability of Interaction</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>B = Legal Consequence of Interaction</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>C = Biological Consequence of Interaction</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**250.4 MANAGEMENT STRATEGY**

The following forest management strategy is designed to address both stand level (recorded sites) and landscape level (unrecorded sites) management of the tufted clubrush / golden star-moss ecological community.

**Overall Objective**

Retain $\geq 70\%$ of the area of this blue-listed ecological community type in natural condition, at a landscape unit or large watershed level.

This objective cannot be fully monitored, because even when Terrestrial Ecosystem Mapping has been done, classification of wetlands and other non-forested habitats was incomplete. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

**Stand Level**

Strategies to address known occurrences of this community are:
- Maintain the ecological community in a natural state (i.e., same species composition, physical structure, tree composition and density of adjacent forest, and ecological processes).
  - If roads must be within the buffer, minimize the clearing width and amount of disturbed soil adjacent to the road surface. Avoid changing the subsurface or surface water flow patterns into or out of the community, and avoid sediment inputs from ditches. Where possible, rehabilitate and replant roads, landings and bladed trails.
  - Minimize introduction of alien plant species by only using quality seed mixes that have low occurrence of weed seeds, when revegetating disturbed soil areas in the buffer.
- Maintain the natural hydrological regime.
  - Locate harvesting, roads, landings, and bladed trails outside a 80 m buffer around an occurrence of the community (especially upslope, to maintain hydrology and minimize sediment inputs), where possible. Focus wildlife tree patches, old growth management areas, and any deferred harvest areas on forest adjacent to occurrences of the ecological community.
  - Alternatively a soil hydrologist or ecologist can develop a prescription to maintain the hydrological regime of the ecosystem.
- Prevent physical disturbance.
- Prevent water and sediment inputs from ditches.

**Landscape Level**

63 Based on the IWMS account for the hybrid white spruce / ostrich fern ecological community.
Species of Management Concern BCTS Cariboo Region

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 80 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

250.5 REFERENCES AND ADDITIONAL INFORMATION


251. TUFTED HAIRGRASS COMMUNITY

251.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The tufted hairgrass Community (Deschampsia cespitosa Community) ecological community occurs as tufted hairgrass dominated wet meadows forming extensive communities in frost-prone basins fed by seepage from the surrounding upland; sites are usually saturated to the surface in the early part of the growing season. Soils are fine textured and imperfectly drained. It is dominated by tufted hairgrass and can form nearly pure stands giving the site a tussocky appearance; beaked sedge can be prominent in wetter microsites.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFdk3/Gs04;</td>
<td>Central</td>
<td>CaribooS3</td>
<td>Blue</td>
<td></td>
</tr>
<tr>
<td>IDFdk4/Gs04;</td>
<td>Quesnel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDFdw/Gs04;</td>
<td>Chilcotin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSdc2/Gs04;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSpv/Gs04;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SBPSdc/Gs04;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SBPSxc/Gs04;</td>
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<tr>
<td>SBPSxc/W3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

251.2 MANAGEMENT DIRECTION

Management direction for the tufted hairgrass Community ecological community is from CCLUP direction to maintain species at risk and biodiversity in general. The FPC Biodiversity Guidebook (1995) and the CCLUP Biodiversity Conservation Strategy (1996; 2001a,b,c; 2002) emphasize conservation of rare plant communities through over-representation in no-harvest areas.

251.3 FOREST MANAGEMENT ISSUES AND RISK ASSESSMENT

Forest management issues for tufted hairgrass Community ecological community are limited to road construction, followed by weed invasion.
Species of Management Concern BCTS Cariboo Region

Relative Risk of Activities

<table>
<thead>
<tr>
<th>Total Risk Ranking</th>
<th>Planning &amp; Layout</th>
<th>Roads, Bridges and Culverts</th>
<th>Harvesting</th>
<th>Silviculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Ranking = A x (B + C)</td>
<td>Risk Ranking = A x (B + C)</td>
<td>Risk Ranking = A x (B + C)</td>
<td>Risk Ranking = A x (B + C)</td>
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</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

251.4 MANAGEMENT STRATEGY

The following forest management strategies address both stand level (known sites) and landscape level (unrecorded sites) management of tufted hairgrass Community ecological community.

Overall Objective

Retain 70% of occurrences of this blue-listed community in climax condition. Each loss of part or all of an occurrence of this community will incrementally worsen the conservation status.

This objective cannot be fully monitored, because even when Terrestrial Ecosystem Mapping has been done, classification of wetlands and other non-forested habitats was incomplete. Hence the objective is provided to indicate the general direction for management strategies, rather than for monitoring.

Stand Level

Strategies to address known occurrences of this community are:

- When road construction or harvesting is considered near a community occurrence, minimize disturbance to the site plus a 50 m width surrounding it.

Landscape Level

Strategies to address unrecorded occurrences of this community are:

- Map the known locations of this ecological community from the Terrestrial Ecosystem Maps and Predictive Ecosystem Maps to provide an approximation of part of the distribution within the CCBA.
- Within the area of potential occurrence of this community, determine whether the clearance boundary of a proposed road or harvest area is within 50 m of an occurrence of this community. If the ecological community is found, it should be managed as under the ‘Stand Level’ section.
- Provide the Conservation Data Centre (Victoria) with a map, photographs, description, and GPS coordinates for the location of the ecological community, so that the abundance and locations of the community can be tracked.

251.5 REFERENCES AND ADDITIONAL INFORMATION


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64 Based on the IWMS account for the Vasey's big sagebrush / pinegrass ecological community.


9. EXTRALIMITAL SPECIES AND ECOSYSTEMS

These species and ecosystems were listed by the Conservation Data Centre (CDC) as occurring in the Chilcotin, Central Cariboo and/or Quesnel Forest Districts. They actually do not occur in the CCBA, and hence are not considered in this report. The CDC has been notified of the errors, but the species and ecosystems have been retained in this section until they are no longer listed for the CCBA area.
252. AUTUMN MEADOWHAWK

252.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

Autumn Meadowhawk (*Sympetrum vicinum*) is a small dragonfly with, in males, a slender, bright red abdomen with only minimal black markings. The legs are yellow to reddish brown, and the forehead is red. Females and immature males have a light brown forehead, the thorax is yellow to grey, the legs yellowish, and the abdomen brown.

It lives in wetlands, ponds, slow streams and lakes with dense emergent vegetation. The adults rest on bushes, tall herbs and grasses. This species has the latest flight period of any species in North America. In British Columbia, it flies from late July to early November.

In BC it is uncommon on southern Vancouver Island and the South Coast, and is rare in the southern interior. The Conservation Data Centre incorrectly lists the species for the Chilcotin Forest District, based on an incorrect identification from near Chilanko Forks. The species does not actually occur there (Dr. R.A. Cannings, pers. comm.). The CDC has been sent a note with the correction.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilcotin</td>
<td>S3S4</td>
<td>Blue</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The species occurs only outside the CCBA; hence there is no further discussion.

253. FISCHER’S CHICKWEED

This species was listed by the CDC for the Central Cariboo Forest District. In response to an inquiry as part of this project, the specimen on which the record was based has been re-identified as Field Chickweed, and the listing of the Central Cariboo FD will be deleted by the CDC (Marta Donovan, CDC, pers. comm.).

The species occurs only outside the CCBA; hence there is no further discussion.
254. BLACK SPRUCE – LODGEPOLE PINE / KALMIAS / PEAT-MOSSES

254.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The black spruce – lodgepole pine / kalmias / peat-mosses (Picea mariana – Pinus contorta / Kalmia spp. / Sphagnum spp.) ecological community does not actually occur in the Quesnel FD. The ICHmm is in the Robson Valley, outside the forest district. The SBSvk occurs immediately adjacent to the forest district boundary in the extreme northeast corner of the district, northeast of Bowron Lake. The BGC unit boundary and the district boundary precisely coincide.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICHmm/07; SBSvk/08</td>
<td>Quesnel</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

The ecological community is outside the CCBA; hence there is no further discussion.

255. BLUEBUNCH WHEATGRASS – WESTERN PASQUEFLOWER

255.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The bluebunch wheatgrass – western pasqueflower (Pseudoroegneria spicata – Anemone occidentalis) ecological community does not occur in the CCBA. The northern boundary of the ESSFxc precisely coincides with the south boundary of Central Cariboo Forest District.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSFxc/03</td>
<td>Central Cariboo</td>
<td>S1</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

The ecological community is outside the CCBA; hence there is no further discussion.

256. DOUGLAS-FIR – PONDEROSA PINE / BLUEBUNCH WHEATGRASS

256.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Douglas-fir – ponderosa pine / bluebunch wheatgrass (Pseudotsuga menziesii - Pinus ponderosa / Pseudoroegneria spicata) ecological community does not occur in the CCBA. The IDFxh1 and IDFxh2 are far to the south. The northern boundary of the IDFxw precisely coincides with the south boundary of Central Cariboo Forest District.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFxh1/02; IDFxh2/02; IDFxh2/03; IDFxw/04</td>
<td>Central Cariboo</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

The ecological community is outside the CCBA; hence there is no further discussion.
257. **DOUGLAS-FIR – PONDEROSA PINE / BLUEBUNCH WHEATGRASS – PINEGRASS**

### 257.1 Species Summary: Identification and Habitat

The Douglas-fir – ponderosa pine / bluebunch wheatgrass – pinegrass (*Pseudotsuga menziesii* - *Pinus ponderosa* / *Pseudoroegneria spicata* - *Calamagrostis rubescens*) ecological community does not occur in the CCBA. The IDFdk2, IDFdm1, IDFxh1 and IDFxh2 are far to the south. The northern boundary of the IDFxw precisely coincides with the south boundary of Central Cariboo Forest District.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFdk2/02; IDFdm1/03; IDFxh1/03; IDFxh2/04; IDFxw/02</td>
<td>Central Cariboo</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

The ecological community is outside the CCBA; hence there is no further discussion.

258. **DOUGLAS-FIR / ROCKY MOUNTAIN JUNIPER / BLUEBUNCH WHEATGRASS**

### 258.1 Species Summary: Identification and Habitat

The Douglas-fir / Rocky Mountain juniper / bluebunch wheatgrass (*Pseudotsuga menziesii* / *Juniperus scopulorum* / *Pseudoroegneria spicata*) ecological community does not occur in the CCBA. The northern boundary of the IDFxw precisely coincides with the south boundary of Central Cariboo Forest District.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFxw/01</td>
<td>Central Cariboo</td>
<td>S2S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

The ecological community is outside the CCBA; hence there is no further discussion.

259. **DOUGLAS-FIR / WESTERN SNOWBERRY / BLUEBUNCH WHEATGRASS**

### 259.1 Species Summary: Identification and Habitat

The Douglas-fir / western snowberry / bluebunch wheatgrass (*Pseudotsuga menziesii* / *Symphoricarpos occidentalis* / *Pseudoroegneria spicata*) ecological community does not occur in the CCBA. The northern boundary of the IDFxw precisely coincides with the south boundary of Central Cariboo Forest District.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFxw/01</td>
<td>Central Cariboo</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

The ecological community is outside the CCBA; hence there is no further discussion.
260. HYBRID WHITE SPRUCE – WATER BIRCH / NORTHERN GOOSEBERRY

260.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The hybrid white spruce – water birch / northern gooseberry (Picea engelmannii x glauca – Betula occidentalis / Ribes oxyacanthoides) ecological community does not occur in the CCBA. The northern boundary of the IDFxw precisely coincides with the south boundary of Central Cariboo Forest District.

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFxw/06</td>
<td>Central Cariboo</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

The ecological community is outside the CCBA; hence there is no further discussion.

261. SCRUB BIRCH – NORTHERN GOOSEBERRY

261.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The scrub birch – northern gooseberry (Betula nana – Ribes oxyacanthoides) ecological community is listed by the CDC but does not actually exist (Ray Coupé, pers. comm.).

<table>
<thead>
<tr>
<th>BGC Unit</th>
<th>Forest District</th>
<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGxh3/00; BGxw2/00</td>
<td>Central Cariboo</td>
<td>S2</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

Chilcotin

The ecological community does not exist; hence there is no further discussion.

262. SITKA SPRUCE / SALMONBERRY DRY

262.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The Sitka spruce / salmonberry Dry (Picea sitchensis / Rubus spectabilis Dry) ecological community occurs on high bench floodplain sites, which experience flooding at greater than five-year intervals. Soil are sorted silts, sandy loams or sand, often with a surface cap of finer sediments; medium to very rich in nutrients. It is forested with Sitka spruce, black cottonwood, red alder, western red cedar, bigleaf maple, and western hemlock; shrubs are salmonberry, devil’s club, red elderberry, stink currant, common snowberry, and some Utah honeysuckle; and the herb layer has a wide diversity of species. Mosses are electrified cat’s tail moss, coastal leafy moss, and some palm tree moss.

This occurs at low elevations on the mainland and immediately adjacent islands from Hardwicke Island in the north to the Chilliwack River in the Southeast. Along the Sunshine Coast and the low Valley, this association once occurred more commonly along the Lilooet, Elaho, Nahatlatch, and Fraser Rivers, including their upper drainages.

This community does not occur in the Chilcotin FD.
263. SPRUCES – SUBALPINE FIR / SKUNK CABBAGE

263.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The spruces–subalpine fir / skunk cabbage (*Picea* spp. – *Abies lasiocarpa* / *Lysichiton americanus*) ecological community does not actually occur in the Quesnel FD. The SBSvk occurs immediately adjacent to the forest district boundary in the extreme northeast corner of the district, northeast of Bowron Lake. The BGC unit boundary and the district boundary precisely coincide.

<table>
<thead>
<tr>
<th>BGC Unit</th>
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<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBSvk/10; SBSvk/Ws11</td>
<td>Quesnel</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

The ecological community is outside the CCBA; hence there is no further discussion.

264. SUBALPINE FIR / GROUSEBERRY – SITKA VALERIAN

264.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The subalpine fir / grouseberry – Sitka valerian (*Abies lasiocarpa* / *Vaccinium scoparium* – *Valeriana sitchensis*) ecological community does not occur in the CCBA. The northern boundary of the ESSFxc precisely coincides with the south boundary of Central Cariboo Forest District.

<table>
<thead>
<tr>
<th>BGC Unit</th>
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<th>BC Rank</th>
<th>BC List</th>
<th>Identified Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSFxc/01</td>
<td>Central Cariboo</td>
<td>S3</td>
<td>Blue</td>
<td></td>
</tr>
</tbody>
</table>

The ecological community is outside the CCBA; hence there is no further discussion.

265. THREE-WAY SEDGE

265.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The three-way sedge (*Dulichium arundinaceum* Herbaceous Vegetation) ecological community does not actually occur in the Central Cariboo FD. The ICHwk1 occurs immediately adjacent to the forest district boundary in the extreme southeast corner of the district, in of Wells Gray Park. The BGC unit boundary and the district boundary precisely coincide.
The ecological community is outside the CCBA; hence there is no further discussion.

266. WESTERN HEMLOCK / VELVET-LEAVED BLUEBERRY – FALSEBOX

266.1 SPECIES SUMMARY: IDENTIFICATION AND HABITAT

The western hemlock / velvet-leaved blueberry – falsebox (Tsuga heterophylla / Vaccinium myrtilloides – Paxistima myrsinites) ecological community does not actually occur in the Central Cariboo FD. The ICHwk1 occurs immediately adjacent to the forest district boundary in the extreme southeast corner of the district, in Wells Gray Park. The BGC unit boundary and the district boundary precisely coincide.

The ecological community is outside the CCBA; hence there is no further discussion.