Rare and Endangered Plant Communities of the Southeastern Skeena Region

Prepared for

BC Environment Skeena Region and the Habitat Conservation Trust Fund (HCTF)

RARE PLANT COMMUNITY AND RARE PLANT SPECIES REPORTS FOR THE *(FORMER)* BULKLEY, KISPIOX, MORICE & LAKES FOREST DISTRICTS

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Introduction

The purpose of this report is to provide information about rare plant communities and plant species to operational staff working in the Bulkley portion of the Bulkley-Cassiar Forest District (referred to here as "the Bulkley", it includes the TSA, crown land outside the Provincial forest, and private land). It does not describe rare animal species, nor does it discuss rare plants and plant communities in the former Cassiar Forest District.

Rare Plant Communities of the Bulkley

Rare Ecosystems (Ministry of Forests working definition, November 1997)

Rare ecosystems are defined to include:

1. Plant communities listed in the Identified Wildlife Guidebook (includes red-listed **species** affected by forest or range activities);

2. Plant communities listed as red or blue with the B.C. Conservation Data Centre;

3. Ecosystems identified by the regional ecologist or regional rare and endangered species specialist as being rare or significant; and

4. An ecosystem (site series or surrogate) that comprises less than 2% of the landscape unit and is not common in adjacent landscape units.

Definition 1. Plant communities listed in the Identified Wildlife Guidebook

The Forest Practises Code guidebook for managing rare and endangered species and ecosystems - called "Managing Identified Wildlife "- is currently under development. No information from the guidebook was included in this report.

Definition 2. Plant Communities listed as red or blue with the B.C. Conservation Data Centre The B.C. Conservation Data Centre (**CDC**) is a program of the Wildlife Branch of the B.C. Ministry of Environment, Lands and Parks. The CDC collects information on the rare and endangered plants, animals and plant communities in British Columbia and maintains a computerized database on their status, location and level of protection. The CDC is a partner of the National Heritage Network, a international body that uses standardized methods and terminology (Table 1) to gather and exchange information on threatened elements of global biodiversity. By international convention, the CDC uses the term "plant community", rather than the term "ecosystem". These terms are used more-or-less interchangeably in this report.

In British Columbia we tend to use the names and abbreviations of Biogeoclimatic Site Series (e.g. SBSdk/81 Saskatoon - slender wheatgrass) when referring to plant communities or ecosystems. This is often appropriate, but in some cases the rare plant community may be an exceptional variation of a more common site series. For example, it may occur on an unusual type of parent material, or be dominated by an unusual tree species. Where this is the case, it is addressed below in the descriptions of individual plant communities.

For each Forest District in British Columbia, the CDC maintains a tracking list of **red**- and **blue-listed** species and plant communities known or believed to occur within the District. The most recent version of the list is available at the website: **www.env.gov.bc.ca/wld/cdc.**

Table 1. CDC Definitions

Global Ranks (G1 to G5) These reflect the conservation status of an organism from a global (i.e. range-wide) perspective. Plant communities are not currently assigned a global rank, because there is no established international system for classifying or comparing plant communities.

Provincial Ranks (S1 to S5) These reflect the conservation status of an organism or plant community within the province of British Columbia. Note that a species or community can be considered imperiled or vulnerable within British Columbia even if it is common or secure outside of the province. However, organisms or communities that are threatened locally (e.g, within the Bulkley) may not be ranked if they are common in other areas of the province.

G1 or S1 = critically imperiled because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 5 or fewer occurrences or very few remaining individuals (<1,000).

G2 or S2 = imperiled because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000).

G3 or S3 = vulnerable either because very rare and local throughout its range, found in only a restricted range (even if abundant at some locations) or because of other factors making it vulnerable to extinction. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.

G4 or S4 = apparently secure Uncommon but not rare, and usually widespread. Possibly cause for longterm concern. Typically more than 100 occurrences or more than 10,000 individuals.

G5 = secure common, typically widespread and abundant.

T = infraspecific taxon (trinomial) Subspecies or varieties of a species (indicated by a scientific name with three parts) have a "T" following the global or provincial rank. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1.

U = **Unrankable** due to lack of information about status or trends.

Range Ranks (S#S# or G#G#) or **?** are used to indicate uncertainty about the exact status of a taxon or community.

Provincial Lists

red list: includes any indigenous species or subspecies (taxa) considered to be Extirpated, Endangered, or Threatened in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. Red-listed taxa include those that have been, or are being, evaluated for these designations.

blue list: includes any indigenous species or subspecies (taxa) considered to be Vulnerable in British Columbia. Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened.

Relationship between Red and Blue Lists and Provincial Ranks

PROVINCIAL RANK	RED LIST	BLUE LIST
Plants:	S1 S2	S1? S2S3
Plant Communities:	S1 S1S2 S2 S2?	S2S3 S3 S3?

Table 2. B.C. Conservation Data Centre: Rare Plant Community Tracking List - Bulkley Forest District (FD # 23)
Downloaded January, 1998, last updated June 10, 1996

SCIENTIFIC NAME	COMMON NAME	HABITAT* REQUIREMENT	PROV RANK	PROV LIST
ABIES AMABILIS/THUJA PLICATA - GYMNOCARPIUM DRYOPTERIS	AMABILIS FIR/WESTERN REDCEDAR - OAK FERN	CWHws1/04 CWHws2/04	S3	BLUE
ABIES AMABILIS/THUJA PLICATA - OPLOPANAX HORRIDUS, WET SUBMARITIME	AMABILIS FIR/WESTERN REDCEDAR - DEVIL'S CLUB, WET SUBMARITIME	CWHws2/06	S3	BLUE
ABIES LASIOCARPA - JUNIPERUS - CLADONIA	SUBALPINE FIR/LODGEPOLE PINE - JUNIPER - LICHEN	ESSFmc/02	S3	BLUE
ABIES LASIOCARPA - PINUS CONTORTA - CLADONIA	SUBALPINE FIR/LODGEPOLE PINE - CLADONIA	ESSFwv/02	S3	BLUE
ABIES LASIOCARPA - VACCINIUM MEMBRANACEUM - EMPETRUM	SUBALPINE FIR - HUCKLEBERRY - CROWBERRY	ESSFmc/03	S3	BLUE
AMELANCHIER ALNIFOLIA - ELYMUS TRACHYCAULUS	SASKATOON - SLENDER WHEATGRASS	SBSdk/81	S2	RED
PICEA MARIANA - VACCINIUM MEMBRANACEUM - PETASITES	BLACK SPRUCE/LODGEPOLE PINE - FEATHERMOSS	SBPSmc/03 SBSmc2/03	S3	BLUE
PICEA SITCHENSIS - RUBUS SPECTABILIS, WET SUBMARITIME 2	SITKA SPRUCE - SALMONBERRY, WET SUBMARITIME 2	CWHws2/07	S2	RED
PINUS ALBICAULIS - CLADONIA - DICRANUM FUSCESCENS	SUBALPINE FIR/WHITEBARK PINE - CLADONIA	ESSFmk/02 ESSFmk/03	S3	BLUE
PINUS CONTORTA - ARCTOSTAPHYLOS UVA-URSI	LODGEPOLE PINE - KINNIKINNICK	CWHws1/02 CWHws2/02	S3	BLUE
PINUS CONTORTA - JUNIPERUS COMMUNIS - ORYZOPSIS ASPERIFOLIA	LODGEPOLE PINE - JUNIPER - RICEGRASS	SBSdk/02	S3	BLUE
PINUS CONTORTA - SPHAGNUM GIRGENSOHNII, WET SUBMARITIME 2	LODGEPOLE PINE - SPHAGNUM, WET SUBMARITIME 2	CWHws2/10	S3	BLUE
POA SECUNDA - ELYMUS TRACHYCAULUS	BLUEGRASS - SLENDER WHEATGRASS	SBSdk/82	S1	RED

Table 2. Bulkley Forest District Rare Plant Communities cont'd.

SCIENTIFIC NAME	COMMON NAME	REQUIREMENT	RANK	LIST
POPULUS BALSAMIFERA SSP TRICHOCARPA - CORNUS SERICEA	COTTONWOOD - RED-OSIER DOGWOOD	CWHvm1/10 CWHwm/06* CWHws1/08* CWHws2/08*	S3	BLUE
POPULUS BALSAMIFERA SSP. TRICHOCARPA - CORNUS SERICEA - ROSA WOODSII[1]	COTTONWOOD - DOGWOOD - PRICKLY ROSE	SBSdk/08	S2	RED
PSEUDOTSUGA MENZIESII - PLEUROZIUM - HYLOCOMIUM	DOUGLAS-FIR - FEATHERMOSS - STEPMOSS	SBSdk/04	S3	BLUE
THUJA PLICATA - OPLOPANAX HORRIDUS - EQUISETUM ARVENSE	WESTERN REDCEDAR/HYBRID WHITE SPRUCE - DEVIL'S CLUB - HORSETAIL	ICHmc2/07	S3	BLUE
TSUGA HETEROPHYLLA - ARCTOSTAPHYLOS - CLADONIA	WESTERN HEMLOCK - KINNIKINNICK - CLADONIA	ICHmc1/02 ICHmc2/02	S3	BLUE
TSUGA HETEROPHYLLA - MENZIESIA - LYSICHITON	WESTERN HEMLOCK - AZALEA - SKUNK CABBAGE	ICHmc1/06	S3	BLUE

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

[1]Note that this species should be *Rosa acicularis* not *R. woodsii* (S. Haeussler)

Red- and Blue-Listed Plant Communities of the Bulkley

The order of presentation follows the CDC tracking list of June 10, 1996 (Table 2). Please refer to the Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region (Banner et al. 1993) for a more complete description of the biogeoclimatic site series which correspond to each of the listed plant communities.

CWHws1 or CWHws2/04: Amabilis fir - western redcedar - oakfern (S3, Blue list)

There is no CWHws1 in the Bulkley, but the CWHws2 is found on leeward slopes of the Coast Mountains above the Zymoetz (Copper) River and its tributaries west of the Coal Ck. burn, and in the upper Telkwa River. Within this landscape, small pockets of the CWHws2/04 (subhygric/rich) site series are very common on toe slopes, along drainage channels, in fluvial fans or wherever intermittent seepage occurs. These ecosystems are usually a mixture of western hemlock and amabilis fir. They are productive sites for conifer growth and tend to be targeted for logging, however there is no danger of permanent habitat loss. Tree, shrub, herb and moss layers generally contain no vulnerable species -but watch out for unusual ferns, and the epiphytic lichen and fungal communities may contain rare species (see e.g. Goward 1995).

Large, well developed, old growth examples of the CWHws2/04 are rare in the Bulkley. Western redcedar is thought to be absent, except for a few trees near the Kalum District boundary around the mouth of Red Canyon Ck. Any sites with western redcedar, with exceptionally large or old trees, or with very high plant species diversity should be considered for conservation. Such ecosystems tend to occur on large fluvial fans, or less frequently alluvial floodplains or lacustrine deposits near lakes. These ecosystems depend on the flow of moisture and nutrients from upslope and their humid, sheltered microclimate may be influenced by surrounding forest cover. To preserve ecosystem integrity, road construction and timber harvesting must take these factors into account.

CWHws2/06: Amabilis fir - western redcedar - devil's-club (S3, Blue list)

The CWHws2/06 in the Bulkley occurs on toe slopes and in riparian areas adjacent to the Zymoetz and upper Telkwa Rivers and their tributaries. The most extensive known examples are in the midsection of Mulwain Ck. and near the mouth of Red Canyon Creek. These ecosystems are strongly transitional to the SBSmc2 and tend to be dominated by subalpine fir and hybrid white spruce rather than the less cold-tolerant amabilis fir and western redcedar. Within the Bulkley, any CWHws2/06 sites containing large mature western redcedar and amabilis fir should be conserved as these species are at the eastern limits of their range.

Most of the comments for the CWHws2/04 apply here as well, but this site series is less abundant, usually more productive for tree growth, and is probably more sensitive to changes in the hydrological regime and microclimate. CWHws2/06 ecosystems are typically diverse in species and structure and have high habitat value for a range of wildlife -particularly where they occur in a mosaic with open meadows and shrub thickets. Herb layers may contain infrequent or unusual species -particularly along streambanks (e.g., watch for *Galium kamschaticum* -an unusual bedstraw that looks like a shamrock). Rare epiphytic lichens may be present in the canopy (Goward 1995). Large, well developed examples of this plant community typically occur on large fluvial or fluvial/colluvial deposits, lacustrine (former lakebed) deposits or older floodplains and should definitely be given priority for conservation.

ESSFmc/02 Subalpine fir - lodgepole pine - juniper - lichen (S3, Blue list)

Small rocky outcroppings classified as ESSFmc/02 are common within the Bulkley, but large, dry, sunny examples on bedrock, sand or gravelly ridges and terraces are probably uncommon to rare. These communities are dominated by lodgepole pine, with common juniper (*Juniperus communis)* and kinnikinnick (*Arctostaphylos uva-ursi)* in the understory along with abundant terrestrial and arboreal lichens. They are an important habitat feature for a variety of animals because the open, dry setting contrasts with the surrounding moister, shadier landscape. Ridgetops and eskers are often preferred travel corridors for vertebrates. In the Telkwa Mtn Range these ecosystems are important to the caribou, who feed on the lichens. Whitebark pine (*Pinus albicaulis)* and its avian consort, the Clark's nutcracker (*Nucifraga columbiana)* are found at their northern limits on timberline ESSFmc/02 ecosystems. Whitebark pine is fairly scattered south of Hwy 16, extending northeast to the south side of Hudson Bay Mtn, but only a few isolated populations are known from the north side (along the Cronin Mine Rd. and on Mt. McKendrick). Additional outlier populations should be located, mapped and conserved. It would be a good idea to monitor the health and viability of these communities and look for evidence of expansion or retreat in response to climate change (e.g. incidence of white pine blister rust, mountain pine beetle or other damaging agents; nutcracker and whitebark pine demographics). Other interesting species to watch out for in this ecosystem are white-flowered rhododendron (*Rhododendron albiflorum* -in the Babine/Nilkitkwa) and the tiny *"*bug-on-a-stick*" (Buxbaumia* sp.*)* moss.

The ESSFmc/02 usually occurs as minor inclusions within cutblocks (commonly left for wildlife tree patches). Larger examples tend to be unmerchantable but are favoured for road locations, gravel pits and informal campsites. Such destruction should be avoided. Fire suppression also poses a serious long term threat to these plant communities as the organic layer builds up, moss replaces lichen, subalpine fir ingrowth occurs and mountain pine beetle takes out the oldest lodgepole pine. Occasional disturbance to the canopy and forest floor (e.g. fire or summer logging) may be beneficial to these ecosystems, but chronic or severe soil disturbance should be avoided.

Logging whitebark pine trees is unacceptable; where scattered whitebark pine stems occur within operable forests, they should be left as wildlife and seed trees. Removal of subalpine fir and lodgepole pine ingrowth may be an effective means of simulating the effects of a low intensity surface fire to maintain open stands of whitebark pine.

ESSFwv/02 Subalpine fir - lodgepole pine - cladonia (S3, Blue list)
Because the ESSFwv has a wetter, snowier climate with less frequent fire than the ESSFmc, dry pine-lichen plant communities are less common in the landscape -and are a more critical feature for habitat diversity. Similar management concerns exist as for the ESSFmc/02, but fire suppression may be an even greater threat in the ESSFwv because of the greater rarity of the ecosystem, and the more rapid rate of organic matter accumulation. Whitebark pine is present in the ESSFwv where it borders on the ESSFmk and mc, as for example around Miller Creek and the Ski Smithers cabin runs on Hudson Bay Mtn.

Avoid converting these ecosystems to roads, landings or gravel pits because they are "unproductive". Large, well developed examples of this plant community, any sites with sandy rather than gravelly or rocky soil, and young wildfire-origin stands should be mapped and given priority for conservation.

ESSFmc/03 Subalpine fir - huckleberry - crowberry (S3, Blue list)
This plant community is widespread and apparently common in the ESSFmc (it's probably listed because of its importance to caribou) particularly at parkland elevations where it often occurs in a

ridge-hollow complex with subalpine meadows. Berry production in these communities is important for bears, birds and other wildlife. These are marginal sites for timber production, and I suspect that seral stages of this plant community are more threatened than mature and old growth stages because of a lack of fire -so I don't see any particular reason to protect them from logging, although severe disturbance or permanent habitat destruction should be minimized. Watch out for whitebark pine (see above) and white-flowered rhododendron (*Rhododendron albiflorum*) at the northern limit of its range in the Babine/Nilkitkwa area.

SBSdk/81 Saskatoon - slender wheatgrass (S2, Red list).
Most occurrences of this dry scrub-steppe plant community in the SBSdk zone of the Bulkley Valley have been mapped at 1:20,000. However, an equivalent community can also be found on south to southwest-facing slopes in the SBSmc2 (e.g. Babine shoreline), the ICHmc (e.g. Harold Price Ck, Kitseguecla valley), even as high up as the ESSFmc (e.g. Grouse Mtn). These occurrences have not all been mapped. Because of high insolation and low snowpacks saskatoon - slender wheatgrass ecosystems provide critical habitat for many animals and support plant and invertebrate species that do not occur elsewhere in the landscape. Although they contain no operable timber, these ecosystems are often damaged or fragmented by road and communication tower construction, rock quarrying, and insensitive recreational use. Overbrowsing and grazing by cattle and wildlife also causes excessive soil disturbance, damages sensitive species, and accelerates the spread of invasive species. I have identified three different types or variations of the /81 site series which are described separately below:

(1) Low elevation "savanna-steppe" examples of the SBSdk/81 with well developed open stands of Rocky Mtn juniper (*Juniperus scopulorum)* intermixed with xeric to submesic grassland, wild cherry thickets, and base-rich rock outcrop communities are extremely rare and imperiled. They are primarily restricted to the Bulkley Valley, and most occurrences are on private land (e.g. above Tyhee Lake, Viewmount Rd.-Call Lake, Malkow Lookout, Morris Rd in Telkwa, and Hubert-Woodmere Rds). Remaining occurrences on Crown land (near Reiseter Ck, Cam Brook and in the Bulkley River canyon) should be left unfragmented and unaccessed to reduce vandalism, accidental damage and the spread of invasive non-native species. Greater public awareness is needed to protect these ecosystems -for example it may be possible to convince woodworkers to salvage dead and downed material rather than cutting live trees. Livestock grazing should not be permitted, and methods to protect regenerating juniper from deer and moose browse should be investigated. Prescribed fire (with extreme care!) may be needed on some sites to reduce shrub and aspen encroachment.

(2) Examples of the Saskatoon - slender wheatgrass scrub-steppe ecosystem on shallow rocky soils with few or no Rocky Mtn juniper are much less rare, but still vulnerable. These ecosystems contain a diverse mosaic of low scrub, taller shrub thickets, xeric grassland (*Poa* spp.,*Festuca saximontana, Stipa* spp., *Koeleria macrantha, Elymus* spp.) and rock outcrop communities, In the Bulkley, the best remaining examples are on Crown Land outside and above the settled valley bottom, above the Telkwa High Rd, between Glentanna and Reiseter Ck., in the Kitseguecla valley, on Grouse Mtn, and above Seymour and Bigelow Lakes. This type is widespread in the Lakes and Morice Forest Districts. Most occurrences appear to be relatively stable and probably only require intermittent fire (on the order of 30-100 yrs?, depending on the degree of exposure to sun and wind and the amount wildlife disturbance) to prevent tree encroachment. They can tolerate sporadic livestock grazing (generally too steep and rocky for cattle) and light recreational use, but sustained or heavy grazing or human use, and construction of roads, trails and quarries that expose mineral soil must be avoided. Such activities greatly accelerate the spread of invasive species.

(3) On private land within the Bulkley Valley, a type of SBSdk/81 scrub-steppe (transitional to the SBSdk/82) was formerly common on the deep, rapidly-drained soils of steep fluvial escarpments bordering the Bulkley River (e.g. above Hwy 16 between Telkwa and Smithers) and tributaries such as Driftwood, Canyon, Vanderven and Deep Cks. This site type is less ecologically diverse than the rock outcrop SBSdk/81 site type(2), and tends to be dominated by shrubs, but it can support excellent subxeric to submesic grassland (*Stipa, Elymus,Poa*). Rocky Mountain juniper is typically absent or there may be a few isolated trees. This community has been greatly modified by almost a century of agricultural use and is now imperiled. Remnant examples that have not been heavily grazed (e.g. above the Telkwa River opposite Goathorn Ck.) are small and shrinking. These "disclimax" ecosystems depend on a combination of fire and ongoing animal disturbance (beavers, ungulates) to prevent aspen encroachment. Restoration of some examples of this type will require active management of livestock and deer use and reintroduction of fire.

SBSmc2/03 Black spruce - Lodgepole pine - Feathermoss (S3, Blue list)
(The SBPSmc does not occur in the Bulkley). Black spruce - lodgepole pine communities growing on mineral soil are a relatively rare feature in western, mountainous portions of the SBS, although they are common in the plateau country to the east (e.g. Vanderhoof), and in the true boreal forest. In the Bulkley, black spruce approaches the southwestern limits of its range, and is therefore somewhat vulnerable. Black spruce can be difficult to distinguish from slow-growing, clubby-topped white spruce (check the cones and the hairy twiglets). The understory vegetation contains an assortment of Ericaceous plants such as labrador tea (*Ledum groenlandicum)*, creeping-snowberry (*Gaultheria hispidula)* and poor-site mosses that are uncommon on upland ecosystems. This plant community invariably occurs on low-lying frost pocket sites where soils are compacted or otherwise have restricted rooting. Small patches typically occur in association with wetlands. Occurrences exist near Smithers at Canyon Creek and in the Chapman Lake - Nilkitkwa country, but are absent or rare on the west side of the Bulkley Valley.

These communities have low timber productivity, and protecting them from indiscriminate logging and silvicultural practices should not be difficult, given a little awareness. Encourage natural regeneration of black spruce. Prescribed burning or light soil scarification is more appropriate than an severe mechanical site preparation treatment (mounding, plowing, ripping) intended to enhance site productivity. Protect these sites from changes in soil drainage that may cause flooding. Any large, well developed examples of this plant community should be mapped and protected.

CWHws2/07 Sitka spruce - salmonberry wet submaritime (S2, Red list)
Sitka spruce floodplain ecosystems have been red-listed wherever they occur in B.C.. The classic low elevation CWHws1 Sitka spruce - salmonberry plant community that has been almost entirely logged out of the major floodplains around Terrace and the Kitimat valley does not exist in the Bulkley. Floodplains in the CWHws2 on the lee side of the Coast Range are smaller, colder and snowier, often dominated by shrub thickets and wetlands. They are transitional in character to the ESSF and SBS. The CWHws2/07 differs very little from CWHws2/06 ecosystems described above. Subalpine fir is usually the dominant tree and the spruce is a hybrid (probably white x Engelmann with minor (if any) Sitka genes). Floodplain understories are dominated by devil's club (*Oplopanax horridus)*, black twinberry (*Lonicera involucrata)*, mountain alder *(Alnus incana)*, highbush-cranberry *(Viburnum edule)*, and red-osier dogwood *(Cornus sericea)* with only minor salmonberry (*Rubus spectabilis)*..

These are high value riparian complexes that warrant protection to maintain the integrity of both aquatic and terrestrial ecosystems. The best examples of this plant community will be found on

braided (wandering) stream reaches on larger stream systems within the CWHws2 (e.g. portions of Mulwain Ck., possibly the headwaters of the Telkwa River). Reaches with a stable, single thread channel tend to have small, high benches with relatively poorly developed floodplain communities (e.g. Zymoetz River west of Coal Creek burn). Preliminary mapping (1:20,000 scale) of these ecosystems has been completed for the Zymoetz River drainage, but not the upper Telkwa River. The Zymoetz River occurrences are mostly zoned as Core Ecosystems, whereas the Telkwa River examples lie within a Landscape Corridor.

On relatively stable, high bench floodplains, silvicultural prescriptions developed for Spruce/Balsam mixes in Landscape Corridors (District Manager's Policy, May 30, 1996) are probably appropriate, but extra care is needed to ensure that natural drainage and flooding patterns and habitat diversity are maintained. To ensure diverse plant communities, future stands must have both well developed tree cover and well developed shrub and herb understories with intermittent openings-ideally achieved through a combination of wide tree spacing and clumped regeneration patterns. A continuing supply of large snags and coarse woody debris is particularly critical in these riparian communities. Although a minor component of black cottonwood would be a valuable addition to many of these communities, conversion of conifer-dominated riparian forest to mixedwood and deciduous stands should be avoided. Avoid exposing mineral soil to prevent invasion by deciduous trees and weedy species.

ESSFmk/02 Subalpine fir - Whitebark pine - Cladonia
ESSFmk/03 Subalpine fir - Mountain hemlock - Cladonia (S3, Blue list)
The ESSFmk is a narrow band of subalpine forest lying in the rainshadow just east of the Coast Mtns, south of Telkwa Pass. Only the northern-most tip occurs in the Bulkley, at the headwaters of the Telkwa River, and here it is transitional to the ESSFwv. There are some excellent examples of xeric whitebark pine - lichen forest on sandy skeletal fluvial and glaciofluvial parent materials in the Burnie River valley (Morice District). In the Bulkley, one is most likely to find small occurrences on wind-exposed bedrock outcrops or talus at the upper parkland elevations of the ESSF, but be on the lookout for large or low elevation occurrences on south-facing talus slopes, river terraces or old lava flows(?). These ecosystems are critical for Clark's nutcracker and probably very important to caribou, grouse, ptarmigan and other wildlife. Understory layers are typically sparse and lack diversity. The best examples have will have an abundance of whitebark pine and ground lichen, while the more typical /02 and /03 ecosystems will have mainly subalpine fir, lodgepole pine, mountain hemlock and more mosses and liverworts than lichens. Two possible (extremely rare) subalpine plant communities to watch for are (1) whitebark pine on calcareous rock substrate with a grassy understory, or (2) a xeric/wetland complex with hummocks of whitebark pine, lichen and oatgrass (*Danthonia intermedia),* spike trisetum (*Trisetum spicatum*) grassland on sand and gravel, interspersed with sedge wetlands in the hollows.

ESSFmk/02 and /03 ecosystems are unsuitable for logging but may occur as minor inclusions in larger cutblocks -where they should probably be left as wildlife tree patches. Removal of subalpine, amabilis fir, hemlock and lodgepole pine ingrowth to create a more open stand conducive to regeneration of whitebark pine may not be a bad idea. Logging and mining access roads should definitely not be permitted. These ecosystems have very shallow soils and are vulnerable to damage from insensitive recreational use (campsites, ATV traffic, etc.). The health and recruitment of whitebark pine and Clark's nutcracker populations should be monitored (mountain pine beetle and the introduced white pine blister rust (*Cronartium ribicola)* are the two primary threats. Where feasible, a "let-burn" policy may be the best long-term strategy for these ecosystems.

CWHws2/02 Lodgepole pine - kinnikinnick (S3, Blue list)
Very dry ecosystems with a history of recurring fire, and with lodgepole pine regenerating in the forest understory are rare within the high elevation CWHws2. In the Bulkley, ecosystems that may be classified as CWHws2/02 can be found on south-facing slopes transitional to the SBSmc2, for example, in and around the Coal Creek burn on the north bank of the Zymoetz (Copper) River. They are less likely in the upper Telkwa. A search for Pl-leading stands in the CWHws2 should locate the larger occurrences fairly quickly. These ecosystems have interesting lichens, saprophytes, fungi and insects that are unusual within a coastal forest setting, but a lot less unusual in areas transitional to the SBSmc2. Look for the rare gnome plant (*Hemitomes congestum*-pg 354 in Pojar and MacKinnon 1994) a saprophyte with an outlier population in the Skeena River valley -but unknown in the Bulkley. Also watch for an unusual variation of this plant community: open-grown lodgepole pine with native red fescue (*Festuca rubra)* bunchgrass in the understory (unlikely in the Copper). Occurrences on pure sand rather than over bedrock or mixed sand and gravel should be considered highly unusual. The CWHws2/02 is normally considered inoperable, but may occur as small inclusions within larger cutblocks. Over the long term, fire suppression may pose the greatest threat, causing these ecosystems to gradually succeed to Hemlock - moss plant communities.

SBSdk/02 Lodgepole pine - juniper - ricegrass (S3, Blue list)
Xeric lodgepole pine - common juniper - ricegrass - kinnickinnick - lichen plant communities on rapidly drained bedrock, gravelly terraces and eskers or sand deposits are definitely at risk within the SBSdk of the Bulkley, although they may be considerably more common in the Lakes and Morice Forest Districts, and an equivalent plant community can be found at higher elevations in the SBSmc2. The SBSdk/02 is usually found as the driest portion of a landform that is dominated by SBSdk/03 or /05 ecosystems and it is never very extensive. The most common, and least vulnerable occurrences are on rocky, south-facing ridge crests because these are largely inaccessible and difficult places to build houses (e.g. between Glentanna and Reiseter Creek; just south of Billeter Road on both sides of the Telkwa High Road; between Hislop Road and Eckman/Burnt Cabin Rd., and above Seymour Lake). Occurrences on other types of parent material are rare and imperiled because most have been developed for homesites or dug up for sand, gravel or dump sites (e.g. river terraces along both banks of the Bulkley River between Smithers and Telkwa). Because the forest floor vegetation is extremely vulnerable to soil disturbance from human or livestock traffic, it is difficult to find examples of this plant community in good condition. These ecosystems support an unusual variety of herbs, saprophytes, lichens, bryophytes, fungi and insects not commonly found on moister or richer ecosystems. They also have high value as wildlife habitat, for example as deer winter range.

All SBSdk/02 occurrences of significant size on Crown land in the Bulkley should be mapped and conserved. These are not productive timber-growing sites. Where they occur within woodlots or Crown forest these ecosystems should probably be designated as wildlife tree patches. It should be easy to naturally or artificially regenerate lodgepole pine on these dry ecosystems without having to create canopy gaps of more than a few trees (not tree-heights). Fire is needed for long term persistence of these ecosystems and for forest health. Although the landscape is highly fragmented and settled, on many sites it should be feasible to carry out small scale, low to medium intensity, controlled burns during periods of low fire hazard. Forage production on these sites is low, but (except for rock outcrop types) they are often favoured by cattle because of the easy terrain and shade. Where occurrences in good condition occur within existing or proposed grazing tenures, measures should be taken to prevent cattle from congregating within them. Avoid locating roads, landings, quarries or recreation sites within occurrences in good condition.

CWHws2/10 Lodgepole pine - Sphagnum (S3, Blue list)
Swamp forests with more than 10% cover of lodgepole pine growing in peat are probably rare in the CWHws2 of the Bulkley. The wetlands in the Copper and upper Telkwa drainages tend to be either shrub- and sedge-dominated fens or horsetail swamps with spruce, subalpine fir, western and mountain hemlock with a strong ESSF or MH character because of cold air ponding. However, the fire history and transitional-to-SBS character of the Bulkley CWHws make a lodgepole pine-dominated community less remarkable here than it is on the west slopes of the Coast Range. Features to look for in an exceptional example of this plant community would be good cover of lodgepole pine together with a high diversity of bog plants: dwarf shrubs, orchids, sundews *(Drosera* spp.*)*, and bryophytes (principally *Sphagnum* spp.), including a mix of species from both interior and coastal settings. Watch for the arctic eyebright (*Euphrasia arctica* var. *disjuncta)* a blue-listed plant of northern interior bogs (see pg 26).

CWHws2/10 ecosystems normally occur near non-forested wetlands and should be relatively straightforward to identify. The lodgepole pine in this community is not of merchantable size. To maintain this plant community, avoid changes to local drainage patterns and sudden changes in exposure (e.g. clearcutting to the wetland boundary). Any large, well developed examples of this plant community should be mapped and given high priority for conservation.

SBSdk/82 Bluegrass - slender wheatgrass grasslands (S1, Red list)
There are no significant examples of true SBSdk/82 grassland remaining in the Bulkley. It is unclear how much native grassland existed when European settlers first arrived because the climate and soils of the Bulkley Valley are marginal for grassland. Under current climatic conditions, most submesic to mesic south-facing sites that are not actively cultivated, grazed or burned will fairly quickly grow back to aspen woodland. Any original low elevation grasslands have long since been modified by cultivation and livestock grazing and it is no longer possible to distinguish them from areas where the aspen was cleared for farming. I have identified six plant community types or complexes in the Bulkley Valley that marginally exhibit characteristics of the SBSdk/82:

(a) tiny pockets of mesic to submesic bluegrass-slender wheatgrass-needlegrass-Junegrass grassland (usually no more than 5 - 10 m across) in deeper soils within larger xeric to subxeric areas mapped as SBSdk/81. Examples: Hubert Rd juniper site, above Tyhee Lake,

(b) ungrazed or very lightly grazed mesic Aster (*Aster* spp.- peavine (*Lathyrus nevadensis)* - meadow rue (*Thalictrum occidentale*) forb meadows with a significant component of native grasses. They fit the site and soil characteristics described for the SBSdk/82 but are not true grasslands -probably because the climate is too moist and there is insufficient disturbance (grazing or fire). These meadows are usually very small (< 1 ha) and have been found at upper elevations of the SBSdk or in the SBSmc2 outside the main valley. They usually occur in complex with (c). (Examples: above Reiseter Ck., above Telkwa River, Pine Ck.)

(c) open aspen - prickly rose (*Rosa acicularis*) - peavine woodland interspersed with cow parsnip (*Heracleum lanatum*) - meadow rue subhygric herb meadows . This is a very common type. It appears that in the absence of fire or grazing the mesic Aster - peavine meadow type (b) is quickly overtaken by aspen forest while the subhygric cow parsnip meadows are more resistant to aspen encroachment.

(d) lightly grazed to ungrazed submesic to subhygric ESSFmc herb meadows. The subhygric areas are dominated by cow parsnip, meadow rue, fireweed (*Epilobium angustifolium),* large-leaved avens (*Geum macrophyllum),* arrow-leaved ragwort (*Senecio triangularis),* brome

(*Bromus* spp.) and blue wild rye (*Elymus glaucus)*, while mesic-to-submesic areas are a diverse mix of native forbs and grasses. These ESSF meadows appear to be quite stable with low rates of tree encroachment (Examples: Moose Meadows, Grouse Mtn meadows -also Kitseguecla valley upper ICHmc1/ESSFwv)

(e) semi-natural hay meadows dominated by timothy (*Phleum pratense)* , clover (*Trifolium* spp.) and other agronomic and weed species but still containing many native herbs. These are formerly cultivated sites from which an occasional hay crop is taken, light grazing occurs or which are gradually being allowed to revert to rose-soapberry (*Symphoricarpos albus)* scrub or aspen woodland. (Examples: widespread along the Telkwa High Road and Round Lake to Hungry Hill on private land)

(f) fluvial grassland/meadow complexes on inactive fluvial deposits with a fine-textured capping over gravels. These complexes can be found at all elevations in the Bulkley. Low elevation occurrences on well drained soils most closely ressemble the SBSdk/82 but have virtually all been developed for agriculture. In the SBSmc2 and lower ESSFmc one can still find undeveloped examples of these fluvial grasslands and meadows (referred to as "montane" meadows). The ESSF examples closely resemble (d) above but occur on flat terrain. (Examples: Telkwa River floodplain, Pine Creek floodplain (SBSdk), Silvern Ck. and Passby Ck. meadows (SBSmc2), Netalzul meadow and Nilkitkwa River buttercup meadows (SBSmc2/ESSFmc transition).

Occurrences of the above on Crown land have high value for livestock grazing and wildlife. More work needs to be done to adequately classify the different meadow, grassland, and seral aspen community types, to determine their abundance and distribution, and their response to cattle grazing and fire. The best, ungrazed examples of these communities should be established as benchmark areas and prescribed burning trials should be carried out in areas where aspen and shrub encroachment appears to be rapid. Within existing or proposed grazing tenures, occurrences in good condition should be mapped out and conservative grazing strategies applied. No artificial seeding of forage crops should occur within occurrences currently in good condition with few or no introduced species. Opportunities to restore native grassland on private land should be pursued with interested landowners.

CWHws2/08 Cottonwood - red-osier dogwood (S3, Blue list)(CWHvm1, CWHwm and CWHws1 are not found in the Bulkley). Middle fluvial benches dominated by black cottonwood with a minor cover of hybrid spruce, subalpine fir, western hemlock (perhaps some western redcedar and amabilis fir) occur on the active floodplains of larger rivers and streams and are generally easy to identify and map (using a printout of Act-dominated forest cover types within the CWHws). Within the Bulkley all occurrences of the CWHws2/08 will be strongly transitional to SBSmc2 or ESSF floodplain communities because of strong cold air drainage along river valleys. The best examples of this plant community will be found on braided (wandering) stream reaches on any of the major river/creek systems within the CWHws2. Reaches with a stable, single thread channel will tend to have small, high benches and terraces with poorly developed floodplain communities. In the Bulkley a few small occurrences of this community can be found on the Zymoetz (Copper) west of the Coal Ck. burn and on the lower reaches of tributaries such as Mulwain and Red Canyon Cks. It is possible, but unlikely, that occurrences also exist on the Telkwa River above Milk Ck. In the CWHws2, some active fluvial fans may have black cottonwood-dominated plant communities that approximate the CWHws2/08 (often seral stages of the CWHws2/03 or /04).

Black cottonwood floodplains have been blue-listed throughout the CWH because of their exceptionally high habitat value, their sensitivity to changes in the hydrologic regime, and the degree of human development along major river corridors. Within the CWHws2, and particularly within the Bulkley, this plant community is rare because there are few large floodplains, but most occurrences are minimally affected by human activity. These communities should be protected within the Forest Ecosystem Network, and by Forest Practises Code riparian management guidelines. Occurrences should not be considered for logging or other industrial or commercial uses, and efforts should be made to protect the hydrological regime so that the community is able to maintain itself through flooding and other natural disturbance processes. Concentrated recreational use (e.g. fishing/hunting camps) should be discouraged.

SBSdk/08 Cottonwood - Dogwood - Prickly Rose (S2, Red list)
Black cottonwood floodplain communities in the SBSdk have been red-listed because of the relatively rarity of major rivers in the central interior, their exceptionally high habitat value, sensitivity to changes in the hydrological regime, and the density of human development. The best examples of this plant community are found on braided (wandering) reaches of the major rivers and streams (Riparian Class S1 and larger S2), while reaches with a stable, single thread channel and smaller tributaries (S2,S3) tend to have small, high benches and terraces with poorly developed floodplain communities. In the Bulkley, occurrences of the SBSdk/08 have been mapped at 1:20,000. The best SBSdk floodplains are found on the Bulkley River between Telkwa and Canyon Ck.. The lower Telkwa R., and the Bulkley R. upstream of Telkwa (eg mouth of Thompson Ck.) also have moderately well developed floodplains. Small floodplains occur on the Bulkley R. below Canyon Ck. and on tributaries such as Deep Ck., Vanderven Ck., Goathorn Ck., Pine Ck., Canyon Ck., and Driftwood Ck. Most occurrences are on private land and have been developed for agricultural and residential use. On Crown or public land the best occurrences are found between CN Tatlow and the Telkwa sewage treatment facility (opposite the regional dump), and on the Telkwa River below Goathorn Ck..

The best management strategy for this plant community is to avoid development and changes to the hydrological regime, maintaining the highest degree of connectivity possible along the river and tributary streams and with adjacent upland areas. This will be difficult to achieve given the degree of land alienation and pressures for development and improved flood control. Improved public awareness and close cooperation between provincial, municipal, regional and federal governments is essential. Guidelines developed through the Stewardship Series of publications (see references) are very relevant for this ecosystem.

Active fluvial fans that develop on steeper gradient S3 to S6 creeks (e.g. Toboggan, Glacier Gulch, Kathlyn, Simpson and Dahlie Cks on the face of Hudson Bay Mtn.) often develop black cottonwood communities. I have not mapped these ecosystems, although they are very similar to and provide many of the same habitat features as the floodplain SBSdk/08. They tend to be less developed because they are not on level ground, but are increasingly used for rural housing. The more active portions of the fans should be retained as greenways within any subdivision developments. Logging and road construction (e.g. woodlots and mining access) on active fluvial fans need to be very carefully planned given the highly unstable nature of these ecosystems and the importance of maintaining their hydrological integrity.

SBSdk/04 Douglas-fir - feathermoss - stepmoss (S3, Blue list)
This community does not occur in the Bulkley.

ICHmc2/07 Western redcedar - hybrid white spruce - devil's club - horsetail (S3, Blue list)
This community is called: "western redcedar - hybrid white spruce - horsetail - skunk cabbage"

by Banner et al. (1993) - a much better name. Small pockets of nutrient-poor ICHmc2/07 swamp forest are fairly common in depressional areas throughout the ICHmc2 of the Bulkley (in the Kitseguecla Valley and around Moricetown), although skunk cabbage (*Lysichiton americanum)* and/or western redcedar will often be absent. Horsetail *(Equisetum* spp.) are the dominant indicator species. Small examples of nutrient-rich ICHmc2/07 -with horsetail, lady-fern (*Athyrium filix*-femina) and a great diversity of other forbs including some unusual species, are less common, but occur in former stream backchannels where the base of a slope intersects a fluvial ecosystem (e.g.along the Bulkley River). Large, well developed examples, particularly those with productive tree growth and large, healthy skunk cabbage are rare and need protection. One large occurrence of this community has been mapped on the east side of Hwy 16 just south of Moricetown and north of the new River Rd. subdivision. It does not have western redcedar, but does have abundant skunk cabbage -the most inland population known in the region. Another occurrence (without skunk cabbage or redcedar) has been mapped on the margins of the large swamp system on Graphite Ck. immediately north of Moricetown.

Small ICHmc2/07 occurrences may be included within larger logging blocks and logged with care. They are notoriously difficult to regenerate -usually in frost pockets -and clearcutting is generally not appropriate. Any small occurrences with western redcedar or skunk cabbage present or unusual diversity, and all large occurrences should be excluded from logging and avoided during road construction or other developments. When planning road and cutblock boundary locations, remember that these ecosystems are very sensitive to changes in hydrological properties that affect the degree of soil aeration and mineral supply.

ICHmc1/02 and ICHmc2/02 Western hemlock - kinnikinnick - cladonia (S3, Blue list)
This lodgepole pine-dominated site series, with Pl regenerating sporadically beneath the open forest canopy is found drier, sunnier parts of the ICHmc wherever the landscape includes rocky ridges or gravelly/sandy eskers, ridges or glaciofluvial outwash terraces, and where there is a sufficient history of forest fire (and mountain pine beetle attack?). In the Bulkley it occurs most extensively on south-facing ridgecrests on the north side of the Kitseguecla Valley (in association with the ICHmc/81). Another significant occurrence has been mapped on top of the basalt ridge at Doughty, just northwest of the junction of Hwy 16 and Kitseguecla Lake Rd, and there are scattered occurrences on south-facing ridge crests around Owens Ck. It is probably rare in the remainder of the Bulkley ICH because this tends to be sheltered, older hemlock forest. Many of the comments for the CWHws2/02 and SBSdk/02 apply here. I doubt that the gnome plant (*Hemitomes congestum)* occurs, but watch for it -also sites with a high understory cover of native grasses. Any xeric ecosystem on a sandy (little or no gravel) parent material is highly unusual.

Except in very exposed locations, intermittent fire may be needed to prevent these ecosystems from succeeding to Hemlock - feather moss communities. Logging and mild soil disturbance will partially, but not completely, mimic the ecological impact of fire (experience from Scandinavia suggests that changes in understory and epiphytic species composition occur when mechanical disturbance replaces fire). In landscapes where these ecosystems are rare, avoid preferentially locating roads and gravel pits on them.

ICHmc1/06 Western hemlock - azalea - skunk cabbage (S3, Blue list)
This plant community differs from the ICHmc2/07 mainly in that western redcedar is absent. It is also unlikely that skunk cabbage will be present - so horsetails are the dominant indicator plant. Small nutrient-poor occurrences of this plant community are reasonably common in small depressions throughout the ICHmc1 landscape. Large, nutrient-rich, fairly well-aerated examples of this site series are dominated by spruce (and subalpine fir?) rather than hemlock and occur on

silty or clayey fluvial or lacustrine landforms. These will be rare in the Bulkley ICHmc1 and are worthy of special attention. See ICHmc2/07 for management recommendations.

Definition 3: Ecosystems identified by the regional ecologist or regional rare and endangered species specialist as being rare or significant

The following plant communities have been identified as potential additions to the red and blue lists for the Bulkley. Field work was mainly in low elevation SBS. No effort has been made to include subalpine, alpine, wetland or aquatic plant communities. These habitats have a high potential for containing provincially significant plant communities, but are poorly studied. Low elevation wetland and aquatic communities are particularly threatened and should be a high priority for further field investigations.

Suggested Additions to the Red and Blue Lists

1. SBSdk floodplains

Active floodplains in the SBSdk contain a complex mosaic of forested, shrub and herb dominated communities. While the entire floodplain complex is imperiled by development, only the black cottonwood-dominated SBSdk/08 is currently listed. I have recommended two additional floodplain communities for red-listing: (a) paper birch-black twinberry, and (b) white spruce - horsetail (SBSdk/07), and one for blue-listing: (c) Pacific willow - mountain alder -lady fern.

a) SBSdk/07a seral association: Paper Birch - black twinberry fluvial forest (recommended Red list)

Stands dominated by paper birch (*Betula papyrifera)* are rare in the SBSdk. This plant community, a pure stand of "cathedral-like" paper birch on a very productive subhygric high bench floodplain with an understory shrub layer dominated by black twinberry, moist forbs including false sarsaparilla (*Aralia nudicaulis)*, common horsetail *(Equisetum arvense)*, oak fern (*Gymnocarpium dryopteris*), and Solomon's seals (*Smilacina* spp.*)* is exceptionally rare. It should probably be considered a seral association of the SBSdk/07a. Both known occurrences are very small: (one on an island in the middle of the Bulkley near Canyon Ck., the second on the Telkwa River floodplain below Goathorn Ck). It may also occur in the large floodplain area near the regional dump and in the Morice District on the Bulkley or Morice river floodplain.

b) SBSdk/07 Hybrid white spruce - horsetail floodplain forest (recommended Red list)

Spruce - horsetail forests growing on moist depressional sites are a widespread feature of the subboreal and boreal landscape. However, in the SBSdk they are both naturally uncommon and imperiled by land clearing and logging. I have mapped occurrences of this site series in the SBSdk of the Bulkley district and found them to be much less abundant and much smaller in size than the red-listed SBSdk/08. In particular, I have identified two types of SBSdk/07 that I feel should be red-listed: the SBSdk/07a (described in Banner et al. 1993 and by Pojar et al. 1986) is a highly productive spruce forest growing on sandy to silty Regosolic or Brunisolic floodplain soils. It is reasonably common on the Morice River floodplain -especially in the SBSdk/mc2 transition, but virtually absent elsewhere in the SBSdk where such sites are either dominated by black cottonwood or cleared. The other is a nutrient-rich SBSdk/07b swamp forest, with Gleysolic soils, on lacustrine or fluvial parent materials with water movement through the site. These rich forests have smaller spruce trees than the SBSdk/07a but have an incredibly diverse understory including such locally rare plant species as Rocky Mountain sedge (*Carex saximontana)* (blue-listed, see pg 27),water avens (*Geum rivale),* jewelweed (*Impatiens noli-tangere),* northern twayblade *(Listera borealis)* and many atypical bryophytes.

Although single-tree or small group selection logging is feasible under dry or solidly frozen soil conditions, in the Bulkley I recommend that this plant community be left unlogged because of its

rarity and sensitivity to windthrow and soil damage. The spruce will continue to regenerate without human intervention. Development in the vicinity of these ecosystems must be very careful not to alter the hydrological regime because minor changes in soil drainage can profoundly affect the plant community.

c) Pacific willow - mountain alder - lady fern - low bench floodplain (recommended Blue list) This plant community occurs in regularly flooded backchannels of SBSdk floodplains. It doesn't have much direct economic value but is extremely valuable as wildlife and fish habitat. In the Bulkley SBSdk these ecosystems are naturally uncommon, and threatened by insensitive construction practises, changes to natural drainage patterns and water pollution. These are highly diverse plant communities with multiple shrub layers and a lush herb layer dominated by ferns and horsetails. Highly accessible examples of this community occur at Riverside Park in Smithers and in the Cottonwood flats area of Telkwa.

In addition, there are several other non-forested plant communities containing highly specialized floodplain species that could be considered for listing after further sampling, for example:

- Bluejoint (*Calamagrostis canadensis*) - fowl bluegrass (*Poa palustris*) wet grassland
- Sandbar willow (*Salix exigua*) - wolf willow (*Elaeagnus commutata*) sand and gravel bars (threatened by white clover (*Melilotus alba*) and other non-native spp.),
- Yellow mountain avens (*Dryas drummondii*) - alpine milk vetch(*Astragalus alpinus*) sand and gravel bars (include with above?)
- Sedge (*Carex* spp.) - Horsetail semiaquatic backchannels

Many occurrences of these non-forested floodplain communities, including (c) above, are incorporated into the mapping of SBSdk/08 ecosystems as minor "ecocomponents" of the polygon. However, they should be recognized as distinct plant communities -not merely treated as seral stages of the /08.

2. ICHmc2/06 and ICHmc1/05 Black cottonwood - (hybrid) spruce - red osier dogwood floodplains (recommended Blue list)

Black cottonwood floodplains are blue-listed in the CWH, and red-listed in the SBSdk. It makes sense to blue-list this community in the ICHmc, even though they may be somewhat more abundant and less threatened. In the Bulkley, this plant community occurs along the main Bulkley River from Gramophone Ck. north. It has similar ecological properties to the SBSdk/08 but contains a number of coastal-transitional species such as western redcedar, Nootka rose (*Rosa nutkana*), beaked hazelnut (*Corylus cornuta),* and black sanicle (*Sanicula marilandica).* Watch for the rare pale springbeauty (*Claytonia spathulata)* and orange touch-me-not (*Impatiens aurella).* Information gained from ecological mapping of the major river systems in the Kispiox District can be used to determine whether or not to blue list these communities and how conservatively or liberally to interpret the riparian management guidelines.

3. SBSmc2 Black cottonwood - hybrid white spruce - red osier dogwood - prickly rose floodplains (recommended Blue list)

Banner et al. (1993) did not describe black cottonwood floodplains in the SBSmc2 zone because they are not sufficiently common, but the community does not stop at the SBSdk boundary. In the Bulkley, examples of SBSmc2 Black cottonwood - red-osier dogwood - prickly rose floodplain communities can be found mainly along the Telkwa River, the Babine and Nilkitkwa Rivers, and at the mouths of streams that feed into Babine Lake. Small pockets also exist on other stream systems. They can be readily located by doing a colour-themed check for Act-leading forest cover types. Black cottonwood ecosystems are a rare and extremely valuable habitat feature in the predominantly coniferous SBSmc2/ESSF landscape. However, I recommend that they be blue-listed rather than red-listed because the pressure for development is

low and they will tend to be protected by Protected Area status on the Babine, the Forest Ecosystem Network and FPC riparian management guidelines.

4. Grasslands and Meadows

In the description of the SBSdk/82 (pg. 12) I described 5 plant community types or complexes that marginally exhibit characteristics of the SBSdk/82. Here I provide a more detailed description of specific herbaceous plant communities that are recommended for red or blue-listing.

a) Timber oatgrass dry grassland (SBSdk, SBSmc2, ESSFmc, ESSFmk) (recommended Red (and blue?) list)

A xeric to submesic grassland community characterized by timber oatgrass (*Danthonia intermedia)* has been found on inactive level gravelly fluvial deposits from valley bottom to subalpine elevations. It should be red-listed in the SBSdk and SBSmc2, but may turn out to be sufficiently common in the ESSF that blue-listing is appropriate, because there are few threats at that elevation. It is very rare in the Bulkley, but increases in frequency to the southeast. This plant community was found on the Telkwa River near Goathorn Ck. (SBSdk) growing with needlegrasses (*Stipa richardsonii, S.occidentalis)* and may have been fairly common on fluvial terraces of the Bulkley River before these were cleared for agriculture. In the SBSmc2 it has been found in the driest portions of the fluvial (montane) meadow and wetland complexes in the Zymoetz River valley, but was absent from similar complexes at Netalzul meadows and Nilkitkwa Rivers. In the ESSF it occurs in gravelly frost pocket areas mingled with wetlands and begins to resemble dry alpine grassland, with spike trisetum and alpine timothy (*Phleum alpinum)* as common associates. Other associated species include: northern bedstraw *Galium boreale*, yarrow (*Achillea millefolium*), dwarf blueberry (*Vaccinium caespitosum*), sweetgrass (*Hierochloe odorata*), tall blue penstemon (*Penstemon procerus*), northern gentian (*Gentianella amarella*), orange agoseris (*Agoseris aurantiaca*), stonecrop (*Sedum lanceolatum*), strawberry (*Fragaria virginiana*), grape ferns (*Botrychium* spp,) and pussy toes (*Antennaria* spp). There is moderately developed cryptogammic crust with *Cladina* and *Peltigera* lichens, *Polytrichum juniperinum* and *Thuidium abietinum* mosses. These ecosystems are at risk from tree and shrub encroachment (aspen, Pl, prickly rose), invasive alien species (timothy, dandelion (*Taraxacum officinale)*, creeping red fescue *(Festuca rubra)*), gravel pit and road construction, and expansion of domestic grazing tenures. Avoid any soil disturbance and locate roads well away from these ecosystems.

b) Mesic (montane) forb meadows -variable species composition (all interior zones except AT) (recommended red and blue list)

These plant communities should be red-listed in the SBS and ICHmc and blue-listed in the ESSF. They can be found on level inactive fluvial deposits with a fine-textured surface capping over gravels, or on the gentle southwest-facing slope with a well drained but reasonably deep soil. Mesic forb meadows are difficult to name because their species composition varies greatly from one site to another and there are no obvious dominants. One is inclined to name the community after the particular plant that is in flower during sampling, but another species may become dominant later in the season or the following summer. Characteristic species include: buttercups (*Ranunculus* spp. dominant on the Nilkitkwa River), monkshood (*Aconitum delphinifolium* dominant in the Zymoetz), asters (*Aster modestus, A. ciliatus, A. conspicuus*), peavine, western meadow rue, northern bedstraw, meadow valerian (*Valeriana dioica*), fireweed, yarrow, goldenrod (Solidago canadensis) indian paintbrush (*Castilleja miniata* -orange and yellow), cinquefoils (*Potentilla* spp.*)*, native thistles (*Cirsium foliosum, C. edule)* and grapeferns. A variety of grasses (*Elymus glaucus, Poa spp., Bromus spp., Melica subulata, Schizachne purpurascens*) and sedges (esp. *Carex macloviana*) are present but never dominant.

These plant communities can be distinguished from moist cow parsnip plant communities (often present within the same meadow) by their lower stature, higher species diversity and absence or scarcity of cow parsnip, stinging nettle, large-leaved avens, arrow-leaved ragwort, and bluejoint. They are much less common, and are more prone to tree encroachment. Other threats include road and gravel pit construction, heavy recreational use (ATVs, hunting campsites) expanded use by domestic livestock, and seeding of agronomic species either on site or nearby. Native meadows with a significant component of this plant community should not be considered for anything but light or occasional domestic grazing. Avoid soil disturbance and locate roads well away from these ecosystems.

c) Cow parsnip - large leaved avens - stinging nettle - brome lush meadows (SBSdk, SBSmc, ICHmc, CWHws) (recommended Blue list)

Cow parsnip-dominated meadows are found on deep, rich, moist soils (often underlain by gravels) throughout much of British Columbia and have a fairly similar species composition wherever they occur. Their abundance in the landscape varies with climate, landforms and disturbance history (e.g. common in avalanche terrain or moist areas with repeated fire). I feel they should be blue-listed in the low elevation subzones of the southern Skeena Region (not the ESSF and MH) because they are nowhere very extensive, they are very important to vertebrate and invertebrate wildlife, and most occurrences I have seen are threatened in one way or another. In low elevation, developed areas they are threatened by suburban development, agriculture, domestic grazing and introduced plant species (e.g. Canada thistle (*Cirsium arvense)*). In less developed areas they are threatened by long term fire suppression, possible expansion of grazing tenures, and by insensitive logging and highway development -e.g. road locations and gravel pits across toe slopes and in riparian corridors. Blue-listing these communities would not make them off limits for range use, but should alert resource managers of the need to manage these ecosystems to ensure that they remain in the landscape and that a significant percentage be maintained in good to excellent condition.

d) Bracken - cow parsnip - rice root meadow (ICHmc2)

A rare variation of the more common cow parsnip meadow (c). This community occurs on a gentle south-facing toe slope with deep, rich fine-textured soil (e.g. fluvial or colluvial fan). It represents the southeastern range limit of bracken fern (*Pteridium aquilinum*) in the Skeena Region (it is more frequent in the CWHws1 and ICHvc). Other characteristic species include cow parsnip, western meadow-rue, stinging nettle, cleavers (*Galium aparine),* chocolate lily or riceroot *(Fritillaria camschatcensis),* fireweed,, dragonhead (*Dracocephalum parviflorum),* onion grass *(Melica subulata)* and tall blue lettuce *(Lactuca biennis).* These meadows were important sites for gathering indigenous food crops and may have been burned repeatedly. Digging of root crops by humans or bears may also have been an important disturbance. Once the bracken is well established the meadow is very resistant to tree encroachment, but occasional prescribed burning or tree cutting may still be required. Recorded at Kitseguecla Lake in good condition and at several locations along the Brackenridge in the Kitseguecla Valley in fair condition (domestic livestock grazing).

5. ICHmc2/08 Black spruce - hybrid white spruce - scrub birch - sedge (recommended Blue (red?) list).

Black spruce - peat moss ecosystems with more than 10% tree cover are uncommon, perhaps extremely rare in the ICHmc, and represent the southwestern range limit of *Picea mariana.* I do not know of any occurrences in the ICHmc2 of the Bulkley, but if they exist, they should be mapped and conserved. These ecosystems occur in frost pockets and thus typically contain boreal/sub-boreal vegetation; occurrences containing coastal species like hybrid Sitka spruce or western redcedar should be considered exceptional. These swamp forests tend to be nutrient-

medium rather than highly oligotrophic (acidic), so examples with few sedges and a high proportion of Ericaceous plants are likely to be rare. Watch for *Vaccinium uliginosum* -a bog blueberry with deciduous leaves that is absent from central Interior wetlands but common on the coast. Treat these wetlands cautiously, avoiding any disturbances (roads, bridges, culverts that attract beavers, etc.) that might interfere with natural drainage patterns.

6. ICHmc2/05 and ICHmc2/54: Hybrid spruce - paper birch - devil's club - lady fern (recommended Blue list)

The ICHmc2/05 is a localized and highly productive ecosystem that doesn't occur outside the coast-interior transition zone. It is similar to the red-listed CWHws2/07 (without the salmonberry). Wetter examples of the ICHmc2/54 are the seral equivalent of the ICHmc2/05 and have a restricted distribution. Both of these site units are localized in the eastern part of the ICHmc2 where there is a strong sub-boreal climatic influence. In the Bulkley, a few occurrences of these site series can be found in the Kitseguecla Valley and along the Bulkley River north of Moricetown, although most have already been logged. These ecosystems are highly productive for timber but difficult to manage silviculturally and usually occur in areas affected by riparian management guidelines.

7. ICHmc2/53 Trembling aspen - paper birch - beaked hazelnut - red-osier dogwood (recommended Blue list)

These deciduous forest communities are characteristic of the low elevation ICHmc2 which extends up the Bulkley Valley to the Kitseguecla Valley and Reiseter Creek. The ICHmc2/53 is a rare community in the Bulkley -less so in the Kispiox District. Throughout the Skeena region the best sites for this plant community are on arable, private land. Highly productive ICHmc2 seepage sites dominated by paper birch (toe slope, fluvial landform) should probably be blue-listed, because they are relatively uncommon, have high habitat value, and are threatened by various types of development. These can be located using themed forest cover maps (birch-leading, good site). I am unaware of any large stands in the Bulkley but some may occur on fluvial soils near the Bulkley River. I have sampled two small ICHmc2/53 ecosystems on Crown land near the mouth of Gramophone Ck. Beaked hazelnut occurs sporadically along the Telkwa High Road as far south as Reiseter Ck.

These ecosystems originally developed following fires, and from an ecosystem management perspective it makes sense that at least some should be burned in the future. However, they will not rapidly succeed to conifers in the absence of stand destroying disturbance. Vegetative regeneration of both birch and aspen does occur following both gap-level disturbances and larger scale events such as tent caterpillar outbreaks and climatic injury.

8. ICHmc1/ 03 & /04, ICHmc2/ 03 & /04, and ICHmc1a/02 and /03? Oak fern and Devil's club - Oakfern (possible Blue list?)

It doesn't make sense to include the CWHws2/04 and /05 as blue-listed ecosystems, and not include the analgous ecosystems in the ICHmc -particularly the ICHmc1a/02 and /03 which are practically identical (but less abundant). Personally, I feel that all of these site series should be removed from the blue list with the caveat that large, well-developed and highly productive examples of these ecosystems need to be well represented in protected areas and ecosystem networks -especially those with western redcedar (see comments re: CWHws2/03). This is more critical for the ICHmc than for the CWHws2 because there is less true old growth in this subzone due to fire history. These communities should be captured in landscape planning by rare ecosystem definition #4.

9. Canyon walls and rock cliffs (SBSdk, ICHmc2) and waterfalls (all zones)

Steep rocky cliffs and canyon walls are an uncommon to rare landscape feature at low elevations. Although many are unthreatened by human activity, in populated areas such as the Bulkley Valley they are often dynamited for rock quarries, bridge crossings, or to make room for development, and gentler slopes are damaged by heavy foot traffic (e.g. Moricetown Canyon). Most rock outcrops contain highly specialized, but fairly predictable assemblages of mainly widespread and secure species like three-toothed saxifrage (*Saxifraga tricuspidata),*stonecrops (*Sedum lanceolatum, S. divergens),* Jacob's ladder (*Polemonium pulcherrimum),* sheep fescue (*Festuca saximontana*), northern gooseberry (*Ribes oxyacanthoides),* fragile fern (*Cystopteris fragilis*), field chickweed (*Cerastium arvense),* hairy rockcress (*Arabis hirsuta),* rock mosses (*Tortula ruralis, Thuidium abietinum)* and various lichens. Occasionally one comes across a cliff or canyon wall with either exceptionally high plant diversity or with rare or outlier species, which should be recorded on maps and given some form of protection from development. These may have an unusual rock type (highly calcareous, recent basalt), microclimate (e.g. spray zone, or exceptionally hot and dry) or unusual disturbance history (e.g. constant ravelling, packrats), or they may just be exceptionally large with a great variety of different niches. With additional plant community descriptions it may be possible to propose some of these communities for red or blue listing, but currently these features have to be addressed on a case-by-case basis.

The canyon walls of the Bulkley River downstream of Driftwood Ck. contain some excellent examples of SBSdk and ICHmc2 rock outcrop ecosystems in good condition but they have not been sampled for rare plants. Remaining Crown land in the canyon sections of the river should probably be designated as Sensitive Areas -or included with the floodplains as Wildlife Habitat Areas. Smaller dry rock outcrops such as those above Tyhee Lake can contain unusual or rare species (e.g. tarragon (*Artemisia dracunculus)),* but will generally be mapped as SBSdk/81 (<20% of the polygon is rock). Netalzul Falls (Goal 2 Protected Area) has an excellent example of a spray zone community on base-rich parent material and supports several locally rare species (slender rock-brake (*Cryptogramma stelleri),* few-flowered meadow-rue (*Thalictrum sparsifolium),* reed canarygrass (*Phalaris arundinaceae),* various specialized bryophytes). Twin Falls on Hudson Bay Mtn has a large-awned sedge (*Carex macrochaeta)* spray zone community at the base but doesn't appear to support a highly specialized fern-moss community. Other local waterfalls (e.g. Maxwell Falls on Davey Ck) should be examined.

Definition 4. Ecosystems (site series or surrogate) that comprise less than 2% of a landscape unit and are not common in adjacent landscape units.

This definition can be used to capture regionally significant plant communities that may not be provincially significant, or locally significant communities that may not be regionally significant. For example, analysis of landscape units in the Bulkley may show there is very little mature Spruce or Lodgepole pine on zonal and subhygric ecosystems in the low elevation SBSdk subzone, or wet spruce horsetail ecosystems in the SBSmc2. Coastal transitional ecosystems that are common in the the Kalum or Kispiox Districts may be considered rare in the Bulkley. This definition can also be used to identify communities that have not yet been classified or recognized by the CDC or regional ecologist, for example, wetland and aquatic ecosystems, alpine and subalpine tundra and meadows, and unusual non-forest communities such as those associated with sandbars, rock outcrops, talus, waterfalls and caves.

Themed forest cover/age class maps, or predictive ecosystem mapping (where available) as a surrogate for Terrestrial Ecosystem Mapping are a good way to get an initial handle on the abundance and seral stage distribution of different community types. Some things to watch for in the Bulkley include: less common deciduous forest cover types (e.g. birch-leading in all zones; black cottonwood in the SBSmc; aspen in the ESSF); marginal coniferous types (e.g. outlying stands of hemlock in the Telkwa Ranges, and Babine/Nilkitwa, western redcedar in the

Kitsguecla, Bulkley Valley and Corya; old growth hemlock-amabilis fir in the Corya and Blunt; open range; non-forested shrub thickets (maple, alder, willow); meadows; low elevation rock cliffs or canyons, waterfalls and interesting wetland systems. Areas with unusual habitat diversity, interesting geological formations or anything else out of the ordinary should be considered a priority for TEM mapping or closer field inspection by rare and endangered species specialists.

Table 3. B.C. Conservation Data Centre: Rare Vascular Plant Tracking List -Bulkley Forest District (FD # 23)
last updated June 10, 1996

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	PROVINCIAL RANK	PROVINCIAL LIST
***** DICOTS**				
DELPHINIUM BICOLOR	MONTANA LARKSPUR	G4G5	S2S3	BLUE
DRABA ALPINA	ALPINE DRABA	G4	S1?	BLUE
DRABA CORYMBOSA	BAFFIN'S BAY DRABA	G4G5	S2S3	BLUE
DRABA LONCHOCARPA VAR VESTITA	LANCE-FRUITED DRABA	G4T2	S2S3	BLUE
DRABA RUAXES	COAST MOUNTAIN DRABA	G2G3	S2S3	BLUE
EPILOBIUM LEPTOCARPUM	SMALL-FLOWERED WILLOWHERB	G5	S2S3	BLUE
EUPHRASIA ARCTICA VAR DISJUNCTA	ARCTIC EYEBRIGHT	G5T5	S2S3	BLUE
IMPATIENS AURELLA	ORANGE TOUCH-ME-NOT	G4?	S1?	BLUE
SAGINA NIVALIS	SNOW PEARLWORT	G5	S1?	BLUE
SALIX SESSILIFOLIA	SESSILE-LEAVED SANDBAR WILLOW	G4	S2S3	BLUE
--				
***** MONOCOTS**				
ACORUS AMERICANUS	AMERICAN SWEETFLAG	G5	S1?	BLUE
CAREX SAXIMONTANA	ROCKY MOUNTAIN SEDGE	G5	S2S3	BLUE
SPARGANIUM FLUCTUANS	WATER BUR-WEED	G5	S1?	BLUE

13 TAXA LISTED

Rare Vascular Plants of the Bulkley

No red-listed and 13 blue-listed vascular plant species or varieties are known or thought to occur within the Bulkley (Table 3). Most are unlikely to occur within commercially operable conifer forest (but see *Epilobium leptocarpum* and *Impatiens aurella*). If you think you have found one of these plants, mark it with labelled flagging tape, accurately record the location (on an air photo if available), elevation, slope and aspect and dominant vegetation and habitat features (see Appendices for CDC Field Observation Form (Plants). Take photographs if possible. Do not collect a voucher specimen unless the population is large and you feel it is important to do so - in which case follow the 1 in 20 rule (never collect more than one-twentieth of the population). Do not pull roots or rhizomes from the ground.
Contact: Anne Hetherington, Rare and Endangered Species Specialist, Skeena Region Wildlife Branch, B.C. Ministry of Environment, Lands and Parks. Ph: 847-7692; fax: 847-7728; e-mail: anne.hetherington@gov.bc.ca.

Dicotyledons:

Delphinium bicolor Montana larkspur. Montana larkspur is a plant of the Rocky Mountains. In B.C. it is typically found only the Crowsnest Pass area in extreme southeastern B.C. in open parklike and grassy areas at subalpine (ESSF) elevations. Compared to our common tall delphinium (*Delphinium glaucum),*it is shorter (70 cm max.), with larger deep blue to purplish flowers that are fully open rather than cuplike -and not at all hooded (compare with monkshood (*Aconitum delphinifolium*)). The stem is slender and solid, rather than thick and hollow, with only a few leaves near the base. Look for it in subalpine meadows.
Reference and drawing: Brayshaw 1989

Draba alpina Alpine draba or whitlow-grass. This tiny, densely tufted perennial (2 - 15 cm tall) has oversized yellow flowers, mainly glabrous (non-hairy) fruit, and prominent styles up to 1 mm long. The lower leaf surface has uniformly distributed unforked to 7-forked hairs. Alpine draba is an arctic and boreal plant that occurs rarely in northern B.C. Look for it in moist snowbeds in the alpine tundra. References: Cody 1996(drawing), Douglas et al. 1989, Mulligan 1976.

Draba corymbosa Baffin's Bay draba or whitlow-grass. Yet another arctic tussock plant, this draba grows on mesic to dry meadows in the alpine tundra. Its flowers are pale yellow, but the fruits and flowering stems are conspicuously hairy. Styles are 0.3 to 0.7 mm long. Lower leaf surfaces have uniformly distributed 1- to 3-forked to long-stalked stellate (star-shaped) hairs; no unforked (simple) hairs.

Draba lonchocarpa var. ***vestita*** Lance-fruited draba or whitlow-grass. The rare variety ***vestita*** of this white-flowered draba has glabrous fruits that are very narrow (<2 mm wide). It is loosely tufted and has hairless flowering stems with 1-2 leaves. The hairs on the lower leaf surface are short-stalked and stellate rather than forked. Look for this one on talus, scree slopes and drier meadows in coastal-transitional alpine tundra.
References: Douglas et al. 1989, Mulligan 1976, Pojar and McKinnon 1994 (photo and drawing).

Draba ruaxes Coast Mountain draba or whitlow-grass. Another yellow-flowered draba, this one occurs on limestone rock or scree and dry alpine meadows in the Coast Mountain Range. It has rounded rather than tapered fruit. The fruits and flowering stems are glabrous or have a few simple hairs. The leaves have long-stalked stellate hairs on the lower surface and long, simple to few-forked hairs on the upper surface. References: Cody 1996(drawing), Douglas et al. 1989, Mulligan 1976.

Epilobium leptocarpum Small-flowered willowherb. A decidedly non-showy willowherb, this small perennial is rare throughout B.C., growing along streambanks and in moist meadows from middle to high elevations. It has pinkish to purplish petals 3-5 mm long and grows erect rather than trailing along the ground. It consistently produces fleshy rosettes called "turions" at the base of the stem. This willowherb can be distinguished from the common weedy purple-leaved willowherb (*E. ciliatum)* by the presence of gemmae (reproductive buds) in the upper leaf axils, short stiff hairs rather than glandular hairs on the seedpods and upper stems, and a persistent tuft of reddish-brown hair on the seed. Probably easily overlooked.
References: Douglas et al. 1990, Hitchcock and Cronquist 1973 (drawing).

Euphrasia arctica var. ***disjuncta*** Arctic eyebright. Arctic eyebright is a northern plant that extends south into our region where it can be found in bogs and around the borders of ponds, streams and lakes. It has been recorded in the Smithers Community Forest. This plant is an annual and usually has a single or slightly branched hairy stem and distinctively toothed, glandular-hairy leaves. The flowers are white and yellow, shaped like a snapdragon and surrounded by a leafy bract. This rare plant looks nearly identical to the introduced Eurasian weed hairy eybright (*E. officinalis*) which has white and purple flowers, less hairy flowers and leaves, and grows on disturbed soils.
Reference and drawing: Taylor 1974.

Impatiens aurella Orange touch-me-not. This shade- and moisture-loving plant has small (<20 mm) but showy orange flowers with a downward curved spur and explosive fruits. The foliage is succulent and easily bruised with leaves resembling those of the commonly cultivated *Impatiens.* It could be confused with the common touch-me-not or jewelweed (*Impatiens noli-tangere*) which grows along streambanks in moist, nutrient-rich shaded forests and swamps in the Bulkley Valley. This plant, which despite its name is not particularly common in our area, has larger yellow flowers with purplish brown to orange spots, but is usually non-flowering. Evidence from Europe suggests that *I. noli-tangere* may be intolerant of forest fragmentation, requiring "forest-interior" conditions, though it does grow on disturbed soils. If orange touch-me-not is present in the Bulkley Valley, it probably occupies the same low elevation SBSdk/ICHmc2 habitats, and I'd assume it has similar or greater sensitivity to forest fragmentation.
References: Douglas et al. 1989, Hitchcock and Cronquist 1973 (drawing).

Sagina nivalis Snow pearlwort. Another arctic-alpine plant that apparently extends south into northern and central B.C., snow pearlwort forms flat reddish-green cushions only a few centimetres wide. The stems spread outwards and the flowers are tiny, with the white petal barely exceeding the green, purplish-margined sepals. It can be distinguished from other more common species of pearlwort by its narrowly triangular awl-pointed stem leaves, purple sepal margins and cushion-like habit. This plant can potentially occur at all elevations on moist to mesic sites and lake margins. Reference and drawing: Cody 1996.

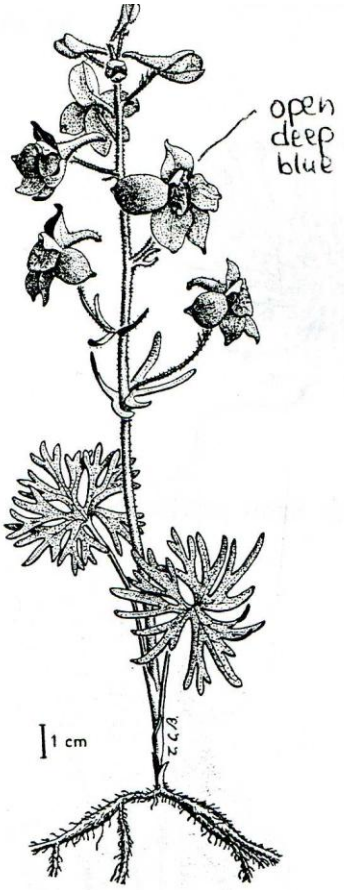
Salix sessilifolia Sessile-leaved sandbar willow. An erect shrub usually 1-3 m tall (max 8 m), this willow forms colonies on sand and gravel bars along riverbanks sandbars by sprouting from its long shallow roots. Like other sandbar willows it has very narrow leaves 5-8 times as long as wide. Unlike the common sandbar willow (*S. exigua), S. sessilifolia* is densely covered with silky grey hairs, has a short style and a slender (not stout) stigma. It is normally thought of as a coastal willow. Reference and drawing: Brayshaw 1996.

Monocotyledons:

Acorus americanus American sweetflag. This plant is a relative of skunk cabbage and calla lily and grows in the same shallow water habitats. It also has a fleshy spadix, but unlike the other two members of its family it has long, linear leaves like a cat-tail and a green rather than a yellow or white spathe. Because it is a southern species, I would look for it along the margins of warm-water lakes and ponds in the SBSdk zone. References: Douglas et al. 1994, Hitchcock and Cronquist 1973 (drawing).

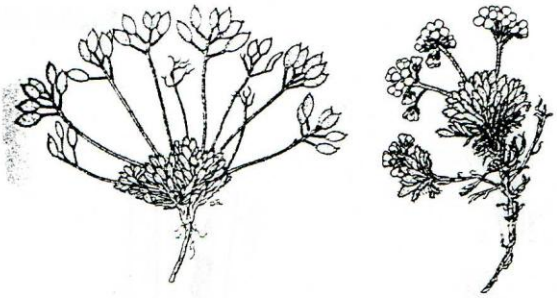
Carex saximontana Rocky Mountain sedge. Also known as *Carex backii*, this rare sedge has been found locally in moist meadows on Grouse Mountain, in the understory of a spruce - horsetail swamp on the Telkwa High Road, in moist crevices of a basalt cliff at Babine Lake, and in an aspen thicket on the north shore of Francois Lake. This sedge has broad flat leaves. When flowering it looks unlike any other local sedge because the lower pistillate scales are like large leafy bracts with long tapered tips, enclosing the perigynia which are large ($\pm$5mm), plump and held erect.
References: Douglas et al. 1994; Taylor 1983 (drawing).

Sparganium fluctuans Water bur-weed. A floating grasslike aquatic plant with prominent burr-like fruits to be looked for in the shallow water of ponds, lakeshores and slow-moving streams, probably at low elevations. Although *S. fluctuans* is listed by the CDC in the Bulkley, I note that Douglas et al. (1994) refer to another bur-reed (*Sparganium glomeratum)* as being rare and known only from the Queen Charlotte Islands and the Smithers area. Both species are typically found in eastern North America. There are several other bur-reed species in B.C. -some fairly common - and they all look very similar. *S. fluctuans* has conspicuously curved achene beaks while *S. glomeratum* has a straight beak and the staminate (male) heads are closely adjacent to the upper pistillate head. Both have achene beaks longer than 1.5 mm.
References: Douglas et al. 1994, Johnson et al. 1995.

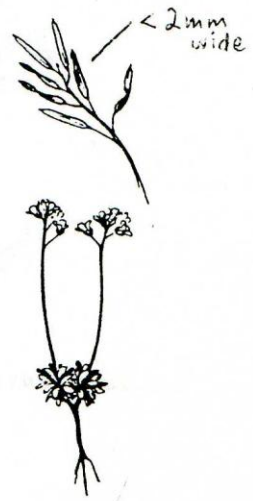


Delphinium bicolor Montana larkspur

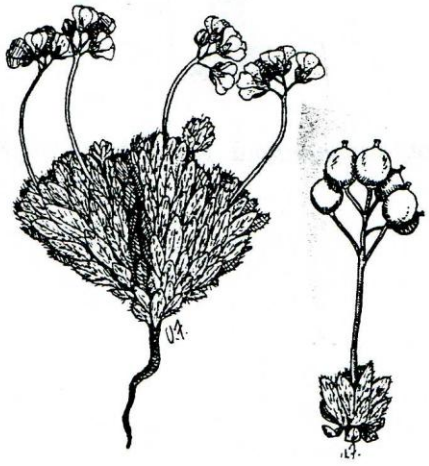
Draba alpina Alpine draba



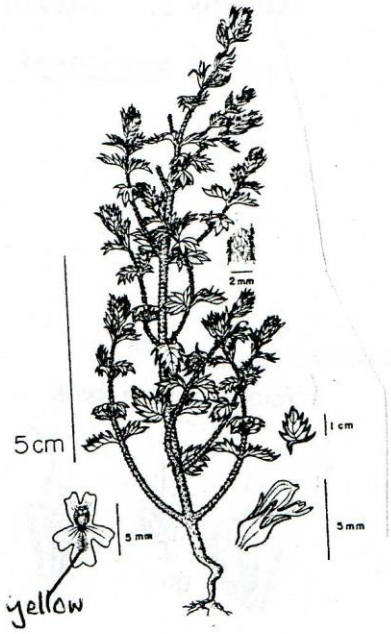
Draba corymbosa Baffin's Bay draba



Draba lonchocarpa var. ***vestita***
Lance-fruited draba



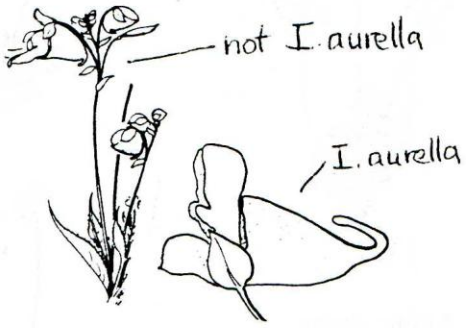
Draba ruaxes Coast Mountain draba



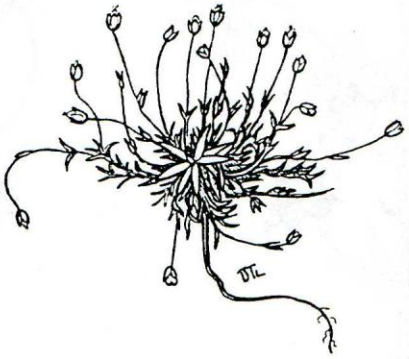
Euphrasia arctica var. ***disjuncta*** Arctic eyebright

Epilobium leptocarpum
Small-flowered willowherb

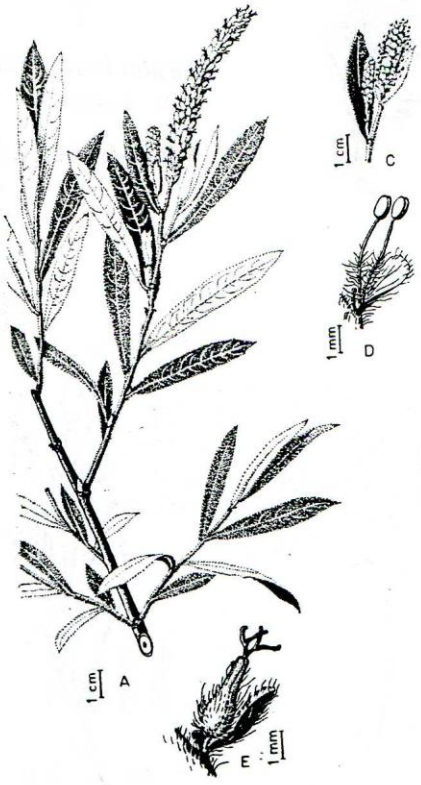
Figure 1. Blue-listed vascular plants of the Bulkley Forest District



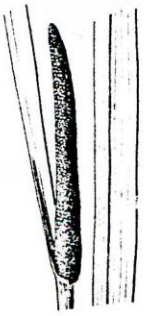
Impatiens aurella Orange touch-me-not.



Sagina nivalis Snow pearlwort

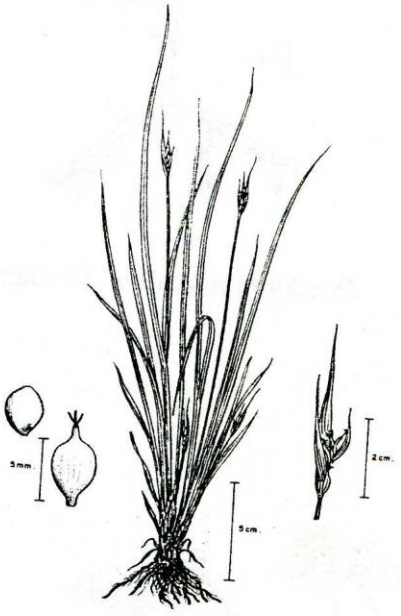


Salix sessilifolia Sessile-leaved sandbar willow

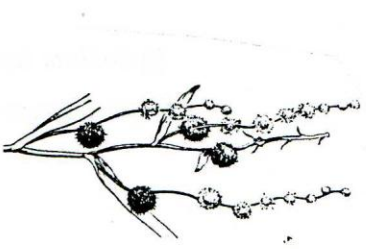


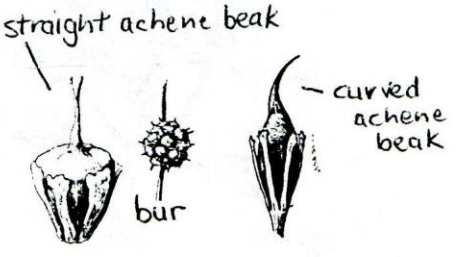
Acorus L. Sweet Flag

not A. americanus



Carex saximontana Rocky Mountain sedge





Sparganium bur-weed Not S. fluctuans

Figure 1 cont'd.....blue-listed vascular plants of the Bulkley Forest District

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Rare Plant Communities and Plant Species
of the
Kispiox Forest District

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Rare Plant Communities and Plant Species of the Kispiox Forest District
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Introduction

The purpose of this report is to provide operational staff working in the Kispiox Forest District with information to help incorporate knowledge about rare plant communities and plant species into resource management activities. It does not provide information on rare animal species.

Rare Plant Communities of the Kispiox Forest District

Rare Ecosystem (Ministry of Forests working definition, November 1997)
Rare ecosystems are defined to include:

1. Plant communities listed in the Identified Wildlife Guidebook (includes red-listed species affected by forest or range activities);

2. Plant communities listed as red or blue with the B.C. Conservation Data Centre;

3. Ecosystems identified by the regional ecologist or regional rare and endangered species specialist as being rare or significant; and

4. An ecosystem (site series or surrogate) that comprises less than 2% of the landscape unit and is not common in adjacent landscape units.

Definition 1. Plant communities listed in the Identified Wildlife Guidebook
A draft version of the Forest Practises Code guidebook for managing rare and endangered species and ecosystems - called the "Managing Identified Wildlife Guidebook" - is currently being reviewed. The guidebook was not consulted during the preparation of this report. Apparently it will include a few of the most important red-listed plant communities in the province affected by forest and range activities, but it is not yet clear what management policies and procedures the guidebook will recommend.

Definition 2. Plant communities listed as red or blue with the B.C. Conservation Data Centre The B.C. Conservation Data Centre (**CDC**) is a program of the Wildlife Branch of the B.C. Ministry of Environment, Lands and Parks. The CDC collects information on the rare and endangered plants, animals and plant communities in British Columbia and maintains a computerized database on their status, location and level of protection. The CDC is a partner of the National Heritage Network, a international body that uses the standardized methods and terminology to gather and exchange information on threatened elements of global biodiversity. By international convention, the CDC uses the term "plant community", rather than the term "ecosystem". These terms are used more-or-less interchangeably in this report.

In British Columbia we tend to use the names and abbreviations of Biogeoclimatic Site Series (e.g. SBSdk/81 Saskatoon - slender wheatgrass) when referring to plant communities or ecosystems. This is often appropriate, but in some cases the rare plant community may be a exceptional variation of a more common site series. For example, it may occur on an usual type of parent material, or be dominated by an unusual tree species. Where this is the case, it is addressed below in the descriptions of individual plant communities.

For each Forest District in British Columbia, the CDC maintains a tracking list of **red**- and **blue-listed** species and plant communities known or believed to occur within the District. The most recent version of the list is available at the website: **www.env.gov.bc.ca/wld/cdc.**

Table 1. CDC Definitions

Global Ranks (G1 to G5) These reflect the conservation status of an organism from a global (i.e. range-wide) perspective. Plant communities are not currently assigned a global rank, because there is no established international system for classifying or comparing plant communities.

Provincial Ranks (S1 to S5) These reflect the conservation status of an organism or plant community within the province of British Columbia. Note that a species or community can be considered imperiled or vulnerable within British Columbia even if it is common or secure outside of the province. However, organisms or communities that are threatened locally (e.g, within the Kispiox District) may not be ranked if they are common in other areas of the province.

G1 or S1 = critically imperiled because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 5 or fewer occurrences or very few remaining individuals (<1,000).

G2 or S2 = imperiled because of extreme rarity or beause of some factor(s) making it especially vulnerable to extinction. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000).

G3 or S3 = vulnerable either because very rare and local throughout its range, found in only a restricted range (even if abundant at some locations) or because of other factors making it vulnerable to extinction. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.

G4 or S4 = apparently secure Uncommon but not rare, and usually widespread. Possibly cause for longterm concern. Typically more than 100 occurrences or more than 10,000 individuals.

G5 = secure common, typically widespread and abundant.

T = infraspecific taxon (trinomial) Subspecies or varieties of a species (indicated by a scientific name with three parts) have a "T" following the global or provincial rank. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1.

U = **Unrankable** due to lack of information about status or trends.

Range Ranks (S#S# or G#G#) or **?** are used to indicate uncertainty about the exact status of a taxon or community.

Provincial Lists

red list: includes any indigenous species or subspecies (taxa) considered to be Extirpated, Endangered, or Threatened in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. Red-listed taxa include those that have been, or are being, evaluated for these designations.

blue list: includes any indigenous species or subspecies (taxa) considered to be Vulnerable in British Columbia. Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened.

Relationship between Red and Blue Lists and Provincial Ranks

	RED LIST	**BLUE LIST**
Plants:	S1 S2	S1? S2S3
Plant Communities:	S1 S1S2 S2 S2?	S2S3 S3 S3?

Red- and Blue-Listed Plant Communities of the Kispiox Forest District

The order of presentation follows the CDC tracking list of June 10, 1996 (Table 2). Please refer to the Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region (Banner et al. 1993) for a description of the biogeoclimatic site series which correspond to each of the listed plant communities.

CWHws1 or CWHws2/04: Amabilis fir - western redcedar - oakfern (S3, Blue list)
There is no CWHws1 in the Kispiox Forest District, but the CWHws2 is extensive at middle elevations (roughly 600 - 1000 m elev.) along the Skeena River and its tributaries west of Kitseguecla and on both sides of the Kitwanga/Cranberry River valley. Within this landscape, small pockets of the CWHws2/04 (subhygric/rich) site series are very common on toe slopes, along drainage channels, in fluvial fans or wherever intermittent seepage occurs. These are productive sites for conifer growth and tend to be targeted for logging, however there is no great danger of permanent habitat loss. Tree, shrub, herb and moss layers generally contain no vulnerable species. However, watch out for unusual ferns, and the epiphytic lichen and fungal communities may contain rare species (see e.g. Goward 1996) Large, well developed, old growth examples of the CWHws2/04 are uncommon. Any sites with extremely large trees, or of exceptional antiquity or diversity should be considered for protection. Such ecosystems tend to occur on large fluvial fans or, less frequently, on inactive alluvial floodplains or lacustrine deposits near lakes. These ecosystems depend on the flow of moisture and nutrients from upslope, and their humid, sheltered setting may be influenced by surrounding forest cover. To preserve ecosystem integrity, road construction and timber harvesting should take these factors into account.

CWHws1 or CWHws2/06: Amabilis fir - western redcedar - devil's-club (S3, Blue list)
Once again, there is no CWHws1 in the Kispiox Forest District. Most of the comments for the CWHws2/04 apply, but this site series is less abundant, usually more productive for tree growth, and is probably more sensitive to changes in the hydrological regime and microclimate. Some of the best remaining old growth is found on this site series. These ecosystems are typically diverse in species and structure and have high habitat value for a range of wildlife. Herb layers may contain infrequent or unusual species.-particularly along streambanks, and rare lichens may be present in the canopy. These factors combine to make the CWHws2/06 more vulnerable and worthy of careful management and conservation than the CWHws2/04. Large, well developed examples of this plant community typically occur on large fluvial fans, lacustrine deposits or older floodplains and should definitely be given priority for conservation.

ESSFmc/02 Subalpine fir - lodgepole pine - juniper - lichen (S3, Blue list)
There is only a small area of ESSFmc subzone in the Kispiox District, around Gunanoot Lake, east of Gail/Cataline Creeks. In this area, dry rocky outcrops or sandy/gravelly ridges and terraces with lodgepole pine, juniper and abundant terrestrial and arboreal lichens are probably uncommon in the landscape, and are an important habitat feature for a variety of wildlife because the open, dry setting contrasts with the surrounding moister landscape. Ridgetops and eskers are often preferred travel corridors for vertebrates. Watch out for whitebark pine (*Pinus albicaulis)* and its avian consort, the Clark's nutcracker, which have not been recorded in the Kispiox District, and for unusual mosses such as the tiny *Buxbaumia* ("bug-on-a-stick moss"). The ESSFmc/02 usually occurs as minor inclusions within cutblocks (commonly left for wildlife tree patches), while larger examples tend to be unmerchantable -although they are often favoured for road

Table 2. B.C. Conservation Data Centre: Rare Plant Community Tracking List -Kispiox Forest District (FD # 24)

Last updated June 10, 1996

SCIENTIFIC NAME	COMMON NAME	HABITAT* REQUIREMENT	PROV RANK	PROV LIST
ABIES AMABILIS/THUJA PLICATA - GYMNOCARPIUM DRYOPTERIS	AMABILIS FIR/WESTERN REDCEDAR - OAK FERN	CWHws1/04 CWHws2/04	S3	BLUE
ABIES AMABILIS/THUJA PLICATA - OPLOPANAX HORRIDUS, MOIST SUBMARITIME	AMABILIS FIR/WESTERN REDCEDAR - DEVIL'S CLUB, MOIST SUBMARITIME	CWHws1/06	S3	BLUE
ABIES AMABILIS/THUJA PLICATA - OPLOPANAX HORRIDUS, WET SUBMARITIME	AMABILIS FIR/WESTERN REDCEDAR - DEVIL'S CLUB, WET SUBMARITIME	CWHws2/06	S3	BLUE
ABIES LASIOCARPA - JUNIPERUS - CLADONIA	SUBALPINE FIR/LODGEPOLE PINE - JUNIPER - LICHEN	ESSFmc/02	S3	BLUE
ABIES LASIOCARPA - PINUS CONTORTA- CLADONIA	SUBALPINE FIR/LODGEPOLE PINE - CLADONIA	ESSFwv/02	S3	BLUE
ABIES LASIOCARPA - VACCINIUM MEMBRANACEUM - EMPETRUM	SUBALPINE FIR - HUCKLEBERRY - CROWBERRY	ESSFmc/03	S3	BLUE
LUZULA PIPERI		AT	S2	RED
PICEA MARIANA - VACCINIUM MEMBRANACEUM - PETASITES	BLACK SPRUCE/LODGEPOLE PINE - FEATHERMOSS	SBPSmc/03 SBSmc2/03	S3	BLUE
PICEA SITCHENSIS - RUBUS SPECTABILIS, WET SUBMARITIME 1	SITKA SPRUCE - SALMONBERRY, WET SUBMARITIME 1	CWHws1/07	S2	RED
PICEA SITCHENSIS - RUBUS SPECTABILIS, WET SUBMARITIME 2	SITKA SPRUCE - SALMONBERRY, WET SUBMARITIME 2	CWHws2/07	S2	RED
PINUS CONTORTA - ARCTOSTAPHYLOS UVA-URSI	LODGEPOLE PINE - KINNIKINNICK	CWHws1/02 CWHws2/02	S3	BLUE
PINUS CONTORTA - SPHAGNUM GIRGENSOHNII, WET SUBMARITIME 2	LODGEPOLE PINE - SPHAGNUM, WET SUBMARITIME 2	CWHws2/10	S3	BLUE
POA RUPICOLA		AT SWB	S2	RED
POPULUS BALSAMIFERA SSP TRICHOCARPA - CORNUS SERICEA	COTTONWOOD - RED-OSIER DOGWOOD	CWHvm1/10 CWHwm/06* CWHws1/08* CWHws2/08*	S3	BLUE
THUJA PLICATA - OPLOPANAX HORRIDUS - EQUISETUM ARVENSE	WESTERN REDCEDAR/HYBRID WHITE SPRUCE - DEVIL'S CLUB - HORSETAIL	ICHmc2/07	S3	BLUE
TSUGA HETEROPHYLLA - ARCTOSTAPHYLOS - CLADONIA	WESTERN HEMLOCK - KINNIKINNICK - CLADONIA	ICHmc1/02 ICHmc2/02	S3	BLUE
TSUGA HETEROPHYLLA - MENZIESIA - LYSICHITON	WESTERN HEMLOCK - AZALEA - SKUNK CABBAGE	ICHmc1/06	S3	BLUE

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

locations, gravel pits, and campsites. Fire suppression may pose the most serious long term threat to these plant communities as the organic layer builds up, moss replaces lichen, and subalpine fir replaces pine. Periodic disturbance to the canopy and forest floor (e.g. summer logging or prescribed burning) may be beneficial to these ecosystems, but chronic or severe soil disturbance should be avoided.

ESSFwv/02 Subalpine fir - lodgepole pine - cladonia (S3, Blue list)
The ESSFwv is the dominant subalpine subzone in the Kispiox Forest District, but because it has a wet, snowy climate with infrequent fire, dry pine-lichen plant communities are a relatively rare feature in the landscape, and this makes them valuable habitat. Similar management concerns exist as for the ESSFmc/02, but fire suppression may be an even greater threat because of the rarity of the ecosystem, and a more rapid rate of organic matter accumulation. Avoid converting these ecosystems to roads, landings or gravel pits because they are "unproductive". Large, well developed examples of this plant community, any sites with sandy rather than gravelly or rocky soil, and young wildfire-origin stands should be mapped and given priority for conservation.

ESSFmc/03 Subalpine fir - huckleberry - crowberry (S3, Blue list)
This plant community is widespread and apparently common in the ESSFmc (it's probably listed because of its importance to caribou further east), particularly at parkland elevations where it often occurs in a ridge-hollow complex with subalpine meadows. However, it is probably quite unusual in the Kispiox District where the ESSFmc is limited, and the landscape is dominated by moister ecosystems. Berry production in these communities is important for bears, birds and other wildlife. Without wildfire, seral stages of this plant community may be more threatened than mature and old growth stages. Thus, although most sites are not suitable for timber production, there is no compelling reason to protect lower elevation occurrences from logging. Severe disturbance or permanent habitat destruction should be avoided. Watch out for white-flowered rhododendron (*Rhododendron albiflorum*) -at the northwestern limit of its range.

AT/00 Luzula piperi (S2, Red list)
Piper's woodrush is an alpine plant that occurs in depressional "snowbed" areas of the tundra. We have no information on the distribution or abundance of this plant community in the Prince Rupert (Skeena) Region. Field observations are welcome.

SBSmc2/03 Black spruce - Lodgepole pine - Feathermoss (S3, Blue list)
Black spruce - lodgepole pine communities growing on mineral soil are a relatively rare feature in western, mountainous portions of the SBS, although they are common in the plateau country from Nilkitkwa River - Babine Lake eastwards, and in the true boreal forest. In the Kispiox District, black spruce is at the southwestern limits of its range, and therefore particularly rare and vulnerable. We do not know of any occurrences of this community in the District, but look for it in the upper Nass and the Babine-Shelagyote drainages, and in transitional ICHmc/SBSmc areas. The SBSmc2/03 invariably occurs on level, low-lying (frost pocket) or north aspect sites where soils are compacted or otherwise have restricted rooting. Small patches typically occur in association with wetlands. Black spruce can be difficult to distinguish from slow-growing, clubby-topped white spruce (check the cones and the hairy twiglets). The understory vegetation contains an assortment of Ericaceous plants (labrador tea (*Ledum groenlandicum),* creeping-snowberry (*Gaultheria hispidula)* and poor-site mosses that are uncommon on upland ecosystems. These communities have low timber productivity, and protecting them from indiscriminate logging and silvicultural practises should not be difficult, with a little awareness. Encourage natural regeneration of black spruce. Prescribed burning or light soil scarification is more appropriate than severe mechanical site preparation treatments (mounding, plowing, ripping) intended to enhance site productivity. Protect these sites from changes in soil drainage

that may cause flooding. Any large, well developed examples of this plant community in the Kispiox should be mapped and protected.

CWHws1 and CWHws2/07 Sitka spruce - salmonberry wet submaritime (S2, Red list)
Sitka spruce floodplain ecosystems have been red-listed wherever they occur in British Columbia. The classic low elevation Sitka spruce - salmonberry plant community that has been almost entirely logged out of the major floodplains around Terrace and the Kitimat valley does not exist in the Kispiox Forest District. Floodplains in the CWHws2 are smaller, colder and snowier, often dominated by shrub thickets and wetlands. Subalpine fir is usually the dominant tree and the spruce is a hybrid (probably mainly white x engelmann with only minor Sitka genes). Floodplain understories are dominated by devil's club, black twinberry, mountain alder, highbush-cranberry, red-osier dogwood and only minor amounts of salmonberry. These are high value riparian complexes that warrant protection to maintain the integrity of both aquatic and terrestrial ecosystems. The best examples of this plant community will be found on braided (wandering) stream reaches on any of the larger stream systems within the CWHws2 (possibly Kitsuns, Sedan, Kitwancool, Kitwanga, Cranberry). Reaches with a stable, single thread channel tend to have small, high benches with poorly developed floodplain communities.

CWHws1 and CWHws2/02 Lodgepole pine - kinnikinnick (S3, Blue list)
Very dry ecosystems with a history of recurring fire and with lodgepole pine regenerating in the forest understory are uncommon in the CWHws, and rare within the high elevation CWHws2. One of the best places to look for such ecosystems is on south-facing slopes of the mid-Skeena, above Cedarvale and Woodcock, and possibly in the Oliver Ck. drainage. These ecosystems have interesting lichens, saprophytes, fungi and insects that are unusual within a coastal-type forest. Look for the rare gnome plant (*Hemitomes congestum*-pg 354 in Pojar and MacKinnon 1994) a saprophyte with an outlier population in the Skeena River valley. This plant is thought by some to be "old-growth-dependent" or at least dependent on mature forest -but doesn't seem to have been eliminated by periodic fire here. Also watch for an unusual variation of this plant community: open-grown lodgepole pine with native red fescue (*Festuca rubra)* bunchgrass in the understory, found on a few warm dry south-exposed sand ridges and rock outcrops near Terrace. The CWHws2/02 is normally considered inoperable, but may occur as small inclusions within larger cutblocks. Over the long term, fire suppression may pose the greatest threat, causing these ecosystems to gradually succeed to hemlock - moss plant communities.

CWHws2/10 Lodgepole pine - Sphagnum (S3, Blue list)
Bog forests with more than 10% cover of lodgepole pine growing in peat are probably very rare in the CWHws2 of the Kispiox District since most of this landscape is steep and mountainous. These ecosystems normally occur near non-forested wetlands and should be relatively straightforward to identify. The lodgepole pine in this community is not of merchantable size. To maintain this plant community avoid changes to local drainage patterns and sudden changes in exposure (e.g. clearcutting to the wetland boundary). Any large, well developed examples of this plant community should be mapped and given high priority for conservation.

AT/00 Poa rupicola (S2, Red list) (SWB is not found in the Kispiox Forest District).
A type of alpine or subalpine grassland that occurs on dry open slopes with sandy or gravelly soils. We have no information on the distribution or abundance of this plant community in the Kispiox District. Field observations are welcome.

CWHws2/08 Cottonwood - red-osier dogwood (S3, Blue list)(CWHvm1, CWHwm and CWHws1 are not found in the Kispiox Forest District). Middle fluvial benches dominated by black cottonwood with a minor cover of hybrid sitka spruce, subalpine fir, western redcedar or western hemlock occur on the active floodplains of larger rivers and streams and are generally easy to identify and map (using a printout of Act-dominated forest cover types). These ecosystems have been blue-listed throughout the CWH because of their exceptionally high habitat value, their sensitivity to changes in the hydrologic regime, and the degree of human development along major river corridors. Within the CWHws2, this plant community is rare because there are few large floodplains, but most are minimally affected by human activity. The best examples of this plant community will be found on braided (wandering) stream reaches on any of the major river/creek systems within the CWHws2. Reaches with a stable, single thread channel will tend to have small, high benches and terraces with poorly developed floodplain communities. Possible places to look for this community include the upper reaches of Kitsuns, Sedan and Kitwancool Creeks, and the upper Kitwanga and Cranberry Rivers. Some active fluvial fans will have black cottonwood-dominated plant communities that approximate the CWHws2/08 (often seral stages of the CWHws2/03 or /04).

ICHmc2/07 Western redcedar - hybrid white spruce - devil's club - horsetail (S3, Blue list)
This community is called: "western redcedar - hybrid white spruce - horsetail - skunk cabbage" by Banner et al. (1993) -a much better name. Small pockets of relatively low-productivity ICHmc2/07 swamp forest are common in depressional areas throughout the ICHmc2, although skunk cabbage (*Lysichiton americanum)* is often absent. Small examples of nutrient-rich ICHmc2/07 are also fairly common in former stream backchannels where the base of a slope intersects a fluvial ecosystem. Large, well developed examples, particularly those with productive tree growth and large, healthy skunk cabbage are rare and deserve protection. They have high species and habitat diversity and are a good place to look for rare lichens. Most stands have had cedar poles removed, and "culturally modified" trees are common. The poorly drained, but nutrient-rich lacustrine and glaciolacustrine landforms that support such forest communities are uncommon in the District. The best occurrences are on moderately-well-aerated clay- and silt-rich sediments where a creek feeds into a former lakebed (eg. south end of Kitwancool Lake). Another unusual variation of the ICHmc2/07 to watch for is an intricately patterned landform with intermittent skunk cabbage depressional areas within a matrix of hemlock - moss (ICHmc2/01) forest. This ecosystem complex usually occurs where there is an impervious layer of clay at variable depths below the soil surface. The mesic ecosystem develops in areas where there is a reasonable depth of aerated mineral soil above the clay, while the ICHmc2/07 occurs where the clay layer appears near the soil surface. More commonly you'll find platforms of elevated organic matter interspersed among the skunk cabbage, or impervious sand and gravel (rather than mineral-rich clay) subsurface horizons supporting small patches of poor hydrophytic vegetation. In all cases, these ecosystems are very sensitive to changes in hydrological properties that will affect the degree of soil aeration and mineral supply.

ICHmc1/02 and ICHmc2/02 Western hemlock - kinnikinnick - cladonia (S3, Blue list)
This lodgepole pine-dominated site series, with Pl regenerating sporadically beneath the open forest canopy is found drier, sunnier parts of the ICHmc wherever the landscape includes rocky ridges or gravelly/sandy eskers, ridges or glaciofluvial outwash terraces, and where there is a sufficient history of forest fire (and mountain pine beetle attack?). It is extensive along the north side of the Skeena River between Cedarvale and Kitwanga in complex with aspen woodland and

saskatoon-willow-cherry scrub. Many of the comments for the CWHws2/02 apply here. There are no records of the gnome plant (*Hemitomes congestum)* occurring in the ICHmc, but watch for it. Also look for sites with an understory dominated by native grasses. Any xeric ecosystem on pure sand parent material (little or no gravel) is rare. Landforms with a complex pattern of sinuous gravelly ridges (eskers) should also be considered rare in the ICHmc -apparently present near the mouth of the Suskwa River. Intermittent fire may be needed to prevent these ecosystems from succeeding to Hemlock - feather moss communities. Logging and mild soil disturbance will partially, but not completely, mimic the ecological impact of fire (experience from Scandinavia suggests that changes to the understory and epiphytic communities occur when mechanical disturbance replaces fire). In landscapes where these ecosystems are rare, avoid preferentially locating roads and gravel pits on them.

ICHmc1/06 Western hemlock - azalea - skunk cabbage (S3, Blue list)
This plant community differs from the ICHmc2/07 mainly in that western redcedar is absent. Otherwise, many of the same comments apply. Large, nutrient-rich, fairly well-aerated examples of this site series will have more spruce (and subalpine fir?) and less hemlock, and will be rarer in the landscape than small nutrient-poor swamps.

Definition 3. Ecosystems identified by the regional ecologist or regional rare and endangered species specialist as being rare or significant

The current CDC red- and blue-list has not received a detailed regional or local review. The Kispiox District needs to be looked at closely because it contains a large area of climatic transition where boreal, temperate rainforest and intermontane biota converge. At all elevations, it is likely to contain unique and provincially significant communities, as well as hybrid or introgressed plant and animal populations (analgous to the much-studied hybrid Sitka spruce), that have not yet been identified. Recent work suggests that the ubiquitous hemlock - moss forest, far from being a "biological desert" has unusually diverse lichen and fungal communities and may contain rare species. This section of the report is a preliminary attempt to improve the CDC list using local knowledge. It emphasizes terrestrial ecosystems in the low elevation ICHmc; no effort has been made to include subalpine, alpine, northern SBS or non-forested wetland and aquatic communities, all of which are poorly studied. More fieldwork and consultation with local residents is needed.

Suggested additions to Red List - preliminary

Hybrid Sitka spruce - black cottonwood - ostrich fern
This is a variation of the ICHmc2/06 or /05 (depending on how wet the soil is and on the relative dominance of spruce vs cottonwood) that occurs on the active floodplains of major rivers such as the Skeena, Kispiox, and Cranberry. Abundance of ostrich fern (*Matteucia struthiopteris*) distinguishes it from the more common examples of the ICHmc2/05 and /06 (recommended for the blue-list) but it also often includes other locally significant vascular plants such as grooved agrimony (*Agrimonia striata),* male fern (*Dryopteris filix-mas)* and beaked hazelnut (*Corylus cornuta).* This ecosystem also contains the best, inland examples of Roche spruce (unconfirmed observations are that spruce growing on floodplains have a higher Sitka component than spruce on adjacent uplands) and provides a natural meeting ground for coastal and interior forms of many other less-studied taxa. Watch for red alder (*Alnus rubra*), Pacific crabapple (*Malus fusca*), and bitter cherry (*Prunus emarginata)* at the limits of their range; possibly the rare pale springbeauty (*Claytonia spathulata*) a Gulf Islands plant collected near Hazelton. The best occurrences of this ecosystem are centrally located, on private or Indian Reserve land, and often developed (e.g. Ksan campground, Kispiox rodeo grounds). Relatively undamaged examples on

Crown land should receive a high degree of protection. Fluvial and animal activity should provide sufficient disturbance to maintain this ecosystem without logging or prescribed fire.

Non-forest Ecosystems

Low to mid-elevations of the Kispiox District are dominated by forest communities, and most ecosystems are rapidly reoccupied by trees following a disturbance such as logging, land clearing or fire. Non-forested ecosystems such as wetlands (not described here), herb meadows, shrub thickets and rock outcrops form only a minor portion of the landscape below timberline. Some of the rarest communities occur on sites that are too dry and exposed to support tree growth. Even rarer may be herb- and shrub-dominated communities that have managed to persist on sites that are quite capable of supporting trees. This usually only happens where some type of repeated or chronic disturbance (such as fire, animal activity, or avalanches) has prevent tree cover and allowed shrubs and herbs to become so well established that they inhibit forest succession (what some ecologists refer to as a "disclimax"). In the Kispiox District, many of these disclimax communities may have been established by aboriginal people using prescribed fire or other techniques to manipulate habitat. These communities tend to be highly threatened for several reasons: (1) they are usually located in or near human settlements, (2) disturbance regimes have radically changed --heavy machinery has replaced fire as the dominant tool for land clearing, and low intensity prescribed fire is now used only on the fringes of settled areas; (3) agronomic plants and Eurasian weeds are aggressive invaders of ecosystems maintained by frequent disturbance, and readily replace less competitive native species.

a) Rocky Mountain juniper savanna-steppe

Known only from Gitwangak to Andimaul Lookout in the Kispiox District. Large, open-grown Rocky Mtn. juniper (*Juniperus scopulorum)* interspersed with dryland grasses (*Stipa, Poa, Elymus* spp.) and scrub (stunted saskatoon (*Amelanchier)* cherry (*Prunus)* and snowberry (*Symphoricarpos*).

b) Saskatoon - slender wheatgrass scrub-steppe

Like (a) but with little or no Rocky Mountain juniper. Scattered on south to southwest facing slopes from Cedarvale to Tenas Hill, Suskwa River and north to Cranberry Junction.

Both of these communities (a and b) are informally classified as ICHmc2/81 and are ecologically equivalent to the red-listed SBSdk/81 (refer to Banner et al. 1993). They contain many rare, unusual or outlier species typically found in southern B.C. or in drier climatic areas to the north in the Stikine Canyon and Yukon, and provide critical habitat for a wide variety of animals. In the ICHmc these communities are smaller and less frequent than in the SBS, and appear to be more closely tied to sites with a long history of human use (along the greasetrail, village sites, fishing camps etc.), suggesting a reliance on relatively frequent, low-intensity fire in the moister ICH. Rates of aspen and coniferous tree encroachment onto these ecosystems is variable and depends on soil depth and the degree of exposure to wind and insolation. Monitoring of tree encroachment is recommended to determine whether prescribed fire is needed. These sites are also damaged by insensitive recreational use, construction of communications towers, access roads and urban development.

c) (Aspen) - wild cherry - beaked hazelnut scrub or woodland (ICHmc2)

A variation of the ICHmc2/53 (or 52) that develops after repeated fire -most notable for its brilliant fall colours (red cherries with yellow hazelnut) and lovely spring blossoms. This community is localized between Sedan Ck. and Hazelton (mostly on warm, south-facing slopes). The best-known example occurs above Hagwilget Canyon; other highly visible examples along Hwy 16 are at Carnaby and between New Hazelton and South Hazelton. The community is fire-dependent because the cherries (*Prunus virginiana* and *Prunus pennsylvanica*) are stimulated to

germinate by the heat of the fire, and the dense thickets of hazelnut, cherry, saskatoon, hawthorn (*Crataegus douglasii)* and other shrubs that resist conifer invasion develop from repeated post-fire suckering and sprouting. An aspen overstory may or may not be present. A very similar community is found across the southern boreal forest from the prairie provinces to Atlantic Canada. Understory layers also contain typical east-of-the-Rockies species like black sanicle (*Sanicula marilandica)* and wild sarsaparilla (*Aralia nudicaulis).* This is a good place to look for Canada anenome (*Anemone canadensis* -see below).

d) Bracken - cow parsnip - rice root meadow (ICHmc2)
A rare variation on the more common cow parsnip meadow. This community represents the southeastern range limit of bracken fern (*Pteridium aquilinum*) in the Skeena Region (it is more frequent in the CWHws1 and ICHvc). Other characteristic species include cow parsnip (*Heracleum lanatum),* western meadow-rue (*Thalictrum occidentale),* stinging nettle (*Urtica dioica),* cleavers (*Galium aparine),* chocolate lily or riceroot *(Fritillaria camschatcensis),* fireweed (*Epilobium angustifolium),* dragonhead (*Dracocephalum parviflorum),*onion grass *(Melica subulata)* and tall blue lettuce *(Lactuca biennis).* These meadows were important sites for gathering indigenous food crops and may have been burned repeatedly. Digging of root crops by humans or bears may also have been an important disturbance. Once the bracken is well established the meadow is very resistant to tree encroachment, but occasional prescribed burning or tree cutting may still be required. Recorded at Kitseguecla Lake (Bulkley District) and along the Kispiox River. Look for gentle south-facing toe slopes with deep fine-textured soil (e.g. fluvial or colluvial fan).

e) Hardhack - Meadow rue - Valerian fluvial shrub/meadow complex (ICHmc2)
This ecosystem is a complex of several plant communities. It develops on older inactive fluvial terraces (behind the active floodplain) with rapidly to imperfectly drained silty or fine sandy soil cappings over coarse sand and gravel. The margins of the meadow are a shrub thicket or carr, usually dominated in the ICHmc by hardhack (*Spirea douglasii*). The driest, central portion of meadow is a submesic to mesic meadow (almost a grassland) -which is rare. In areas of deeper, moister soil, one finds the more common lush meadow community dominated by cowparsnip, fireweed, stinging nettle, and brome (see Blue list below). The rare mesic meadow community has high diversity and composition varies greatly from site to site -perhaps in response to grazing or disturbance history. Characteristic species include a suite of common range species: western meadow rue, yarrow *(Achillea millefolium),* northern bedstraw *(Galium boreale*), wild strawberry *(Fragaria virginiana*), peavine *(Lathyrus nevadensis)* and vetch, *(Vicia americana),* as well as some more unusual or specialized plants like grooved agrimony (*Agrimonia striata*), meadow valerian (*Valeriana dioica),* grape ferns (*Botrychium* spp.). In the ICHmc (unlike equivalent ecosystems in the SBS and ESSF) native grasses are not abundant: blue wild rye (*Elymus glaucus),* occasionally slender wheatgrass (*E. trachycaulus),* bluegrasses (*Poa* spp)., bromes (*Bromus* spp.). Most sites have abundant introduced species (creeping red fescue (*Festuca rubra),* timothy (*Phleum pratense),* Kentucky bluegrass (*Poa pratensis*), dandelion (*Taraxacum officinale),* clovers (*Trifolium* spp.), probably because they were formerly used to graze domestic livestock -but perhaps also because the ecosystem is very susceptible to invasion by more aggressive and competitive agronomic species. This community has been found on the floodplains of the Cranberry, Kitwanga and Kispiox Rivers on sites that appear to have no recent human or livestock activity. Aspen and conifer encroachment threaten the long term persistence of these meadows. Methods to reduce tree encroachment without encouraging the spread of non-native species need local testing. Experience in other areas suggests that on sites with few introduced species, prescribed fire may be a better option than livestock grazing to prevent tree encroachment. However, on sites where introduced species are already well established, either fire or grazing could benefit them at the expense of native species. Girdling and cutting are other, more labour-intensive, options.

f) Woodsia - Polypodium - Artemisia canyon walls (ICHmc2 and ICHmc1)
Steep rocky cliffs and canyon walls are an uncommon to rare landscape feature at low elevations, but they are generally unthreatened by human activity. Most rock outcrops contain highly specialized, but fairly predictable assemblages of mainly widespread and secure species like three-toothed saxifrage (*Saxifraga tricuspidata),*stonecrops (*Sedum lanceolatum, S. divergens),* Jacob's ladder (*Polemonium pulcherrimum),* sheep fescue (*Festuca saximontana*), northern gooseberry (*Ribes oxyacanthoides),* fragile fern (*Cystopteris fragilis*), field chickweed (*Cerastium arvense),* and hairy rockcress (*Arabis hirsuta).* Occasionally one comes across a cliff or canyon wall with either exceptionally high plant diversity or with rare or outlier species, which should be recorded on maps and given some form of protection from development (red-listed?). These may have an unusual rock type (highly calcareous, recent basalt), microclimate (e.g. spray zone, or exceptionally hot and dry) or unusual disturbance history (e.g. constant ravelling, 5,000+ yrs of human settlement, packrats), or they may just be exceptionally large with a great variety of different niches. I have done minimal field work on rock cliffs in the Kispiox District, but consider Hagwilget Canyon to be an excellent example of a large canyon/rock cliff (e.g. isolated population of pasture sage (*Artemisia frigida),* large stand of western polypody fern (*Polypodium hesperium).*

Suggested additions to Blue List -preliminary

ICHmc2/08 Black spruce - hybrid white spruce - scrub birch - sedge (possibly red list?).
Black spruce peat moss ecosystems with more than 10% tree cover are uncommon, perhaps extremely rare in the ICHmc, and represent the southwestern range limit of *Picea mariana.* The best known example is at the north end of Kitwancool Lake; small, highly visible examples are along Hwy 16 between New Hazelton and Seeley Lake (the latter mostly flooded-out). These ecosystems occur in frost pockets and thus typically contain boreal/sub-boreal vegetation, but if one were found containing coastal species like hybrid Sitka spruce or western redcedar, that would be a rare treat. These swamp forests tend to be nutrient-medium rather than highly oligotrophic (acidic), so examples with few sedges and a high proportion of Ericaceous plants are likely to be rare. Watch for *Vaccinium uliginosum* -a bog blueberry with deciduous leaves that is absent from central Interior wetlands but common on the coast. Treat these wetlands cautiously, avoiding any disturbances (roads, bridges, culverts that attract beavers, etc.) that might interfere with natural drainage patterns.

ICHmc2/05 and ICHmc2/54: Hybrid spruce - paper birch - devil's club - lady fern
The ICHmc2/05 is a localized and highly productive ecosystem that doesn't occur outside the coast-interior transition zone. It is similar to the red-listed CWHws2/07 (without the salmonberry). Wetter examples of the ICHmc2/54 are the seral equivalent of the ICHmc2/05 and have a restricted distribution. Both of these site units are localized in the eastern part of the ICHmc2, for example in the valley bottoms of the Kispiox, Kitsequecla, and Babine rivers and their major tributaries where there is a strong sub-boreal climatic influence. They are highly productive for timber but difficult to manage silviculturally and usually occur in areas affected by riparian management guidelines.

ICHmc2/06 and ICHmc1/05 Black cottonwood - hybrid spruce - red osier dogwood
Black cottonwood floodplains are blue-listed in the CWH, and red-listed in the SBSdk. It makes sense to blue-list this community in the ICHmc, even though they may be somewhat more abundant and less threatened. Oikos Ecological Services has mapped the occurrence of this site series on many of the major river systems in the Kispiox District. This mapping combined with

local knowledge on the degree of threat to the community can be used to determine whether or not to blue list the community and how conservatively or liberally to interpret the riparian management guidelines. The diverse complex of forested and non-forested plant communities and successional stages found on active floodplains has not been adequately described or classified. These ecosystems are rich in plant species (many of which grow nowhere else in the landscape), and provide valuable habitat for many different animal species. As noted earlier, riparian corridors are important meeting grounds for coastal and interior biota.

ICHmc2/53 Trembling aspen - paper birch - beaked hazelnut - red-osier dogwood
These deciduous forest communities are abundant in a concentrated central valley portion of the ICHmc2, and are a defining feature of the Hazelton area. However, many of the best sites for this plant community are on arable private or Indian Reserve land. The best occurrences are on highly productive seepage (toe slope) sites or on fluvial/glaciofluvial benches with deep, moist sandy soils, and are dominated by paper birch rather than aspen. Such ecosystems should be blue-listed, because they are relatively uncommon, have high habitat value, and are threatened by development. The larger occurrences can be located using themed forest cover maps (birch-leading, good site) to determine their actual abundance and age class distribution. There is an excellent example below the Kitwanga backroad near the mouth of Burdick Ck. and a young, but very extensive example at the confluence of the Skeena and Babine (possibly the northeastern extent of this ecosystem). These deciduous forest ecosystems originally developed following repeated fires, and from an ecosystem management perspective it makes sense that at least some should be burned in the future. However, they will not rapidly succeed to conifers in the absence of stand-destroying disturbance. Vegetative regeneration of both birch and aspen does occur following both gap-level disturbances and larger scale events such as tent caterpillar outbreaks.

Cow parsnip - stinging nettle - brome lush meadows
Cow parsnip-dominated meadows are found on deep, rich, moist soils (often underlain by gravels) throughout much of British Columbia and have a fairly similar species composition wherever they occur. Their abundance in the landscape varies with climate, landforms and disturbance history (e.g. common in avalanche terrain or areas with repeated fire). They are recommended for blue-listing in the low elevation subzones of the southern Skeena Region (SBSdk, SBSmc, ICHmc, CWHws) because they are nowhere very extensive, they are very important to vertebrate and invertebrate wildlife, and most occurrences are threatened. In low elevation, developed areas threats include suburban development, agriculture, domestic grazing and introduced plant species. In less developed areas the major threats are long term fire suppression, possible expansion of grazing tenures, and by insensitive logging and highway development -e.g. road locations and gravel pits across toe slopes and in riparian corridors. Blue listing these communities would not make them off limits for range use, but should alert resource managers of the need to actively manage these ecosystems to ensure that they remain in the landscape and that a significant percentage be maintained in good to excellent condition. In the Kispiox District, the most extensive low elevation occurrences outside of agricultural areas are along the Cranberry River.

Definition 4. Ecosystems (site series or surrogate) that comprise less than 2% of a landscape unit and are not common in adjacent landscape units.
This definition would capture locally important communities that may be common outside the District, or communities that have not yet been classified or recognized by the CDC or regional ecologist (e.g. wetlands and higher elevation (sub)zones). It is also a good way to recognize exceptional examples of common ecosystems or site series -for example, antique hemlock forests with rare lichens, exceptional productive Western redcedar - Devil's club - oakfern old growth.

Terrestrial Ecosystem Mapping is the best means for locating these ecosystems, but where this is not available, themed forest cover/age class maps, or predictive ecosystem mapping can be used to get an initial handle on the abundance and seral stage distribution of different community types. Surficial and bedrock geology maps should be used to supplement the forest cover/vegetation database. Things to watch for are: (a) less common deciduous forest cover types (e.g. birch-leading, mature cottonwood at low elevations, aspen at higher elevations); (b) non-forested shrub thickets (maple, alder, willow), open range, meadows or wetlands; (c) coniferous species outside their normal range; and (d) ecosystems adjacent to unusual bodies of water or stream systems (e.g. a complex braided floodplain). Areas of intact old growth forest in a younger landscape, particularly those with less common tree species leading (e.g. old growth cedar or spruce-leading, balsam-leading at low elevations, Hw-leading in the east of the District) may also be identified in this way. Also watch for young fire-origin stands with lots of snags (these are rapidly becoming a rare habitat feature) or other types of unusual disturbance (e.g. avalanche tracks and old landslides scars in a dominantly stable landscape). Geological maps can be used to locate features such as unusual bedrock types (e.g. limestone, lava, basalt outcrops, serpentine), erosional features (e.g. canyons and waterfalls), or surficial deposits (e.g., glaciolacustrine clay, esker complexes, sand dunes). Unusually large polygons of an uncommon vegetation or landform deserve a closer look.

Unfortunately, many of the rarest ecosystems will be too small to register at 1:20,000 scale and will be submerged within larger, more generic polygons. Areas with unusual habitat diversity, interesting geological formations or anything else out of the ordinary should be considered a priority for TEM mapping or closer field inspection by rare and endangered species specialists.

Table 3. B.C. Conservation Data Centre: Rare Vascular Plant Tracking List, Kispiox Forest District (FD # 24) last updated: June 10, 1996

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	PROVINCIAL RANK	PROVINCIAL LIST
*** DICOTS				
ANEMONE CANADENSIS	CANADA ANEMONE	G5	S1?	BLUE
APOCYNUM MEDIUM	WESTERN DOGBANE	G5?	S2S3	BLUE
DRABA LONCHOCARPA VAR THOMPSONII	LANCE-FRUITED DRABA	G4T?	S2S3	BLUE
DRABA LONCHOCARPA VAR VESTITA	LANCE-FRUITED DRABA	G4T2	S2S3	BLUE
POLEMONIUM CAERULEUM SSP AMYGDALINUM	TALL JACOB'S-LADDER	G?T?	S1?	BLUE
POLEMONIUM ELEGANS	ELEGANT JACOB'S-LADDER	G4	S2S3	BLUE

6 TAXA LISTED

NOTE: The status and distribution of rare species and plant communities is regularly reviewed and updated. If your copy of this list is more than 3 months old, please visit the BC CDC site to check for a more current copy.

Rare Vascular Plants of the Kispiox Forest District

Six blue-listed vascular plants species or subspecies (no red-listed plants) are thought to occur in the Kispiox Forest District (Table 3). None of these are likely to occur in commercial conifer forest. If you think you have found one of these plants, mark it with labelled flagging tape, accurately record the location (on an air photo if available), elevation, slope and aspect and dominant vegetation and habitat features (see Appendices for CDC Field Observation Form (Plants). Take photographs if possible. Do not collect a voucher specimen unless the population is large and you feel it is important to do so - in which case follow the 1 in 20 rule (never collect more than one-twentieth of the population). Do not pull roots or rhizomes from the ground. Contact: Anne Hetherington, Rare and Endangered Species Specialist, Skeena Region Wildlife Branch, B.C. Ministry of Environment, Lands and Parks. Ph: 847-7692; fax: 847-7728; e-mail: ahetheri@ smithers.env.gov.bc.ca.

Red- and blue-lists have not yet been prepared for non-vascular plants in the Kispiox District. Goward (1996) and Ryan (1996) have of rare lichens and bryophytes, respectively, in British Columbia and listed them by biogeoclimatic zone and ecoregion.

Anemone canadensis Canada anemone. Canada anemone is very common east of the Rocky Mountains, but rare in British Columbia, occurring at scattered locations in the Rocky Mountains. It typically grows at moderate-low elevations in meadows and moist deciduous woods, particularly where the soil is calcareous; and often forms large clonal patches. Canada anemone was collected near Hazelton earlier this century, far outside its normal range, but to my knowledge has not been seen recently. It has white flowers, is larger than our common native *Anemone lyalli (*pink flowers), has less-divided leaves than *Anemone multifida* (cream or pink flowers), and does not grow in the alpine tundra (*Anemone parviflora, A. drummondii, A. narcissiflora)*. Look for it in low elevation ICHmc2 deciduous woodland and meadows. Refs: Brayshaw (1989 p. 43-44); Johnson et al. (1995, p.120).

Apocynum medium Western dogbane. Western dogbane looks like a cross between the common spreading dogbane (*Apocynum androsaemifolium*) and the larger Indian hemp *(Apocynum cannibinum),* found in southern B.C.. Its leaves are narrower than those of *A. androsaemifolium* and do not droop, while the pink flowers grow in larger, more erect clusters and have a longer, pointier calyx. This plant is rare in southeastern B.C. and is a long way outside its normal range in the Hazelton/Kispiox area. Perhaps it was introduced into the area as a trade item by aboriginal peoples who valued it as a source of fibre. Look for it on dry, exposed, southwest-facing slopes and dry forest edges at low elevations. Refs: Hitchcock and Cronquist (1973, p. 362).

Draba lonchocarpa Lance-fruited draba or whitlow-grass. This tiny white-flowered alpine mustard has two rare varieties in our area. Var. ***thompsonii*** is the rare southern interior variety that reaches its northern limit in north central B.C. mountains. It differs from the more typical variety *lonchocarpa* in having leafless, hairless flowering stallks with fruiting pods (silicles) that spread outward and are more than 2mm wide. Var. ***vestita,*** the rare coastal variety, may be found in wetter alpine areas in the Kispiox. It also has leafless, hairless flowering stalks, but the silicles are less than 2mm wide. Look for these plants on talus slopes, windswept grassy turf, and rock outcrops above or near treeline. Refs: Pojar and MacKinnon (1994, p.152); Douglas et al. (1989, p.119); Mulligan (1976).

Polemonium caeruleum ssp. ***amygdalinum*** Tall Jacob's ladder is common in northern B.C. but only scattered in central British Columbia. It looks much like our common showy Jacob's ladder (*Polemonium pulcherrimum)*, but is taller, with pointy rather than rounded leaflets and grows in moist meadows, wetlands and deciduous forest understories with peaty humus layers rather than on the

exposed, gravelly, sandy or rocky sites favored by *P. pulcherrimum*. Southern populations of tall Jacob's ladder apparently belong to a different subspecies than northern populations. Ssp. ***amygdalinum,*** which is rare, differs from the common northern ssp. *villosum*, in having styles (the female reproductive structure at the centre of the flower) that are much taller than the stamens (the male pollen-bearing reproductive structures). In ssp. *amygdalinum* the stamens are short, and don't extend out beyond the petals. Look for it along streams, in moist flower meadows and in wetlands, probably at middle and higher elevations.
Refs: Hitchcock and Cronquist (1973; p.376, called *P. occidentale*).

Polemonium elegans Elegant Jacob's ladder. Our second rare Jacob's ladder is an alpine plant of dry exposed cliffs and scree slopes, where you may also find the common showy Jacob's ladder hairy throughout, especially along the edges of the leaflets, with very attractive -but stinky- blue flowers in a tight rounded cluster at the top. Probably hard to miss when in flower; don't steal it for your rock garden! Refs: Hitchcock and Cronquist (1973; p.376). You may be able to find photos of this beautiful plant in wildflower books from the Oregon-Washington Cascades.

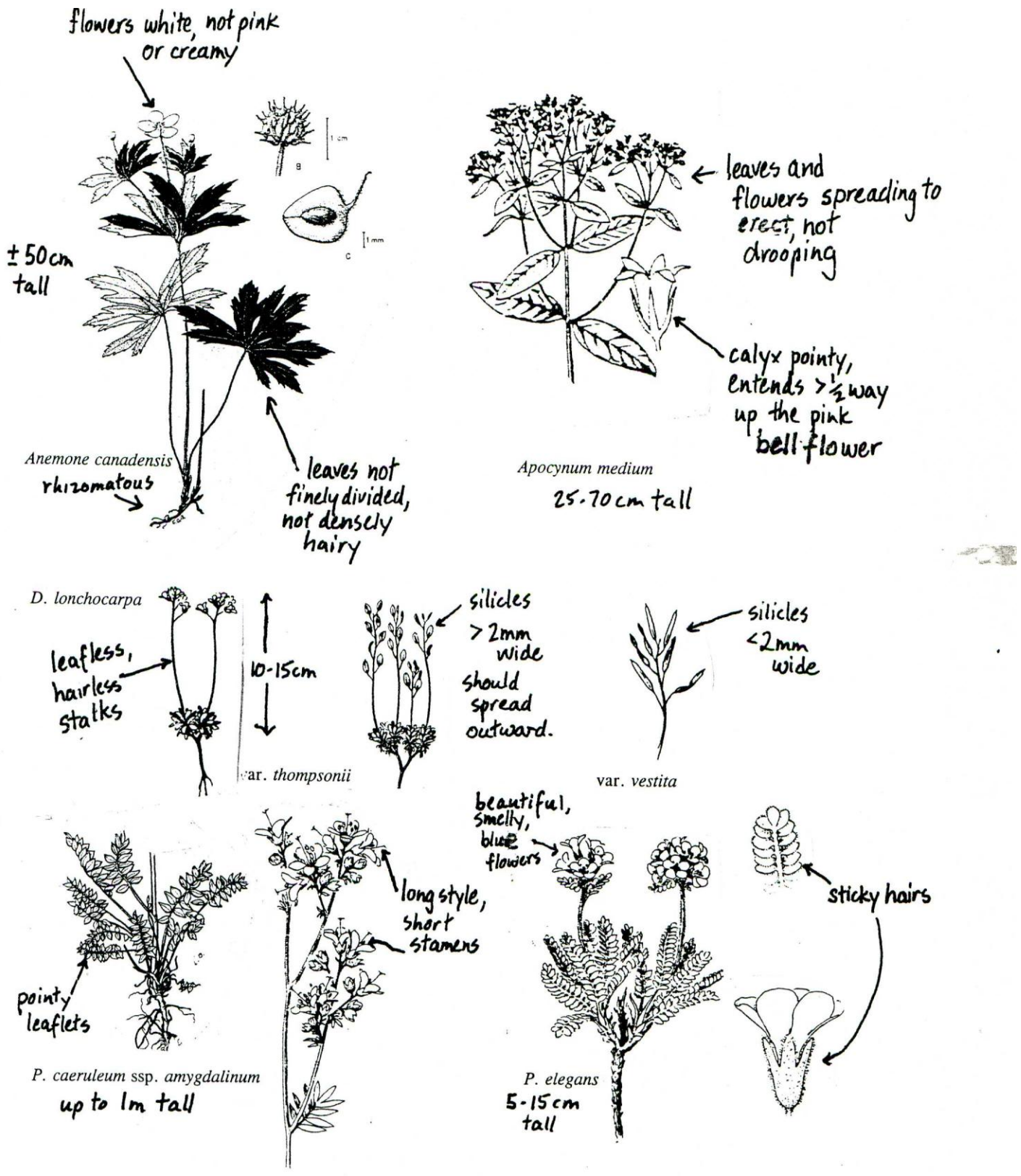

Figure 1. Blue-listed vascular plants of the Kispiox Forest District.

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Rare Plant Communities and Plant Species of the Morice Forest District

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Rare Plant Communities and Plant Species of the Morice Forest District
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Rare Plant Communities and Plant Species within the Morice Forest District

Introduction

The purpose of this report is to provide information about rare plant communities and plant species to operational staff working in the Morice District. Some brief management interpretations are included for information and discussion purposes.

This report assumes readers are familiar with Biogeoclimatic Ecosystem Classification. Refer to Banner et al. (1993) for descriptions of many of the plant communities, abbreviations and terms used here. In British Columbia we tend to use the names and abbreviations of Biogeoclimatic Site Series (e.g. SBSdk/81 Saskatoon - slender wheatgrass) when referring to plant communities or ecosystems. This is often appropriate, but in some cases the rare plant community may be an exceptional variation of a more common site series. For example, it may occur on an unusual type of parent material, or be dominated by an unusual tree species. Where this is the case, it is addressed below in the descriptions of individual plant communities.

Rare Plant Communities of the Morice Forest District

Rare Ecosystems (Ministry of Forests working definition, November 1997)
Rare ecosystems are defined to include:

1. Plant communities listed in the Identified Wildlife Guidebook

2. Plant communities listed as red or blue with the B.C. Conservation Data Centre;

3. Ecosystems identified by the regional ecologist or regional rare and endangered species specialist as being rare or significant; and

4. An ecosystem (site series or surrogate) that comprises less than 2% of the landscape unit and is not common in adjacent landscape units.

Definition 1. Plant communities listed in the Identified Wildlife Guidebook
A draft of the Forest Practises Code guidebook for managing rare and endangered species and ecosystems - called "Identified Wildlife Management Strategy "- is currently in review. It includes the following red-listed plant communities that are affected by forest and range management:

Poa secunda - Elymus trachycaulus **SBSdk/ or mc2/82**
Pacific Bluegrass - Slender Wheatgrass (also abbreviated BW or PsEt)
There are no significant areas of submesic to mesic south-facing grasslands dominated by native bluegrasses, slender wheatgrass, and needlegrasses (*Stipa* spp.) known in the Morice Forest District. Whether this is because all of the true grassland has been radically transformed by a century of cultivation, livestock grazing and (more recently) fire suppression, or whether such grasslands never existed in the Morice is unclear. Mesic grasslands that do exist in the Morice District are typically dominated by non-native species, principally timothy (*Phleum pratense),* Kentucky bluegrass (*Poa pratensis*) and dandelion *(Taraxacum officinale)* and are usually maintained by cattle grazing. Small pockets (typically no more than 10 to 20 m across) of submesic to xeric bluegrass-needlegrass-wheatgrass grasslands can be found on steep south-

facing hillsides in areas more appropriately classified as Saskatoon - slender wheatgrass scrub-steppe (see below). There are also native grasslands dominated by timber oatgrass (*Danthonia intermedia)* and spike trisetum (*Trisetum spicatum),* in frost pockets in the ESSFmc and upper SBSmc2, often in association with wetlands (e.g. Dungate (Foxy Ck., Klo Ck.) meadows).

The most common "grassland" types in the Morice District SBSdk and SBSmc2 are mesic to moist meadows dominated by forb species such as cow parsnip (*Heracleum lanatum)*, fireweed *(Epilobium angustifolium)*, indian paintbrush (*Castilleja miniata)*, asters (*Aster modestus, A. conspicuus, A. ciliatum spp.)*, purple peavine (*Lathyrus nevadensis*), and western meadow-rue (*Thalictrum occidentale*) with a minor component of native grasses, principally blue wild rye (*Elymus glaucus*), and native bromes (*Bromus ciliatus, B. carinatus, B. anomalus, B.vulgaris).* Meadows of this type occur widely in the Poplar and Owen Lakes areas and are scattered on the fringes of agricultural and residential land within the Bulkley Valley and on southwest-facing slopes throughout the SBSmc2. Where there is a history of livestock grazing, these meadows are often dominated by introduced agronomic and weed species. Without fire or grazing, aspen, willows and shrubs tend to take over the meadows. Heavy wildlife use can inhibit tree and shrub encroachment.

Any occurrences of true Bluegrass - slender wheatgrass (*Poa secunda - Elymus trachycaulus) (*SBSdk or mc2/82) grassland with few non-native species should be considered rare and brought to the attention of the Regional Rare and Endangered Species Specialist or District Forest Ecosystem Specialist and MOF range personnel before decisions regarding management are made. The most likely locations are on gentle to steep south- to southwest-facing slopes with moderately deep, well-drained rich soils either on the fringes of the Bulkley Valley or on the north shores of larger lakes (e.g. Francois Lake). See below for comments regarding other herbaceous plant communities.

Amelanchier alnifolia - Elymus trachycaulus **SBSdk or mc2/81**
Saskatoon - Slender wheatgrass **(also abbreviated SW or AaEt)**

Saskatoon - slender wheatgrass is a xeric to submesic scrub-steppe community consisting of a mosaic of low-growing saskatoon (*Amelanchier alnifolia*), snowberry *(Symphoricarpos albus*), cherry *(Prunus virginiana, P. pensylvanica),* prickly rose (*Rosa acicularis*) scrub intermixed with patches of dry grassland *(Elymus* spp., *Stipa* spp., *Festuca saximontana, Poa* spp.), and a variety of wild flowers including peavine, northern bedstraw *(Galium boreale)*, yarrow (*Achillea millefolium*) and wild onion (*Allium cernuum*). Patches of taller willow (*Salix* spp.*)*, aspen, cherry and hawthorn (*Crataegus douglasii)* are common. Because of high insolation and low snowpacks, these ecosystems provide critical habitat for many wildlife species, notably deer and garter snakes, and support plant and insect species that do not occur elsewhere in the landscape.

This plant community is widespread but never abundant on steep rocky south to southwest-facing slopes throughout the Morice District, especially on the north shores of larger lakes and within the Bulkley Valley. Occurrences at low elevations are the most diverse and most threatened by changes associated with human settlement. Although they contain no operable timber, these ecosystems are often damaged or fragmented by road and communication tower construction, rock quarrying, and insensitive recreational use. Overbrowsing and grazing by cattle and wildlife also cause excessive soil disturbance, damage sensitive species, and accelerate the spread of invasive species. Occurrences in more remote areas tend to be in good condition, but are threatened long-term by fire suppression.

In the Bulkley-Cassiar and Lakes Districts Saskatoon - slender wheatgrass ecosystems occasionally include well developed "savanna-steppe" stands of Rocky Mountain juniper (*Juniperus scopulorum).* This plant community is rare in the Skeena Region. To date, no occurrences of Rocky Mountain juniper savanna have been located in the Morice District, although it is possible that scattered Rocky Mountain juniper are present near the District boundary along the Bulkley River and Francois Lake. Occurrences of Rocky Mountain juniper (the upright tree, not the sprawling shrub) in the Morice District should be brought to the attention of the Regional Rare and Endangered Species Specialist or District Forest Ecosystem Specialist.

In the Morice, most occurrences of the Saskatoon - Slender wheatgrass scrub-steppe ecosystem are found on shallow rocky soils and have few or no Rocky Mtn juniper. These occurrences appear to be relatively stable and probably only require intermittent fire (on the order of 30-100 yrs?, depending on the degree of exposure to sun and wind and the amount of wildlife disturbance) to prevent tree encroachment. They can tolerate sporadic livestock grazing (generally too steep and rocky for cattle) and light recreational use, but sustained or heavy grazing or human use, and construction of roads, trails and quarries that expose mineral soil must be avoided. Such activities greatly accelerate the spread of invasive species.

On private land within the Bulkley Valley, a type of SBSdk/81 scrub-steppe (transitional to the SBSdk/82) was formerly common on the deep, rapidly-drained soils of steep fluvial escarpments bordering the Bulkley River. This site type is less ecologically diverse than the typical rock outcrop SBSdk/81, and tends to be dominated by shrubs, but it can support excellent subxeric to submesic grassland (*Stipa*, *Elymus*,*Poa*). This community has been greatly modified by almost a century of agricultural use and is now imperiled. Occurrences that have not been heavily grazed have mostly grown over with aspen and shrubs. These ecosystems depend on a combination of fire and ongoing animal disturbance (beavers, ungulates) to prevent aspen encroachment. Restoration of some examples of this type will require active management of livestock and deer use and reintroduction of fire. Occurrences of this plant community in good condition on Crown land should be brought to the attention of the Regional Rare and Endangered Species Specialist or District Forest Ecosystem Specialist.

***Populus balsamifera* ssp. *trichocarpa - Cornus stolonifera - Rosa acicularis* SBSdk/08**
Cottonwood - Dogwood - Prickly Rose (also abbreviated CD or PbRa)

Black cottonwood floodplain communities in the SBSdk have been red-listed because of the relative rarity of major rivers in the central interior, their exceptionally high habitat value, sensitivity to changes in the hydrological regime, and the density of human development. The best examples of this plant community are found on braided (wandering) reaches of the major rivers and streams (Riparian Class S1 and larger S2), while reaches with a stable, single thread channel and smaller tributaries (S2,S3) tend to have small, high benches and terraces with poorly developed floodplain communities. The Morice District is fortunate to have some of the largest and best developed occurrences of this interior riparian plant community. It occurs along the entire length of both the Morice River (starting in the SBSmc2) and Bulkley River but is scattered and rare in the rest of the District (e.g. shoreline of Babine Lake). Identifying scattered occurrences of SBSdk/08 and the equivalent SBSmc2 community should be a high planning priority for the Morice District. This can readily be done with colour-themed forest cover maps.

Occurrences on the Morice R. are in near-natural condition and include considerable old-growth cottonwood. They are well developed on the middle reach of the Morice R. between Thautil R. and Owen Ck. (transitional SBSmc2 to SBSdk). The lower reach of the river (Owen Ck. to Northwood sawmill) is primarily a single thread channel with frequent, but small black

cottonwood floodplains. An exceptional area of low elevation SBSdk/08 exists at the mouth of the Morice River (below the Northwood sawmill). Along the Bulkley River itself, most occurrences are on private land, and many have been developed for agricultural and residential use. These occurrences have exceptionally high habitat value, but are threatened in the long term by fragmentation and by changes to the hydrological regime of the river, particularly above the Morice River. On the upper Bulkley, towards Perow, there is already some evidence of a transition to upland white spruce forest on floodplains that have been cut off from the river by highway, railway and various flood control measures.

The best management strategy for this plant community is to avoid development and changes to the hydrological regime, maintaining the highest degree of connectivity possible along the river and tributary streams and with adjacent upland areas. Within the Bulkley Valley corridor, this will be difficult to achieve given the degree of land alienation and pressures for development and improved flood control. Improved public awareness and close cooperation between provincial, municipal, regional and federal governments is essential. Guidelines developed through the Stewardship Series of publications (see references) are very relevant for this ecosystem.

Active fluvial fans that develop on steeper gradient S3 to S6 creeks often develop black cottonwood communities. These plant communities are very similar to and provide many of the same habitat features as the floodplain SBSdk/08. Logging and road construction on active fluvial fans need to be very carefully planned given the highly unstable nature of these ecosystems and the importance of maintaining their hydrological integrity.

CWHws2/07
Sitka spruce - salmonberry wet submaritime (S2, Red list)
Sitka spruce floodplain ecosystems have been red-listed wherever they occur in B.C. The classic low elevation CWHws1 Sitka spruce - salmonberry plant community that has been almost entirely logged out of the major floodplains around Terrace and the Kitimat valley does not exist in the Morice District. Floodplains in the CWHws2 on the lee side of the Coast Range are smaller, colder and snowier, often dominated by shrub thickets and wetlands. They are transitional in character to the ESSF and SBS. The CWHws2/07 differs very little from the more common CWHws2/06 ecosystems (described below). Subalpine fir is usually the dominant tree and the spruce is a hybrid (probably white x Engelmann with minor (if any) Sitka genes). Floodplain understories are dominated by devil's club (*Oplopanax horridus)*, black twinberry (*Lonicera involucrata)*, mountain alder *(Alnus incana)*, highbush-cranberry *(Viburnum edule)*, and red-osier dogwood *(Cornus sericea)* with only minor salmonberry (*Rubus spectabilis)*..

The best examples of this plant community will be found on braided (wandering) stream reaches on larger stream systems within the CWHws2. Reaches with a stable, single thread channel tend to have small, high benches with relatively poorly developed floodplain communities. In the Morice District, this ecosystem is probably very rare, possibly occurring where inlet streams feed into Atna, Morice, Tahtsa and Whitesail Lakes.

These are high value riparian complexes that warrant protection to maintain the integrity of both aquatic and terrestrial ecosystems. Most occurrences will probably be exempted from logging because of poor access, riparian management guidelines or other planning restrictions. If logging is planned in these ecosystems, future stands should have both well developed tree cover and well developed shrub and herb understories with intermittent openings-ideally achieved through a combination of wide tree spacing and clumped regeneration patterns. A continuing supply of large snags and coarse woody debris is particularly critical in these riparian ecosystems.

Although a minor component of black cottonwood would be a valuable addition to many of these communities, conversion of conifer-dominated riparian forest to mixedwood and deciduous stands should be avoided. Avoid exposing mineral soil to prevent invasion by deciduous trees and weedy species.

Definition 2. Plant Communities listed as red or blue with the B.C. Conservation Data Centre

The B.C. Conservation Data Centre (**CDC**) is a program of the Wildlife Branch of the B.C. Ministry of Environment, Lands and Parks. The CDC collects information on the rare and endangered plants, animals and plant communities in British Columbia and maintains a computerized database on their status, location and level of protection. The CDC is a partner of the National Heritage Network, a international body that uses standardized methods and terminology (Table 1) to gather and exchange information on threatened elements of global biodiversity. By international convention, the CDC uses the term "plant community", rather than the term "ecosystem". These terms are used more-or-less interchangeably in this report.

For each Forest District in British Columbia, the CDC maintains a tracking list of **red**- and **blue-listed** species and plant communities known or believed to occur within the District. The most recent version of the list is available at the website: **www.env.gov.bc.ca/wld/cdc**, and has been reproduced in Table 2. All of the red-listed plant communities on Table 2 are included in the Identified Wildlife Management Strategy and are described above under Definition 1.

Table 1. CDC Definitions

Global Ranks (G1 to G5) These reflect the conservation status of an organism from a global (i.e. range-wide) perspective. Plant communities are not currently assigned a global rank, because there is no established international system for classifying or comparing plant communities.

Provincial Ranks (S1 to S5) These reflect the conservation status of an organism or plant community within the province of British Columbia. Note that a species or community can be considered imperiled or vulnerable within British Columbia even if it is common or secure outside of the province. However, organisms or communities that are threatened locally (e.g. within the Morice District) may not be ranked if they are common in other areas of the province.

G1 or S1 = critically imperiled because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction.

G2 or S2 = imperiled because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction.

G3 or S3 = vulnerable either because very rare and local throughout its range, found in only a restricted range (even if abundant at some locations) or because of other factors making it vulnerable to extinction.

G4 or S4 = apparently secure Uncommon but not rare, and usually widespread. Possibly cause for longterm concern.

G5 = secure common, typically widespread and abundant.

T = infraspecific taxon (trinomial) Subspecies or varieties of a species (indicated by a scientific name with three parts) have a "T" following the global or provincial rank. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1.

U = **Unrankable** due to lack of information about status or trends.

Range Ranks (S#S# or G#G#) or **?** are used to indicate uncertainty about the exact status of a taxon or community.

Provincial Lists

red list: includes any indigenous species or subspecies (taxa) considered to be Extirpated, Endangered, or Threatened in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. Red-listed taxa include those that have been, or are being, evaluated for these designations. (note: this definition does not describe communities)

blue list: includes any indigenous species or subspecies (taxa) considered to be Vulnerable in British Columbia. Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened. (note: this definition does not describe communities)

Relationship between Red and Blue Lists and Provincial Ranks

PROVINCIAL RANK	RED LIST	BLUE LIST
Plants:	S1 S2	S1? S2S3
Plant Communities:	S1 S1S2 S2 S2?	S2S3 S3 S3?

Table 2. B.C. Conservation Data Centre: Rare Plant Community Tracking List
Morice Forest District (FD # 22) last updated June 10, 1996

SCIENTIFIC NAME	COMMON NAME	HABITAT* REQUIREMENT	PROV RANK	PROV LIST
ABIES AMABILIS/THUJA PLICATA - GYMNOCARPIUM DRYOPTERIS	AMABILIS FIR/WESTERN REDCEDAR - OAK FERN	CWHws1/04 CWHws2/04	S3	BLUE
ABIES AMABILIS/THUJA PLICATA - OPLOPANAX HORRIDUS, WET SUBMARITIME	AMABILIS FIR/WESTERN REDCEDAR - DEVIL'S CLUB, WET SUBMARITIME	CWHws2/06	S3	BLUE
ABIES LASIOCARPA - PICEA MARIANA - LEDUM GROENLANDICUM	SUBALPINE FIR/BLACK SPRUCE - LABRADOR TEA	ESSFmv2/03 ESSFmv3/03, ESSFmv4/03	S3	BLUE
AMELANCHIER ALNIFOLIA - ELYMUS TRACHYCAULUS	SASKATOON - SLENDER WHEATGRASS	SBSdk/81	S2	RED
PICEA MARIANA - VACCINIUM - MEMBRANACEUM - PETASITES	BLACK SPRUCE/LODGEPOLE PINE - FEATHERMOSS	SBPSmc/03 SBSmc2/03	S3	BLUE
PICEA SITCHENSIS - RUBUS SPECTABILIS, WET SUBMARITIME 2	SITKA SPRUCE - SALMONBERRY, WET SUBMARITIME 2	CWHws2/07	S2	RED
PINUS CONTORTA - ARCTOSTAPHYLOS UVA-URSI	LODGEPOLE PINE - KINNIKINNICK	CWHws1/02 CWHws2/02	S3	BLUE
PINUS CONTORTA - JUNIPERUS COMMUNIS - ORYZOPSIS ASPERIFOLIA	LODGEPOLE PINE - JUNIPER - RICEGRASS	SBSdk/02	S3	BLUE
PINUS CONTORTA - SPHAGNUM GIRGENSOHNII, WET SUBMARITIME 2	LODGEPOLE PINE - SPHAGNUM, WET SUBMARITIME 2	CWHws2/10	S3	BLUE
POA SECUNDA - ELYMUS TRACHYCAULUS	BLUEGRASS - SLENDER WHEATGRASS	SBSdk/82	S1	RED
POPULUS BALSAMIFERA SSP TRICHOCARPA - CORNUS SERICEA	COTTONWOOD - RED-OSIER DOGWOOD	CWHvm1/10 CWHwm/06 **(error: should read CWHws2)**	S3	BLUE
POPULUS BALSAMIFERA SSP. TRICHOCARPA CORNUS SERICEA - ROSA WOODSII	COTTONWOOD - DOGWOOD - PRICKLY ROSE	SBSdk/08	S2	RED
PSEUDOTSUGA MENZIESII - PLEUROZIUM - HYLOCOMIUM	DOUGLAS-FIR - FEATHERMOSS - STEPMOSS	SBSdk/04	S3	BLUE

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

Blue-Listed Plant Communities of the Morice Forest District

The order of presentation follows the CDC tracking list of June 10, 1996 (Table 2). Please refer to the Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region (Banner et al. 1993) for a more complete description of the biogeoclimatic site series corresponding to each blue-listed plant community.

CWHws1 or CWHws2/04: Amabilis fir - western redcedar - oakfern (S3, Blue list)

There is no CWHws1 in the Morice, but the CWHws2 is found on leeward slopes of the Coast Mountains along the shores of Morice, Nanika, Tahtsa and Whitesail Lakes. Within this landscape, small pockets of the CWHws2/04 (subhygric/rich) site series are very common on toe slopes, along drainage channels, in fluvial fans or wherever intermittent seepage occurs. These ecosystems are usually a mixture of western hemlock and amabilis fir. Western red-cedar is absent, but hybrid spruce and subalpine fir may be present, especially in areas affected by cold air ponding. These ecosystems are productive sites for conifer growth and tend to be targeted for logging. Tree, shrub, herb and moss layers generally contain no vulnerable species -but watch for unusual ferns, and the epiphytic lichen and fungal communities may contain rare species (see e.g. Goward 1995).

Large, well developed, old growth examples of the CWHws2/04 are probably rare in the Morice District. Sites with exceptionally large or old trees, or with very high plant species diversity should be considered for conservation. Such ecosystems tend to occur on large fluvial fans, or less frequently alluvial floodplains or lacustrine deposits near lakes. These ecosystems depend on the flow of moisture and nutrients from upslope, and their humid, sheltered setting may be influenced by surrounding forest cover. To preserve ecosystem integrity, road construction and timber harvesting must take these factors into account.

CWHws2/06: Amabilis fir - western redcedar - devil's-club (S3, Blue list)

The CWHws2/06 in the Morice District occurs on toe slopes and in riparian areas adjacent to Morice, Nanika, Tahtsa and Whitesail Lakes. These ecosystems are strongly transitional to the SBSmc2 and tend to be dominated by subalpine fir and hybrid white spruce rather than the less cold-tolerant amabilis fir. Western redcedar is absent. Within the Morice District, CWHws2/06 sites containing large mature amabilis fir should be considered for conservation as this species is at the western limits of its range.

Most of the comments for the CWHws2/04 apply here as well, but this site series is less abundant, usually more productive for tree growth, and is probably more sensitive to changes in the hydrological regime and microclimate. CWHws2/06 ecosystems are typically diverse in species and structure and have high habitat value for a range of wildlife -particularly where they occur in a mosaic with open meadows and shrub thickets. Herb layers may contain infrequent or unusual species -particularly along streambanks (e.g., watch for *Galium kamschaticum* -an unusual bedstraw that looks like a shamrock). Rare epiphytic lichens may be present in the canopy (Goward 1995). Large, well developed examples of this plant community typically occur on large fluvial or fluvial/colluvial deposits, lacustrine (former lakebed) deposits or older floodplains and should definitely be given priority for conservation.

ESSFmv3/03 Subalpine fir - black spruce - labrador tea (S3, Blue list)
(the ESSFmv2 and ESSFmv4 are not found in the Morice District).
The ESSFmv3 occupies a high elevation areas northeast of Babine Lake near the boundary with the Prince George Forest Region. In the Skeena Region it is unusual to find black spruce at subalpine elevations, so this plant community is likely to be quite rare unless there are extensive upper elevation plateaux in the vicinity. Refer to SBSmc2/03 for more details.

SBSmc2/03 Black spruce - Lodgepole pine - Feathermoss (S3, Blue list)
(The SBPSmc does not occur in the Morice District).
Black spruce - lodgepole pine communities growing on mineral soil are a relatively rare feature in western, mountainous portions of the SBS, although they are common in the plateau country to the east (e.g. Vanderhoof), and in the true boreal forest. In the Morice District, black spruce reaches the southwestern limits of its range, and is therefore somewhat vulnerable. Black spruce can be difficult to distinguish from slow-growing, clubby-topped white spruce (check the cones and the hairy twiglets). The understory vegetation contains an assortment of Ericaceous plants such as labrador tea (*Ledum groenlandicum)*, creeping-snowberry (*Gaultheria hispidula)* and poor-site mosses that are uncommon on upland ecosystems. This plant community invariably occurs on low-lying frost pocket sites where soils are compacted or otherwise have restricted rooting. Small patches typically occur in association with wetlands. Occurrences are fairly common north of Highway 16 but are absent or rare on the south side of the Bulkley Valley.

These communities have low timber productivity. With a little awareness, protecting them from indiscriminate logging and silvicultural practices should not be difficult. In areas where black spruce is not abundant, encourage natural regeneration. Prescribed burning or light soil scarification is more appropriate than an severe mechanical site preparation treatment (mounding, plowing, ripping) intended to enhance site productivity. Protect these sites from changes in soil drainage (e.g. culvert construction) that may cause flooding. Large, well developed occurrences of this plant community should be brought to the attention of the Regional Rare and Endangered Species Specialist or District Forest Ecosystem Specialist.

CWHws2/02 Lodgepole pine - kinnikinnick (S3, Blue list)
Very dry ecosystems with a history of recurring fire, and with lodgepole pine regenerating in the forest understory are rare within the high elevation CWHws2. In the Morice, ecosystems classified as CWHws2/02 are most likely to be found on south-facing slopes transitional to the SBSmc2, for example on the north shores of the large lakes. A search for Pl-leading stands in the CWHws2 should locate the larger occurrences fairly quickly. These ecosystems have interesting lichens, saprophytes, fungi and insects that are unusual within a coastal forest setting, but a lot less unusual in areas transitional to the SBSmc2. Look for the rare gnome plant (*Hemitomes congestum*-pg 354 in Pojar and MacKinnon 1994) a saprophyte with an outlier population in the Skeena River valley -but unknown in the Morice or Bulkley-Cassiar Districts. Also watch for an unusual variation of this plant community: open-grown lodgepole pine with native red fescue (*Festuca rubra)* bunchgrass in the understory (unlikely). Occurrences on pure sand rather than over bedrock or mixed sand and gravel should be considered highly unusual. The CWHws2/02 is normally considered inoperable, but may occur as small inclusions within larger cutblocks. Over the long term, fire suppression may pose the greatest threat, causing these ecosystems to gradually succeed to Hemlock - moss plant communities.

SBSdk/02 Lodgepole pine - juniper - ricegrass (S3, Blue list)
Xeric lodgepole pine - common juniper - ricegrass - kinnickinnick - lichen plant communities on rapidly drained bedrock, gravelly terraces and eskers or sand deposits are at risk within the settled portion of the SBSdk of the Bulkley Valley, but may be less threatened in other parts of the SBSdk. An equivalent plant community can be found at higher elevations in the SBSmc2. The SBSdk/02 is usually found as the driest portion of a landform that is dominated by SBSdk/03 or /05 ecosystems and it is never very extensive. The most common, and least vulnerable occurrences are on rocky, south-facing ridge crests. Occurrences on other types of parent material are rarer and more threatened because they are often developed for homesites, recreation sites or dug up for sand and gravel pits. Because the forest floor vegetation is extremely vulnerable to soil disturbance from human or livestock traffic, it is difficult to find examples of this plant community in good condition. These ecosystems support an unusual variety of herbs, saprophytes, lichens, bryophytes, fungi and insects not commonly found on moister or richer ecosystems. They also have high value as wildlife habitat, for example as deer winter range.

SBSdk/02 occurrences of significant size on Crown land should be brought to the attention of the Regional Rare and Endangered Species Specialist or District Forest Ecosystem Specialist. These are not productive timber-growing sites. Where they occur within woodlots or Crown forest these ecosystems will often be designated as wildlife tree patches. It should be easy to naturally or artificially regenerate lodgepole pine on these dry ecosystems without having to create canopy gaps of more than a few trees (not tree-heights). Fire is needed for long term persistence of these ecosystems and for forest health. On many sites it should be feasible to carry out small scale, low to medium intensity, controlled burns during periods of low fire hazard. Forage production on these sites is low, but (except for rock outcrop types) they are often favoured by cattle because of the easy terrain and shade. Where occurrences in good condition occur within existing or proposed grazing tenures, measures should be taken to prevent cattle from congregating within them. Avoid locating roads, landings, quarries or recreation sites within occurrences in good condition.

CWHws2/10 Lodgepole pine - Sphagnum (S3, Blue list)
Swamp forests with more than 10% cover of lodgepole pine growing in peat are probably rare in the CWHws2 of the Morice District. Wetlands on the eastern slopes of the Coast Range tend to be either shrub- and sedge-dominated fens or horsetail swamps with spruce, subalpine fir, western and mountain hemlock with a strong ESSF or MH character because of cold air ponding. However, the fire history and transitional-to-SBS character of the Morice CWHws make a lodgepole pine-dominated community less remarkable here than it is on the west slopes of the Coast Range. Features to look for in an exceptional example of this plant community would be good cover of lodgepole pine together with a high diversity of bog plants: dwarf shrubs, orchids, sundews *(Drosera* spp.*)*, and bryophytes (principally *Sphagnum* spp.), including a mix of species from both interior and coastal settings. Watch for the arctic eyebright (*Euphrasia arctica* var. *disjuncta)* a blue-listed plant of northern interior bogs.

CWHws2/10 ecosystems normally occur near non-forested wetlands and should be relatively straightforward to identify. The lodgepole pine in this community is not of merchantable size. To maintain this plant community, avoid changes to local drainage patterns and sudden changes in exposure (e.g. clearcutting to the wetland boundary). Any large, well developed examples of this plant community should be brought to the attention of the Regional Rare and Endangered Species Specialist or District Forest Ecosystem Specialist.

CWHws2/08 Cottonwood - red-osier dogwood (S3, Blue list) (CWHvm is not found in the Morice District). Middle fluvial benches dominated by black cottonwood with a minor cover of hybrid spruce, subalpine fir, western hemlock (perhaps some western redcedar and amabilis fir) occur on the active floodplains of larger rivers and streams on braided (wandering) stream reaches and are generally easy to identify and map (using a printout of Act-dominated forest cover types within the CWHws). Within the Morice occurrences of the CWHws2/08 are likely to be extremely rare because there are no major rivers in this subzone. Occurrences may exist along the shorelines of the major southwestern lakes. They are likely to be strongly transitional to SBSmc2 or ESSF floodplain communities because of strong cold air drainage along river valleys. Some active fluvial fans may have black cottonwood-dominated plant communities that approximate the CWHws2/08 (often seral stages of the CWHws2/03 or /04).

Black cottonwood floodplains have been blue-listed throughout the CWH because of their exceptionally high habitat value, their sensitivity to changes in the hydrologic regime, and the degree of human development along major river corridors. Within the CWHws2, and particularly within the Morice District, this plant community is rare because there are few large floodplains, but most occurrences are minimally affected by human activity. Unless they are exceptionally large (unlikely) these communities should be exempted from logging under Forest Practises Code riparian management guidelines. Because of their rarity, occurrences should not be considered for logging or other industrial or commercial uses, and efforts should be made to protect the hydrological regime so that the community is able to maintain itself through flooding and other natural disturbance processes. Concentrated recreational use (e.g. fishing/hunting camps) should be discouraged.

SBSdk/04 Douglas-fir - feathermoss - stepmoss (S3, Blue list)
This community has not been recorded within the Morice Forest District, but persistent rumours circulate about the occurrence of Douglas-fir. Douglas-fir logs (possibly from the Granisle - Fulton Lake area) appeared in a local sawmill in the early 1980s but efforts to locate standing trees or stumps have been unsuccessful. The most likely location for this species in the Morice is on a south-facing bedrock ridge near the shore of Babine Lake. Jim Pojar and Vladimir Krajina both thought they saw Douglas-fir on the north shore of Morice Lake during helicopter overflights, but this occurrence has not been verified. Any reports of Douglas-fir in the District should be carefully documented and brought to the attention of the MOF Regional Ecologist or MOELP Regional Rare and Endangered Species or District Forest Ecosystem Specialists.

Definition 3: Ecosystems identified by the regional ecologist or regional rare and endangered species specialist as being rare or significant

The following plant communities are included on the provincial blue list and are included on blue-lists for nearby Forest Districts but appear to have been inadvertently omitted from the Morice District list (Table 2):

ESSFmc/02 Subalpine fir - lodgepole pine - juniper - lichen (S3, Blue list)
Small rocky outcroppings classified as ESSFmc/02 are reasonably common within the Morice District, but large, dry, sunny examples on bedrock, sand or gravelly ridges and terraces are uncommon to rare. These communities are dominated by lodgepole pine, with common juniper (*Juniperus communis)* and kinnikinnick (*Arctostaphylos uva-ursi)* in the understory along with abundant terrestrial and arboreal lichens. They are an important habitat feature for a variety of animals because the open, dry setting contrasts with the surrounding moister, shadier landscape. Ridgetops and eskers are often preferred travel corridors for vertebrates. In the Telkwa Mtn Range these ecosystems are important to the caribou, who feed on the lichens. Whitebark pine (*Pinus albicaulis)* and its avian consort, the Clark's nutcracker (*Nucifraga columbiana)* are found at the eastern limits of their range on timberline ESSFmc/02 ecosystems occurring at least as far west as McBride Lake (where it appears on the extensive SBSmc2/02 ecosytem at the west end of the lake). Outlier populations should probably located and conserved. It would be worthwhile to monitor the health and viability of these communities and look for evidence of expansion or retreat in response to climate change (e.g. incidence of white pine blister rust, mountain pine beetle or other damaging agents; nutcracker and whitebark pine demographics). Other interesting species to watch out for in this ecosystem are white-flowered rhododendron (*Rhododendron albiflorum)* and the tiny *"*bug-on-a-stick*" (Buxbaumia* sp.*)* moss.

The ESSFmc/02 usually occurs as minor inclusions within cutblocks (commonly left for wildlife tree patches). Larger examples tend to be unmerchantable but are favoured for road locations, gravel pits and informal campsites. Such destruction should be avoided. Fire suppression also poses a serious long term threat to these plant communities as the organic layer builds up, moss replaces lichen, subalpine fir ingrowth occurs and mountain pine beetle takes out the oldest lodgepole pine. Occasional disturbance to the canopy and forest floor (e.g. fire or summer logging) may be beneficial to these ecosystems, but chronic or severe soil disturbance should be avoided.

Where scattered whitebark pine stems occur within operable forests, they should be left as wildlife and seed trees. Removal of subalpine fir and lodgepole pine ingrowth may be an effective means of simulating the effects of a low intensity surface fire to maintain open stands of whitebark pine.

ESSFmk/02 Subalpine fir - Whitebark pine - Cladonia
ESSFmk/03 Subalpine fir - Mountain hemlock - Cladonia (S3, Blue list)
The ESSFmk is a narrow band of subalpine forest lying in the rainshadow just east of the Coast Mtns, at the southwest margins of the Morice District. and (Morice District). Because it has a summer-dry climate, xeric ecosystems are reasonably prevalent in this subzone. Small occurrences of the xeric whitebark pine - lichen forest are probably common on wind-exposed bedrock outcrops or talus at the upper parkland elevations of the ESSF, but be on the lookout for large or low elevation occurrences on south-facing talus slopes and river terraces. For example, there are some excellent occurrences on sandy skeletal fluvial and glaciofluvial parent materials in the Burnie River valley. These ecosystems are critical for Clark's nutcracker and probably

very important to caribou, grouse, ptarmigan and other wildlife. Understory layers are typically sparse and lack diversity. The best examples have will have an abundance of whitebark pine and ground lichen, while the more typical /02 and /03 ecosystems will have mainly subalpine fir, lodgepole pine, mountain hemlock and more mosses and liverworts than lichens. Two possible (extremely rare) subalpine plant communities to watch for are (1) whitebark pine on calcareous rock substrate with a grassy understory, or (2) a xeric/wetland complex with hummocks of whitebark pine, lichen and oatgrass (*Danthonia intermedia),* spike trisetum (*Trisetum spicatum*) grassland on sand and gravel, interspersed with sedge wetlands in the hollows.

ESSFmk/02 and /03 ecosystems are unsuitable for logging but may occur as minor inclusions in larger cutblocks -where they should probably be left as wildlife tree patches. Removal of subalpine, amabilis fir, hemlock and lodgepole pine ingrowth to create a more open stand conducive to regeneration of whitebark pine may not be a bad idea. Avoid road construction. These ecosystems have very shallow soils and are vulnerable to damage from insensitive recreational use (campsites, ATV traffic, etc.). The health and recruitment of whitebark pine and Clark's nutcracker populations should be monitored (mountain pine beetle and the introduced white pine blister rust (*Cronartium ribicola)* are the two primary threats). Where feasible, a "let-burn" policy may be the best long-term strategy for these ecosystems.

Suggested Additions to the Red and Blue Lists

The following plant communities have been identified as potential additions to the red and blue lists for the Morice Forest District. Little field work has been done to define rare communities in the Morice. Information on these communities is mainly drawn from field work in the Bulkley-Cassiar District. No effort has been made to include subalpine, alpine, wetland or aquatic plant communities. These habitats have a high potential for containing provincially significant plant communities, but are poorly studied. Low elevation wetland and aquatic communities are particularly threatened and should be a priority for further field investigations.

1. SBSdk floodplains
Active floodplains in the SBSdk contain a complex mosaic of forested, shrub and herb dominated communities, but only the black cottonwood-dominated SBSdk/08 is currently listed. I have recommended two additional floodplain communities for red-listing: (a) paper birch-black twinberry, and (b) white spruce - horsetail (SBSdk/07), and one for blue-listing: (c) Pacific willow - mountain alder -lady fern.

a) Paper Birch - black twinberry fluvial forest (recommended Red list)
Stands dominated by paper birch (*Betula papyrifera)* are rare in the SBSdk. This plant community, a pure stand of "cathedral-like" paper birch on a very productive subhygric high bench floodplain with an understory shrub layer dominated by black twinberry, moist forbs including false sarsaparilla (*Aralia nudicaulis),* common horsetail *(Equisetum arvense),* oak fern (*Gymnocarpium dryopteris*), and Solomon's seals (*Smilacina* spp.*)* is exceptionally rare. Devil's club (*Oplopanax horridus)* may be present. This community may occur within the large floodplain complexes on the Bulkley or Morice rivers. It is a variation of the newly-described SBSk/$58 seral association (Oikos 1998).

b) SBSdk/07 Hybrid white spruce - horsetail floodplain forest (recommended Red list)
Spruce - horsetail forests growing on moist depressional sites are a widespread feature of the subboreal and boreal landscape. However, in the SBSdk they are both naturally uncommon and

imperiled by land clearing and logging. They appear to be much less abundant and much smaller in size than the red-listed SBSdk/08. Two site types of the SBSdk/07 are of particular concern: the SBSdk/07a (described in Banner et al. 1993 and by Pojar et al. 1986) is a highly productive spruce forest growing on sandy to silty Regosolic or Brunisolic floodplain soils. It appears to be reasonably common on the Morice River floodplain -especially in the SBSdk/mc2 transition, but is virtually absent elsewhere in the SBSdk where such sites are either dominated by black cottonwood or cleared. The other is a nutrient-rich SBSdk/07b swamp forest, with Gleysolic soils, on lacustrine or fluvial parent materials with water movement through the site. These rich forests have smaller spruce trees than the SBSdk/07a but have an incredibly diverse understory including such locally rare plant species as Rocky Mountain sedge (*Carex saximontana)* (blue-listed, see pg 20),water avens (*Geum rivale),* jewelweed (*Impatiens noli-tangere),* northern twayblade *(Listera borealis)* and many atypical bryophytes.

c) Pacific willow - mountain alder - lady fern - low bench floodplain (recommended Blue list) This plant community occurs in regularly flooded backchannels of SBSdk floodplains. It doesn't have much direct economic value but is extremely valuable as wildlife and fish habitat. In the Morice District these ecosystems are more common than elsewhere in the SBSdk, but are not abundant. In developed areas this plant community is threatened by insensitive construction practises, changes to natural drainage patterns and water pollution. These are highly diverse plant communities with multiple shrub layers and a lush herb layer dominated by ferns and horsetails.

In addition, there are several other non-forested plant communities containing highly specialized floodplain species that could be considered for listing after further sampling, for example:

- Bluejoint (*Calamagrostis canadensis*) - fowl bluegrass (*Poa palustris*) wet grassland
- Sandbar willow (*Salix exigua*) - wolf willow (*Elaeagnus commutata*) sand and gravel bars (threatened by white clover (*Melilotus alba*) and other non-native spp.),
- Yellow mountain avens (*Dryas drummondii*) - alpine milk vetch(*Astragalus alpinus*) sand and gravel bars (include with above?)
- Sedge (*Carex* spp.) - Horsetail semiaquatic backchannels

2. SBSmc2 Black cottonwood - hybrid white spruce - red osier dogwood - prickly rose floodplains (recommended Blue list)

Banner et al. (1993) did not describe black cottonwood floodplains in the SBSmc2 zone because they are not sufficiently common, but the community does not stop at the SBSdk boundary. In the Morice District, examples of SBSmc2 Black cottonwood - red-osier dogwood - prickly rose floodplain communities can be found mainly along the upper Morice River, and probably at the mouths of streams that feed into Babine Lake. Small pockets also exist on other stream systems. Black cottonwood ecosystems are a rare and extremely valuable habitat feature in the predominantly coniferous SBSmc2/ESSF landscape.

3. Grasslands and Meadows

Several grassland or meadow community types were mentioned in the description of the red-listed Bluegrass - Slender Wheatgrass plant community (pg 1). These include:

a) Timber oatgrass dry grassland (SBSdk, SBSmc2, ESSFmc, ESSFmk) (recommended Red (and blue?) list)

A xeric to submesic grassland community characterized by timber oatgrass (*Danthonia intermedia)* has been found on inactive level gravelly fluvial deposits from valley bottom to subalpine elevations. It should probably be red-listed in the SBSdk and SBSmc2, but may turn out to be sufficiently common in the ESSF that blue-listing is appropriate, because there are few

threats at that elevation. Although very rare in the Bulkley-Cassiar District, it increases in frequency in the Morice District and further southeast. This plant community may have been fairly common on fluvial terraces of the Bulkley River before these were cleared for agriculture. In the upper SBSmc2 and ESSF it occurs in gravelly frost pocket areas mingled with wetlands and begins to resemble dry alpine grassland, with spike trisetum and alpine timothy (*Phleum alpinum)* as common associates. Other associated species include: northern bedstraw *Galium boreale*, yarrow (*Achillea millefolium*), dwarf blueberry (*Vaccinium caespitosum*), sweetgrass (*Hierochloe odorata*), tall blue penstemon (*Penstemon procerus*), northern gentian (*Gentianella amarella*), orange agoseris (*Agoseris aurantiaca*), stonecrop (*Sedum lanceolatum*), strawberry (*Fragaria virginiana*), grape ferns (*Botrychium* spp,) and pussy toes (*Antennaria* spp). There is moderately developed cryptogammic crust with *Cladina* and *Peltigera* lichens, *Polytrichum juniperinum* and *Thuidium abietinum* mosses. These ecosystems are at risk from tree and shrub encroachment (aspen, Pl, prickly rose), invasive alien species (timothy, dandelion (*Taraxacum officinale)*, creeping red fescue *(Festuca rubra)*), gravel pit and road construction, and expansion of domestic grazing tenures. Avoid any soil disturbance and locate roads well away from these ecosystems.

b) Mesic Aster - peavine -meadow rue forb meadows (all interior zones) (recommended red or blue list) (abbreviated AM)

These plant communities should probably be red-listed in the SBS and blue-listed in the ESSF. They can be found on level inactive fluvial deposits with a fine-textured surface capping over gravels, or on the gentle southwest-facing slopes with a well drained but reasonably deep soil. Species composition varies greatly from one site to another and there are no obvious dominants. Characteristic species include: buttercups (*Ranunculus* spp. dominant on the Nilkitkwa River), monkshood (*Aconitum delphinifolium* dominant in the Zymoetz), asters (*Aster modestus, A. ciliatus, A. conspicuus*), peavine, western meadow rue, northern bedstraw, meadow valerian (*Valeriana dioica*), fireweed, yarrow, goldenrod (Solidago canadensis) indian paintbrush (*Castilleja miniata* -orange and yellow), cinquefoils (*Potentilla* spp.*)*, native thistles (*Cirsium foliosum, C. edule)* and grapeferns. A variety of grasses (*Elymus glaucus, Poa spp., Bromus spp., Melica subulata, Schizachne purpurascens*) and sedges (esp. *Carex macloviana*) are present but never dominant.

These plant communities can be distinguished from moist cow parsnip plant communities (often present within the same meadow) by their lower stature, higher species diversity and absence or scarcity of cow parsnip, stinging nettle, large-leaved avens, arrow-leaved ragwort, and bluejoint. They are much less common, and are more prone to tree encroachment. Other threats include road and gravel pit construction, heavy recreational use (ATVs, hunting campsites) expanded use by domestic livestock, and seeding of agronomic species either on site or nearby. Meadows with a significant component of this plant community in good condition and no history of agricultural use should not be considered for anything but light or occasional domestic grazing. Avoid soil disturbance and locate roads well away from these ecosytems.

c) Cow parsnip - large leaved avens - stinging nettle - brome lush meadows (SBSdk, SBSmc, CWHws) (recommended Blue list) (abbreviated CA)

Cow parsnip-dominated meadows are found on deep, rich, moist soils (often underlain by gravels) throughout much of British Columbia and have a fairly similar species composition wherever they occur. Their abundance in the landscape varies with climate, landforms and disturbance history (e.g. common in avalanche terrain or moist areas with repeated fire). In low elevation subzones of the southern Skeena Region (not the ESSF and MH) they are nowhere extensive and very important to vertebrate and invertebrate wildlife. In low elevation, developed areas these communities are often threatened by suburban development, agriculture, domestic

grazing and introduced plant species (e.g. Canada thistle (*Cirsium arvense)*). In less developed areas they are threatened by long term fire suppression, possible expansion of grazing tenures, and by insensitive logging and highway development -e.g. road locations and gravel pits across toe slopes and in riparian corridors. Blue-listing these communities would not make them off limits for range use, but should alert resource managers of the need to manage these ecosystems to ensure that they remain in the landscape and that a significant percentage be maintained in good to excellent condition.

4. Canyon walls and rock cliffs (SBSdk, SBSmc2) and waterfalls (all zones)
Steep rocky cliffs and canyon walls are an uncommon to rare landscape feature at low elevations. Although many are unthreatened by human activity, in populated areas such as the Bulkley Valley they are often dynamited for rock quarries, bridge crossings, or to make room for development, and gentler slopes are damaged by heavy foot traffic. Most rock outcrops contain highly specialized, but fairly predictable assemblages of mainly widespread and secure species like three-toothed saxifrage (*Saxifraga tricuspidata),*stonecrops (*Sedum lanceolatum, S. divergens),* Jacob's ladder (*Polemonium pulcherrimum),* sheep fescue (*Festuca saximontana*), northern gooseberry (*Ribes oxyacanthoides),* fragile fern (*Cystopteris fragilis*), field chickweed (*Cerastium arvense),* hairy rockcress (*Arabis hirsuta),* rock mosses (*Tortula ruralis, Thuidium abietinum)* and various lichens. Occasionally one comes across a cliff or canyon wall with either exceptionally high plant diversity or with rare or outlier species, which should be designated on maps and afforded some protection from development. These may have an unusual rock type (highly calcareous, recent basalt), microclimate (e.g. spray zone, or exceptionally hot and dry) or unusual disturbance history (e.g. constant ravelling, packrats), or they may just be exceptionally large with a great variety of different niches. With additional plant community descriptions it may be possible to propose some of these communities for red or blue listing, but currently these features have to be addressed on a case-by-case basis.

Definition 4. Ecosystems (site series or surrogate) that comprise less than 2% of a landscape unit and are not common in adjacent landscape units.
This definition can be used to capture regionally significant plant communities that may not be provincially significant, or locally significant communities that may not be regionally significant. For example, analysis of landscape units in the Morice may show that there is very little mature Spruce or Lodgepole pine on zonal and subhygric ecosystems in the low elevation SBSdk subzone, or wet spruce horsetail ecosystems in the SBSmc2. Coastal ecosystems that are common in the the Kalum or Kispiox Districts may be rare in the Morice. This definition can also be used to identify communities that have not yet been classified or recognized by the CDC or regional ecologist, for example, wetland and aquatic ecosystems, alpine and subalpine tundra and meadows, and unusual non-forest communities such as those associated with sandbars, rock outcrops, talus, waterfalls and caves.

Where Terrestrial Ecosystem Mapping (TEM) is not available, themed forest cover/age class maps or predictive ecosystem mapping (PEM), in combination with surficial and bedrock geology maps, are a good way to get an initial handle on the abundance and seral stage distribution of different community types. Some things to watch for in the Morice include: less common deciduous forest cover types (e.g. birch-leading in all zones; black cottonwood in the SBSmc; aspen in the ESSF); marginal coniferous types (e.g. outlying stands of hemlock in the Telkwa Ranges ; open range; non-forested shrub thickets (maple, alder, willow); meadows; low elevation rock cliffs or canyons, waterfalls and interesting wetland systems. Areas with unusual habitat diversity, interesting geological formations (e.g. limestone) or landforms (e.g. glaciolacustrine, or sandy esker complexes) or anything else out of the ordinary should be considered a priority for TEM mapping or closer field inspection by rare and endangered species specialists.

Rare Vascular Plants of the Morice Forest District

Only 4 blue-listed vascular plants and no red-listed plants are reported to occur in the Morice Forest District. More blue- or red-listed taxa might be found if a detailed botanical survey of alpine areas, wetlands and other atypical habitats were carried out. None of the species occur in typical upland forested habitats, but two may be found in rangeland situations-see below for habitat details.

If you think you have found one of the listed plants, mark it with labelled flagging tape, accurately record the location (on an aerial photo if available), elevation, slope and aspect and dominant vegetation and habitat features (see Appendix for CDC Field Observation Form (Plants)). Take photographs if possible. Do not collect a voucher specimen unless the population is large and you feel it is important to do so - in which case follow the 1 in 20 rule (never collect more than one-twentieth of the population). Do not pull roots or rhizomes from the ground. Contact: Anne Hetherington, Rare and Endangered Species Specialist, Skeena Region Wildlife Branch, B.C. Ministry of Environment, Lands and Parks. Ph: 847-7692; fax: 847-7728; e-mail: ahetheri@ smithers.env.gov.bc.ca.

Red- and blue-lists have not yet been prepared for non-vascular plants in the Morice District. Goward (1996) and Ryan (1996) have described rare lichens and bryophytes, respectively, in British Columbia and listed them by biogeoclimatic zone and ecoregion.

Ferns

Woodsia glabella Smooth cliff fern. This delicate little fern grows in moist, shady crevices and ridges of calcareous rocks. It has been found on limestone at Fort St. James and should be looked for on any limestone or other base-rich rock outcrops in the Morice District. I did not find it on the limestone near Granisle, but have not done a thorough survey of the entire ridge.
This fern is usually less than 10 cm tall and can be distinguished from other species of *Woodsia* (which typically grown on dry rock outcrops) by its small size, lack of hairs or chaffy scales, and by the distinct joint near the base of the stem which causes the old stipes to break off at a uniform length. It looks a lot like *Asplenium viride* which grows in similar habitats, but doesn't have the jointed base.
Reference and drawing: Taylor 1973.

Woodsia ilvensis Rusty cliff fern. This cliff fern is found on dry rock outcrops and scree slopes and is normally 15-20 cm tall, like the two more common species of Woodsia, *W. oregana* and *W. scopulina*. Unlike these two ferns, rusty cliff fern has the distinct joint near the base of the stipe, causing the bases to fracture evenly. Its stipe and foliage are covered in rusty brown scales and hairs -compare to the white hairs of *W. scopulina* and the unhairy *W. oregana*.
Reference and drawing: Taylor 1973

Dicotyledons

Polemonium caeruleum ssp. ***amygdalinum*** Tall Jacob's ladder is a very attractive blue to purple flowered plant that is common in northern B.C. but only scattered in central British Columbia. It looks much like our common showy Jacob's ladder (*Polemonium pulcherrimum),* but is taller, with pointed rather than rounded leaflets and grows in moist meadows, wetlands and deciduous forest understories with peaty humus layers rather than on the exposed, gravelly, sandy or rocky sites favored by *P. pulcherrimum*. Southern populations of tall Jacob's ladder apparently belong to a different subspecies than northern populations. Ssp. ***amygdalinum,*** which is rare, differs

Table 3. B.C. Conservation Data Centre: Rare Vascular Plant Tracking List -Morice Forest District (FD # 22)
last updated November 12, 1996

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	PROVINCIAL RANK	PROVINCIAL LIST
*** FERNS AND ALLIES				
WOODSIA GLABELLA	SMOOTH CLIFF FERN	G5	S2S3	BLUE
WOODSIA ILVENSIS	RUSTY CLIFF FERN	G5	S2S3	BLUE
*** DICOTS				
POLEMONIUM CAERULEUM SSP AMYGDALINUM	TALL JACOB'S-LADDER	G?T?	S1?	BLUE
*** MONOCOTS				
CAREX SAXIMONTANA	ROCKY MOUNTAIN SEDGE	G5	S2S3	BLUE

4 TAXA LISTED

from the common northern ssp. *villosum*, in having styles (the female reproductive structure at the centre of the flower) that are much taller than the stamens (the male pollen-bearing reproductive structures). In ssp. *amygdalinum* the stamens are short, and don't extend out beyond the petals. Look for it along streams, in moist flower meadows and in wetlands, probably mainly at middle and higher elevations. Tall Jacob's Ladder is abundant in the meadows along the Equity Mine road (e.g at Klo Ck. and Foxy Ck.), but I don't know whether this is spp. *amygdalinum* or ssp. *villosum.*
Refs: Douglas et al. 1990; Hitchcock and Cronquist (1973; drawing, called *P. occidentale*).

Monocotyledons

Carex saximontana Rocky Mountain sedge. Also known as *Carex backii*, this rare sedge has been found in a variety of rich habitats in the Lakes and Bulkley-Cassiar Districts, ranging from the moist shaded crevices on Tetzalto (Grizzly) Mountain, grasslands at Colleymount to moist spruce forest understories in the Bulkley Valley. This sedge has broad flat leaves. When flowering it looks unlike any other local sedge because the lower pistillate scales look like large leafy bracts with long tapered tips, enclosing the perigynia which are large ($\pm$5mm), plump and held erect.
References: Douglas et al. 1994; Taylor 1983 (drawing).

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Rare Plant Communities and Plant Species
of the
Lakes Forest District

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Rare Plant Communities and Plant Species of the Lakes Forest District

Introduction

The purpose of this report is to provide information about rare plant communities and plant species to operational staff working in the Lakes District. Some brief management interpretations are included for information and discussion purposes.

This report assumes readers are familiar with Biogeoclimatic Ecosystem Classification. Refer to Banner et al. (1993) for descriptions of many of the plant communities, abbreviations and terms used here. In British Columbia we tend to use the names and abbreviations of Biogeoclimatic Site Series (e.g. SBSdk/81 Saskatoon - slender wheatgrass) when referring to plant communities or ecosystems. This is often appropriate, but in some cases the rare plant community may be an exceptional variation of a more common site series. For example, it may occur on an unusual type of parent material, or be dominated by an unusual tree species. Where this is the case, it is addressed below in the descriptions of individual plant communities.

Rare Plant Communities of the Lakes Forest District

Rare Ecosystems (Ministry of Forests working definition, November 1997)
Rare ecosystems are defined to include:

1. Plant communities listed in the Identified Wildlife Guidebook

2. Plant communities listed as red or blue with the B.C. Conservation Data Centre;

3. Ecosystems identified by the regional ecologist or regional rare and endangered species specialist as being rare or significant; and

4. An ecosystem (site series or surrogate) that comprises less than 2% of the landscape unit and is not common in adjacent landscape units.

Definition 1. Plant communities listed in the Identified Wildlife Guidebook
A draft of the Forest Practises Code guidebook for managing rare and endangered species and ecosystems - called "Identified Wildlife Management Strategy "- is currently in review. It includes the following red-listed plant communities that are affected by forest and range management:

Poa secunda - Elymus trachycaulus **SBSdk/ or mc2/82**
Pacific Bluegrass - Slender Wheatgrass (also abbreviated BW or PsEt)
Most occurrences of the red-listed bluegrass - slender wheatgrass plant community are found in the Lakes Forest District. These native grasslands are dominated by grasses with variable forb cover and very few shrubs. They differ from grasslands in southern B.C. in lacking bluebunch wheatgrass (*Elymus* spicatus), big sage *(Artemisia* tridentata) and southern fescues (e.g. *Festuca idahoensis)* and from most northern and subalpine grasslands in having abundant slender wheatgrass *Elymus trachycaulus* and a variety of needlegrasses (dominantly *Stipa occidentalis* and *Stipa richardsonii)* and native bluegrasses (*Poa secunda, P. glauca*) while lacking northern or high elevation grasses such as Altai fescue (*Festuca* altaica), alpine bluegrass *(Poa* alpina) and alpine timothy *(Phleum* alpinum).

This plant community is considered critically imperilled in the Lakes District. It is absent from the Sutherland River proposed protected area and only minor occurrences exist in the Uncha Mountains - Red Hills proposed protected area. Much of the original extent of the community was lost during inundation of the Nechako Reservoir. In recent years the extent of grassland communities has further diminished because wildfire suppression and elimination of the widespread practice of range burning encouraged aspen and shrub invasion. Remnant grassland areas, most of them found along the north shores of the large lakes in the southern portion of the District (Francois, Ootsa, Cheslatta, Cheslasie arm), have been greatly transformed by up to 100 years of grazing by sheep, horses, cattle, and deer, range seeding and cultivation and are now dominated by agronomic species of grass (timothy (*Phleum pratense),* Kentucky bluegrass (*Poa pratensis),* red fescue *(Festuca rubra*), orchard grass (*Dactylis glomerata*) as well as a variety of introduced weeds, notably dandelion *(Taraxacum officinale).* Some of the best remaining occurrences are steep slopes below basalt buttes such as at Colleymount and Tyhee Butte where the soils are deep and rich but the slopes are too steep for intensive livestock use, and too dry and exposed for tree invasion.

Eliminating livestock grazing from Bluegrass - Slender wheatgrass ecosystems will not cause these plant communities to revert to a presettlement condition, and it may accelerate tree and shrub encroachment on some sites. However, carefully developed range use plans that control the distrubution and season of use by livestock to avoid overgrazing will benefit wildlife, encourage native grassland species, prevent degradation of sensitive sites, and allow degraded areas to recover. Reintroduction of prescribed burning may be appropriate for some sites.

Amelanchier alnifolia - Elymus trachycaulus **SBSdk or mc2/81**
Saskatoon - Slender wheatgrass **(also abbreviated SW or AaEt)**

Saskatoon - slender wheatgrass is a xeric to submesic scrub-steppe community consisting of a mosaic of low-growing saskatoon (*Amelanchier alnifolia*), snowberry *(Symphoricarpos albus*), cherry *(Prunus virginiana, P. pensylvanica),* prickly rose (*Rosa acicularis*) scrub intermixed with patches of dry grassland *(Elymus* spp., *Stipa* spp., *Festuca saximontana, Poa* spp.), and a variety of wild flowers including peavine, northern bedstraw *(Galium boreale),* yarrow (*Achillea millefolium*) and wild onion (*Allium cernuum*). Patches of taller willow (*Salix* spp.*),* aspen, cherry and hawthorn (*Crataegus douglasii)* are common. Because of high insolation and low snowpacks, these ecosystems provide critical habitat for many wildlife species, notably deer and garter snakes, and support plant and insect species that do not occur elsewhere in the landscape.

This plant community is widespread but never abundant on steep rocky south to southwest-facing slopes throughout the Lakes District, especially on the north shores of larger lakes. Occurrences at low elevations are the most diverse and most threatened by changes associated with human settlement. Although they contain no operable timber, these ecosystems are often damaged or fragmented by road and communication tower construction, rock quarrying, and insensitive recreational use. Overbrowsing and grazing by cattle and wildlife also cause excessive soil disturbance, damage sensitive species, and accelerate the spread of invasive species. Occurrences in more remote areas tend to be in good condition, but are threatened long-term by fire suppression. There is excellent representation of this plant community in both the Sutherland River and Uncha Mountain - Red Hills proposed protected areas.

In the Bulkley-Cassiar and Lakes Districts, Saskatoon - slender wheatgrass ecosystems occasionally include well developed “savanna-steppe” stands of Rocky Mountain juniper (*Juniperus scopulorum).* This plant community is rare and most of the Bulkley Valley occurrences are threatened. There appear to be well developed occurrences of juniper savanna in

good condition within both of the new proposed protected areas (the Red Hills site is unverified). Additional occurrences outside of protected areas should be brought to the attention of the Regional Rare and Endangered Species Specialist or District Forest Ecosystem Specialist.

Most occurrences of the Saskatoon - Slender wheatgrass scrub-steppe ecosystem are found on shallow rocky soils and have few or no Rocky Mtn juniper. These occurrences appear to be relatively stable and probably only require intermittent fire (on the order of 30-100 yrs?, depending on the degree of exposure to sun and wind and the amount wildlife disturbance) to prevent tree encroachment. They can tolerate sporadic livestock grazing (generally too steep and rocky for cattle) and light recreational use, but sustained or heavy grazing or human use, and construction of roads, trails and quarries that expose mineral soil must be avoided. Such activities greatly accelerate the spread of invasive species.

Another type of SBSdk/81 scrub-steppe (transitional to the SBSdk/82) can be found on deep, rapidly-drained soils of steep fluvial or lacustrine escarpments bordering rivers, creeks and perhaps some lakes. This site type is less diverse than the typical rock outcrop SBSdk/81, and tends to be dominated by shrubs, but it can support excellent subxeric to submesic grassland (*Stipa, Elymus,Poa*). Most occurrences of this plant community are on private land and have been greatly modified by agricultural use. Occurrences that were not heavily grazed have mostly grown over with aspen and shrubs. These ecosystems depend on a combination of fire and ongoing animal disturbance (beavers, ungulates) to prevent aspen encroachment. Restoration of some examples of this type will require active management of livestock and deer use and reintroduction of fire. Probably the best remaining examples of SBSdk/81 on deep soil are found on the lacustrine escarpment bordering the north side of the Sutherland River valley. These occurrences are small and would probably benefit from prescribed burning. Any other occurrences of this type of SBSdk/81 in good condition on Crown land should be brought to the attention of the Regional Rare and Endangered Species Specialist or District Forest Ecosystem Specialist.

***Populus balsamifera* ssp. *trichocarpa - Cornus stolonifera - Rosa acicularis* SBSdk/08**
Cottonwood - Dogwood - Prickly Rose (also abbreviated CD or PbRa)

Black cottonwood floodplain communities in the SBSdk have been red-listed because of the relatively rarity of major rivers in the central interior, their exceptionally high habitat value, sensitivity to changes in the hydrological regime, and the density of human development. The best examples of this plant community are found on braided (wandering) reaches of the major rivers and streams (Riparian Class S1 and larger S2), while reaches with a stable, single thread channel and smaller tributaries (S2,S3) tend to have small, high benches and terraces with poorly developed floodplain communities. Because the Lakes District has no major rivers, this plant community is extremely rare, and occurrences tend to be small, poorly developed and threatened by human disturbance. They are particularly valuable in this District because large trees capable of producing large snags and cavities are in limited supply. In the Lakes District, occurrences of floodplain black cottonwood are typically found on the deltas of creeks entering the larger lakes (e.g. shorelines of Babine Lake and Francois Lake). Small pockets are also scattered along larger creeks and rivers. Active fluvial fans that develop on steeper gradient S3 to S6 creeks often have black cottonwood communities that are similar to and provide many of the same habitat features as the floodplain SBSdk/08.

Identifying scattered occurrences of SBSdk/08 and the equivalent SBSmc2 community should be a high planning priority for the Lakes District. This can readily be done with colour-themed forest cover maps. The best management strategy for this plant community is to avoid development and

changes to the hydrological regime, maintaining the highest degree of connectivity possible along the river and tributary streams and with adjacent upland areas. Logging and road construction on active fluvial fans must be very carefully planned given the highly unstable nature of these ecosystems and the importance of maintaining their hydrological integrity.

Definition 2. Plant Communities listed as red or blue with the B.C. Conservation Data Centre

The B.C. Conservation Data Centre (**CDC**) is a program of the Wildlife Branch of the B.C. Ministry of Environment, Lands and Parks. The CDC collects information on the rare and endangered plants, animals and plant communities in British Columbia and maintains a computerized database on their status, location and level of protection. The CDC is a partner of the National Heritage Network, a international body that uses standardized methods and terminology (Table 1) to gather and exchange information on threatened elements of global biodiversity. By international convention, the CDC uses the term "plant community", rather than the term "ecosystem". These terms are used more-or-less interchangeably in this report.

For each Forest District in British Columbia, the CDC maintains a tracking list of **red**- and **blue-listed** species and plant communities known or believed to occur within the District. The most recent version of the list is available at the website: **www.env.gov.bc.ca/wld/cdc**, and has been reproduced in Table 2. All of the red-listed plant communities on Table 2 are included in the Identified Wildlife Management Strategy and are described above under Definition 1.

Table 1. CDC Definitions

Global Ranks (G1 to G5) These reflect the conservation status of an organism from a global (i.e. range-wide) perspective. Plant communities are not currently assigned a global rank, because there is no established international system for classifying or comparing plant communities.

Provincial Ranks (S1 to S5) These reflect the conservation status of an organism or plant community within the province of British Columbia. Note that a species or community can be considered imperiled or vulnerable within British Columbia even if it is common or secure outside of the province. However, organisms or communities that are threatened locally (e.g. within the Lakes District) may not be ranked if they are common in other areas of the province.

G1 or S1 = critically imperiled because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction.

G2 or S2 = imperiled because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction.

G3 or S3 = vulnerable either because very rare and local throughout its range, found in only a restricted range (even if abundant at some locations) or because of other factors making it vulnerable to extinction.

G4 or S4 = apparently secure Uncommon but not rare, and usually widespread. Possibly cause for longterm concern.

G5 = secure common, typically widespread and abundant.

T = infraspecific taxon (trinomial) Subspecies or varieties of a species (indicated by a scientific name with three parts) have a "T" following the global or provincial rank. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1.

U = **Unrankable** due to lack of information about status or trends.

Range Ranks (S#S# or G#G#) or **?** are used to indicate uncertainty about the exact status of a taxon or community.

Provincial Lists

red list: includes any indigenous species or subspecies (taxa) considered to be Extirpated, Endangered, or Threatened in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. Red-listed taxa include those that have been, or are being, evaluated for these designations. (note: this definition does not describe communities)

blue list: includes any indigenous species or subspecies (taxa) considered to be Vulnerable in British Columbia. Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened. (note: this definition does not describe communities)

Relationship between Red and Blue Lists and Provincial Ranks

PROVINCIAL RANK	RED LIST	BLUE LIST
Plants:	S1 S2	S1? S2S3
Plant Communities:	S1 S1S2 S2 S2?	S2S3 S3 S3?

Table 2. B.C. Conservation Data Centre: Rare Plant Community Tracking List -Lakes Forest District (FD # 21)
last updated June 10, 1996

SCIENTIFIC NAME	COMMON NAME	HABITAT* REQUIREMENT	PROV RANK	PROV LIST
ABIES LASIOCARPA - JUNIPERUS - CLADONIA	SUBALPINE FIR/LODGEPOLE PINE - JUNIPER - LICHEN	ESSFmc/02	S3	BLUE
ABIES LASIOCARPA - VACCINIUM MEMBRANACEUM - EMPETRUM	SUBALPINE FIR - HUCKLEBERRY - CROWBERRY	ESSFmc/03	S3	BLUE
AMELANCHIER ALNIFOLIA - ELYMUS TRACHYCAULUS	SASKATOON - SLENDER WHEATGRASS	SBSdk/81	S2	RED
PICEA MARIANA - VACCINIUM MEMBRANACEUM - PETASITES	BLACK SPRUCE/LODGEPOLE PINE - FEATHERMOSS	SBPSmc/03 SBSmc2/03	S3	BLUE
PINUS CONTORTA - JUNIPERUS COMMUNIS - ORYZOPSIS ASPERIFOLIA	LODGEPOLE PINE - JUNIPER - RICEGRASS	SBSdk/02	S3	BLUE
POA SECUNDA - ELYMUS TRACHYCAULUS	BLUEGRASS - SLENDER WHEATGRASS	SBSdk/82	S1	RED
POPULUS BALSAMIFERA SSP. TRICHOCARPA - CORNUS SERICEA - ROSA WOODSII	COTTONWOOD - DOGWOOD - PRICKLY ROSE	SBSdk/08	S2	RED
PSEUDOTSUGA MENZIESII - PLEUROZIUM - HYLOCOMIUM	DOUGLAS-FIR - FEATHERMOSS - STEPMOSS	SBSdk/04	S3	BLUE

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

Blue-Listed Plant Communities of the Lakes Forest District

The order of presentation follows the CDC tracking list of June 10, 1996 (Table 2). Please refer to the Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region (Banner et al. 1993) for a more complete description of the biogeoclimatic site series corresponding to each blue-listed plant community.

ESSFmc/02 Subalpine fir - lodgepole pine - juniper - lichen (S3, Blue list)

Because the Lakes District is not mountainous, the extent of the ESSFmc is limited compared to other Districts, but dry pine-lichen ecosystems occupy a larger portion of the subalpine landscape. Small rocky outcroppings classified as ESSFmc/02 are probably common; large, dry, sunny examples on bedrock, sand or gravelly ridges and terraces are less so. These communities are dominated by lodgepole pine, with common juniper (*Juniperus communis)* and kinnikinnick (*Arctostaphylos uva-ursi)* in the understory along with abundant terrestrial and arboreal lichens. They are an important habitat feature for a variety of animals because the open, dry setting contrasts with the surrounding moister, shadier landscape. Ridgetops and eskers are often preferred travel corridors for vertebrates. In the southern Lakes District these ecosystems are very important to caribou, who feed on the lichens.

The ESSFmc/02 usually occurs as minor inclusions within cutblocks (commonly left for wildlife tree patches). Larger occurrences tend to be unmerchantable but are favoured for road locations, gravel pits and informal campsites. Fire suppression also poses a serious long term threat to these plant communities as the organic layer builds up, moss replaces lichen, subalpine fir ingrowth occurs and mountain pine beetle takes out the oldest lodgepole pine. Occasional disturbance to the canopy and forest floor (e.g. fire or summer logging) may be beneficial to these ecosystems, but chronic or severe soil disturbance should be avoided. Caribou special management guidelines will probably apply to southern occurrences of this plant community.

ESSFmc/03 Subalpine fir - huckleberry - crowberry (S3, Blue list)

This plant community is widespread and apparently common in the ESSFmc, particularly at parkland elevations where it often occurs in a ridge-hollow complex with subalpine meadows. It is probably listed because of its importance to caribou. Berry production in these communities is important for bears, birds and other wildlife. These are marginal sites for timber production, and I suspect that seral stages of this plant community are more threatened than mature and old growth stages because of a lack of fire, thus in areas where caribou habitat protection is not an issue, I do not see a particular reason to protect them from logging. These ecosystems will be slow to recover from severe disturbance. The white-flowered rhododendron (*Rhododendron albiflorum*) reaches the northwestern limits of its range on these ecosystems in the Lakes and Morice Forest Districts.

SBSmc2/03 and SBPSmc/03 Black spruce - Lodgepole pine - Feathermoss (S3, Blue list)

Black spruce is at the southern limit of its range in the Lakes District and is therefore somewhat vulnerable. Black spruce - lodgepole pine communities growing on mineral soil (not peat) are typically found in mid-elevation plateau landscapes. In the SBSmc2 they are scattered in the Babine Lake country on the north side of Highway 16 and rare on the south side. They are more common, but never extensive, in the SBPSmc subzone. These communities are more extensive in the Prince George Forest Region and in the boreal forest further north. Black spruce can be difficult to distinguish from slow-growing, clubby-topped white spruce (check the cones and the hairy twiglets). The understory vegetation contains an assortment of Ericaceous plants such as labrador tea (*Ledum groenlandicum)*, creeping-snowberry (*Gaultheria hispidula)* and poor-site

mosses that are uncommon on upland ecosystems. This plant community occurs on flat or gently sloping areas subject to cold air ponding or on dry north-facing slopes, with soils that are often compacted or otherwise have restricted rooting. Small patches typically occur in association with wetlands.

Black spruce - lodgepole pine feathermoss communities have low timber productivity. With a little awareness, protecting them from indiscriminate logging and silvicultural practices should not be difficult. In areas where black spruce is not abundant, encourage natural regeneration. Broadcast burning or light soil scarification is more appropriate than severe mechanical site preparation treatments (mounding, plowing, ripping) intended to enhance site productivity. Avoid changes in soil drainage that may cause flooding. Large, well developed occurrences of this plant community should be brought to the attention of the Regional Rare and Endangered Species Specialist or District Forest Ecosystem Specialist.

SBSdk/02 Lodgepole pine - juniper - ricegrass (S3, Blue list)

Xeric lodgepole pine - common juniper - ricegrass - kinnickinnick - lichen plant communities on rapidly drained bedrock, gravelly terraces and eskers or sand deposits are at risk within the settled portion Hwy 16 portion of the SBSdk, but may be less threatened elsewhere. An equivalent plant community can be found at higher elevations in the SBSmc2. The SBSdk/02 is usually found as the driest portion of a landform that is dominated by SBSdk/03 or /05 ecosystems and it is never very extensive. The most common, and least vulnerable occurrences are on rocky, south-facing ridge crests. These are extensive in the Sutherland River proposed protected area (mostly SBSmc2). Occurrences on other types of parent material are rarer and more threatened because they are often developed as homesites or recreation sites or excavated for sand and gravel. Because the forest floor vegetation is extremely vulnerable to soil disturbance from human or livestock traffic, it is difficult to find examples of this plant community in good condition near settled areas. These ecosystems support an unusual variety of herbs, saprophytes, lichens, bryophytes, fungi and insects not commonly found on moister or richer ecosystems. They also have high value as wildlife habitat, for example as deer winter range.

SBSdk/02 occurrences of significant size on Crown land should be brought to the attention of the Regional Rare and Endangered Species Specialist or District Forest Ecosystem Specialist. These are not productive timber-growing sites. Where they occur within woodlots or Crown forest these ecosystems will often be designated as wildlife tree patches. It should be easy to naturally or artificially regenerate lodgepole pine on these dry ecosystems without having to create canopy gaps of more than a few trees (not tree-heights). Fire is needed for long term persistence of these ecosystems and for forest health. On many sites it should be feasible to carry out small scale, low to medium intensity, controlled burns during periods of low fire hazard. Forage production on these sites is low, but (except for rock outcrop types) they are often favoured by cattle because of the easy terrain and shade. Where exceptional occurrences are within existing or proposed grazing tenures, measures should be taken to prevent cattle from congregating within them. Avoid locating roads, landings, quarries or recreation sites within exeptional occurrences of this plant community.

SBSdk/04 Douglas-fir - feathermoss - stepmoss (S3, Blue list)
Interior Douglas-fir is at the northwestern limits of its range in the Lakes District and is vulnerable to climatic change and changes in the disturbance regime such as fire suppression and insect populations. Douglas-fir - feathermoss - stepmoss plant communities are submesic ecosystems usually found on south-facing rocky knolls. Soopolallie (*Shepherdia canadensis*) and birch-leaved spirea (*Spirea betulifolia)* are characteristic shrub dominants. These ecosystems developed following repeated underburns. Without fire, spruce, subalpine fir and lodgepole pine ingrowth occurs, forest health problems develop in Douglas-fir veterans, and Douglas-fir regenerates poorly. Restoration practises such as thinning and prescribed burning being used in southern interior Douglas-fir forests may be appropriate here. These ecosystems are valuable for wildlife because of their large Douglas-fir snags, and serve as important deer winter range. SBSdk/04 ecosystems are common and in good condition in both the Sutherland River and Uncha Mountains - Red Hills proposed protected areas.

A rare xeric variation of this plant community has been found on rich bedrock at Tetzalto Mountain and Francois Lake. This community has Douglas-fir and (apparently) three species of juniper (*Juniperus scopulorum, J. communis,* and *J. horizontalis).* The understory may include pinegrass *(Calamagrostis rubescens).* This community is a northern outlier of one that is more widespread in southern B.C. and represents a southern interior analogue of the Rocky Mountain juniper savanna-steppe of the Bulkley Valley.

Definition 3: Ecosystems identified by the regional ecologist or regional rare and endangered species specialist as being rare or significant

The following plant communities have been identified as potential additions to the red and blue lists for the Lakes Forest District. These suggestions should be considered very preliminary because little fieldwork has been done to define rare communities in the Lakes and I have little previous field experience in this District. Supplementary information was obtained from Terrestrial Ecosystem Mapping (TEM) in the Babine East and Taltapin (Oikos Ecological Services 1997) and seral deciduous classification for the SBSdk (Oikos 1998). No effort was made to include subalpine, alpine, wetland or aquatic plant communities which are poorly studied.

1. SBSdk floodplains
Active floodplains in the SBSdk contain a complex mosaic of forested, shrub and herb dominated communities, but only the black cottonwood-dominated SBSdk/08 is currently listed. I have identified two additional floodplain communities for red-listing: (a) paper birch-black twinberry, and (b) white spruce - horsetail (SBSdk/07), and two for blue-listing: (c) Pacific willow - mountain alder -lady fern, (d) Drummond's willow - mountain alder.

a) Paper Birch - black twinberry fluvial forest
Stands dominated by paper birch (*Betula papyrifera)* are rare in the SBSdk, and probably exceptionally rare in the Lakes District. This plant community, a pure stand of "cathedral-like" paper birch on a very productive subhygric high bench floodplain has an shrub layer dominated by black twinberry (*Lonicera involucrata),* moist forbs including false sarsaparilla (*Aralia nudicaulis),* common horsetail *(Equisetum arvense),* oak fern (*Gymnocarpium dryopteris*), and Solomon's seals (*Smilacina* spp.*).* Devil's club (*Oplopanax horridus)* may be present. It is a variation of the newly-described SBSk/$58 seral association (Oikos 1998).

b) SBSdk/07 Hybrid white spruce - horsetail floodplain forest

Spruce - horsetail forests growing on moist depressional sites are a widespread feature of the subboreal and boreal landscape. However, on SBSdk floodplains they are both naturally uncommon and imperiled by land clearing and logging. They appear to be less abundant and smaller in size than the red-listed SBSdk/08 -although that may not be the case in the Lakes District. Two site types of the SBSdk/07 are of particular concern: the SBSdk/07a (described in Banner et al. 1993 and by Pojar et al. 1986) is a highly productive spruce forest growing on sandy to silty Regosolic or Brunisolic floodplain soils. The other is a nutrient-rich SBSdk/07b swamp forest, with Gleysolic soils, on lacustrine or fluvial parent materials with water movement through the site. These rich forests have smaller spruce trees than the SBSdk/07a but have a very diverse understory including such locally rare plant species as Rocky Mountain sedge (*Carex saximontana)* (blue-listed, see pg 16),water avens (*Geum rivale),* jewelweed (*Impatiens noli-tangere),* northern twayblade *(Listera borealis)* and many atypical bryophytes. Some of the best fluvial spruce horsetail ecosystems in west central B.C. occur in the Sutherland River drainage, where both poorly drained and well drained (transitional to SBSdk/06) occurrences are found.

c) Pacific willow - mountain alder - lady fern - low bench floodplain
This plant community occurs in regularly flooded backchannels of SBSdk floodplains. It has little direct economic value but is extremely valuable as wildlife and fish habitat. It may be absent from the Lakes District because of the absence of major rivers and floodplain ecosystems. In developed areas this plant community is threatened by insensitive construction practises, changes to natural drainage patterns and water pollution. These are diverse plant communities with multiple shrub layers and a lush herb layer dominated by ferns and horsetails.

d) Drummond's willow - mountain alder low bench floodplains (abbrev. DM)
This plant community has been found in SBSdk and SBSmce low bench floodplains on the banks of streams and small rivers such as the Sutherland River. It was described as rare by Oikos Ecological Services within the East Babine - Taltapin area, and has not been described elsewhere, but probably occurs in the central and southern portion of the District as well. It is similar to c) above but occurs on smaller streams more typical of the Lakes District. These sites have very high shrub cover of Drummond's willow (*Salix drummondii),* mountain alder, *(Alnus incana* ssp. tenuifolia) and black twinberry and have a well developed herb layer with stinging nettle *(Urtica dioica)* and bluejoint (*Calamagrostis canadensis*).

2. SBSmc2 Black cottonwood - hybrid white spruce - red osier dogwood - prickly rose floodplains
Banner et al. (1993) did not describe black cottonwood floodplains in the SBSmc2 zone because they are not sufficiently common. In the Lakes District, very small occurrences of Black cottonwood - red-osier dogwood - prickly rose floodplain communities may be present along larger creeks within the SBSmc2 such as Pinkut Ck. Although poorly developed, these small pockets with large deciduous trees are a valuable habitat feature in the predominantly coniferous SBSmc2/ESSF landscape, providing denning sites for bears and cavities for larger species.

3. Other Douglas-fir communities
A Douglas-fir, paper birch, white spruce ecosystem with Devil's club and oakfern in the understory was found on a fluvial fan near Uncha Mountain. This ecosystem is undoubtedly rare in the SBSdk although similar plant communities may be more frequent in the southern interior IDF and ICH zones. Representation within the Lakes District of a full range of Douglas-fir - dominated plant communities is the best way to ensure that undescribed plant communities such as this one are not unintentionally eliminated. The Sutherland River and Uncha Mtn. proposed

protected areas include some of the most extensive and best developed Douglas-fir ecosystems in the Skeena Region. Exceptional stands outside these areas should be brought to the attention of the Regional Rare and Endangered Species Specialist or District Forest Ecosystem Specialist.

4. Aspen - scrub birch

A single occurrence of a rare subhygric aspen community on nutrient-poor soils adjacent to a wetland has been described by Oikos (1998) in the Burns Lake area. This is a scrubby aspen community with an understory dominated by scrub birch (*Betula glandulosa*) and probably occurs in frost pocket areas adjacent to wetlands.

3. Grasslands and Meadows

In addition to the red-listed Bluegrass - Slender Wheatgrass plant community (pg 1), several other low to mid-elevation grassland or meadow community types can be found in the southeastern Skeena Region. These include:

a) Timber oatgrass dry grassland (SBSdk, SBSmc2, ESSFmc, ESSFmk)

A xeric to submesic grassland community characterized by timber oatgrass (*Danthonia intermedia)* has been found on inactive level gravelly fluvial deposits from valley bottom to subalpine elevations. It appears to be rare in the SBSdk and SBSmc2, but may turn out to be sufficiently common in the ESSF that blue-listing is appropriate, because there are few threats at that elevation. Although very rare in the Bulkley-Cassiar District, it increases in frequency to the southeast, and may be relatively common in the Lakes District. In the Burns Lake area most occurrences of this community have probably been converted to agriculture. In the upper SBSmc2 and ESSF it occurs in gravelly frost pocket areas mingled with wetlands and begins to resemble dry alpine grassland, with spike trisetum and alpine timothy (*Phleum alpinum)* as common associates. Other associated species include: northern bedstraw *Galium boreale,* yarrow (*Achillea millefolium*), dwarf blueberry (*Vaccinium caespitosum*), sweetgrass (*Hierochloe odorata*), tall blue penstemon (*Penstemon procerus*), northern gentian (*Gentianella amarella*), orange agoseris (*Agoseris aurantiaca*), stonecrop (*Sedum lanceolatum*), strawberry (*Fragaria virginiana*), grape ferns (*Botrychium* spp,) and pussy toes (*Antennaria* spp). There is moderately developed cryptogammic crust with *Cladina* and *Peltigera* lichens, *Polytrichum juniperinum* and *Thuidium abietinum* mosses. These ecosystems are at risk from tree and shrub encroachment (aspen, Pl, prickly rose), invasive alien species (timothy, dandelion (*Taraxacum officinale),* creeping red fescue *(Festuca rubra)*), gravel pit and road construction, and expansion of domestic grazing tenures. Avoid soil disturbance and locate roads well away from these ecosystems.

b) Mesic Aster - peavine -meadow rue forb meadows (all interior zones) (AM)

These plant communities are uncommon to rare and should probably be red-listed in the SBS and blue-listed in the ESSF. They can be found on level inactive fluvial deposits with a fine-textured surface capping over gravels, or on the gentle southwest-facing slopes with a well drained but reasonably deep soil. Species composition varies greatly from one site to another and there are no obvious dominants. Characteristic species include: buttercups (*Ranunculus* spp.), asters (*Aster modestus, A. ciliatus, A. conspicuus*), peavine, western meadow rue, northern bedstraw, meadow valerian (*Valeriana dioica*), fireweed, yarrow, goldenrod (Solidago canadensis) indian paintbrush (*Castilleja miniata* -orange and yellow), cinquefoils (*Potentilla* spp.*),* native thistles (*Cirsium foliosum, C. edule)* and grapeferns. A variety of grasses (*Elymus glaucus, Poa spp., Bromus spp., Melica subulata, Schizachne purpurascens*) and sedges (esp. *Carex macloviana*) are present but never dominant.

These mesic meadow communities can be distinguished from moist cow parsnip communities (often present within the same meadow) by their lower stature, higher species diversity and absence or scarcity of cow parsnip, stinging nettle, large-leaved avens, arrow-leaved ragwort, and bluejoint. They are much less common, and are more prone to tree encroachment. Other threats include road and gravel pit construction, heavy recreational use (ATVs, hunting campsites) expanded use by domestic livestock, and seeding of agronomic species either on site or nearby. Meadows with a significant component of this plant community in good condition and no history of agricultural use should not be considered for anything but light or occasional domestic grazing. Avoid soil disturbance and locate roads well away from these ecosytems.

c) Cow parsnip - large leaved avens - stinging nettle - brome lush meadows (CA)
Cow parsnip-dominated meadows are found on deep, rich, moist soils (often underlain by gravels) throughout much of British Columbia and have a fairly similar species composition wherever they occur. Their abundance in the landscape varies with climate, landforms and disturbance history (e.g. common in avalanche terrain or moist areas with repeated fire). In the plateau landscape of the Lakes District, such meadows are rarely extensive and they are always important to vertebrate and invertebrate wildlife. In low elevation, developed areas these communities are often threatened by suburban development, agriculture, domestic grazing and introduced plant species (e.g. Canada thistle (*Cirsium arvense)*). In less developed areas they are threatened by long term fire suppression, possible expansion of grazing tenures, and by insensitive logging and highway development -e.g. road locations and gravel pits across toe slopes and in riparian corridors. Blue-listing these communities would not make them off limits for range use, but should alert resource managers of the need to manage these ecosystems to ensure that they remain in the landscape and that a significant percentage be maintained in good to excellent condition.

4. Canyon walls and rock cliffs (SBSdk, SBSmc2) and waterfalls (all zones)
Steep rocky cliffs and canyon walls are an uncommon to rare landscape feature at low elevations. Although many are unthreatened by human activity, in populated areas they are often dynamited for rock quarries, bridge crossings, or to make room for development, and gentler slopes are damaged by heavy foot traffic. Most rock outcrops contain highly specialized, but fairly predictable assemblages of mainly widespread and secure species like three-toothed saxifrage (*Saxifraga tricuspidata),*stonecrops (*Sedum lanceolatum, S. divergens),* Jacob's ladder (*Polemonium pulcherrimum),* sheep fescue (*Festuca saximontana*), northern gooseberry (*Ribes oxyacanthoides),* fragile fern (*Cystopteris fragilis*), field chickweed (*Cerastium arvense),* hairy rockcress (*Arabis hirsuta),* rock mosses (*Tortula ruralis, Thuidium abietinum)* and various lichens. Occasionally one comes across a bluff, cliff or canyon wall with either exceptionally high plant diversity or with rare or outlier species, which should be designated on maps and afforded some protection from development.. Such ecosystems may have an unusual rock type (highly calcareous, recent basalt), microclimate (e.g. spray zone, or exceptionally hot and dry) or unusual disturbance history (e.g. constant ravelling, packrats), or they may just be exceptionally large with a great variety of different niches. Two good examples from the Lakes District are Tetzalto (Grizzly Mountain) and China Nose Mountain With additional plant community descriptions it may be possible to propose some of these communities for red or blue listing, but currently these features have to be addressed on a case-by-case basis.
Definition 4. Ecosystems (site series or surrogate) that comprise less than 2% of a landscape unit and are not common in adjacent landscape units.
This definition can be used to capture regionally significant plant communities that may not be provincially significant, or locally significant communities that may not be regionally significant.

For example, analysis of some landscape units in the Lakes District may show that there is very little mature or old growth Spruce or Lodgepole pine on zonal and subhygric ecosystems or wet spruce horsetail ecosystems in some SBSdk landscape units. This definition can also be used to identify communities that have not yet been classified or recognized by the CDC or regional ecologist, for example, wetland and aquatic ecosystems, alpine and subalpine tundra and meadows, and unusual non-forest communities such as those associated with sandbars, rock outcrops, talus, waterfalls and caves.

Where Terrestrial Ecosystem Mapping (TEM) is not available, themed forest cover/age class maps or predictive ecosystem mapping (PEM), in combination with surficial and bedrock geology maps, are a good way to get an initial handle on the abundance and seral stage distribution of different community types. Some things to watch for in the Lakes District include: less common deciduous forest cover types (e.g. birch-leading or black cottonwood leading in all zones, the SBSmc; aspen in the ESSF); marginal coniferous types (e.g. outlying stands of subalpine fir in the SBPS; Douglas-fir in the SBSdk and mc2, open range at higher elevations; non-forested shrub thickets (maple, alder, willow); meadows; low elevation rock cliffs or canyons, waterfalls and interesting wetland systems. Areas with unusual habitat diversity, interesting geological formations (e.g. limestone) or landforms (e.g. glaciolacustrine, or sandy esker complexes) or anything else out of the ordinary should be considered a priority for TEM mapping or closer field inspection by rare and endangered species specialists.

Table 3. B.C. Conservation Data Centre: Rare Vascular Plant Tracking List - Lakes Forest District (FD # 21)
last updated November 12, 1996

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	PROVINCIAL RANK	PROVINCIAL LIST
*** DICOTS				
ARABIS HOLBOELLII VAR PINETORUM	HOLBOELL'S ROCKCRESS	G5T?	S1?	BLUE
CHENOPODIUM LEPTOPHYLLUM VAR. OBLONGIFOLIUM	NARROW-LEAVED GOOSEFOOT	G5T?	S2	RED
RUMEX PAUCIFOLIUS	ALPINE SORREL	G4	S1?	BLUE
*** MONOCOTS				
CAREX SAXIMONTANA	ROCKY MOUNTAIN SEDGE	G5	S2S3	BLUE
ERIOPHORUM VAGINATUM SSP SPISSUM	SHEATHED COTTON-GRASS	G5T5	S2S3	BLUE

5 TAXA LISTED

Rare Vascular Plants of the Lakes Forest District

Only one of British Columbia's red-listed vascular plants and 4 blue-listed vascular plants are reported to occur in the Lakes Forest District. More red- or blue-listed taxa might be found if a detailed botanical survey of alpine areas, wetlands and other atypical habitats were carried out. Of the listed plants, only the Rocky Mountain sedge is likely to occur in forested habitats, while several of the others may occur in rangeland situations -see below for habitat details.

If you think you have found one of the listed plants, mark it with labelled flagging tape, accurately record the location (on an aerial photo if available), elevation, slope and aspect and dominant vegetation and habitat features (see Appendix for CDC Field Observation Form (Plants)). Take photographs if possible. Do not collect a voucher specimen unless the population is large and you feel it is important to do so - in which case follow the 1 in 20 rule (never collect more than one-twentieth of the population). Do not pull roots or rhizomes from the ground. Contact: Anne Hetherington, Rare and Endangered Species Specialist, Skeena Region Wildlife Branch, B.C. Ministry of Environment, Lands and Parks. Ph: 847-7692; fax: 847-7728; e-mail: ahetheri@ smithers.env.gov.bc.ca.

Red- and blue-lists have not yet been prepared for non-vascular plants in the Lakes District. Goward (1996) and Ryan (1996) have described rare lichens and bryophytes, respectively, in British Columbia and listed them by biogeoclimatic zone and ecoregion.

Dicotyledons

Arabis holboellii* var. *pinetorum Holboell's rockcress. (Also known as *A. pinetorum).* Holboell's rockcress is a very common and highly variable species on dry rangeland, rock outcrops and meadows in the Lakes District. When mature it can be readily distinguished from most other rockcresses because the narrow pods (siliques) hang downwards. In this rare variety (*pinetorum),* the stalks attaching the fruit to the stem and often the silique itself are somewhat curved, so that they arch downwards, rather than being closely appressed to the stem. Also in this variety, the middle stem leaves usually have auricles (earlobe or arrow-shaped appendages at the base of the leaf), and the undersides of the basal leaves have tiny backwards pointing hairs that are 0 to 3 times loosely forked, rather than having spreading, star-shaped hairs with 3-4 rays. References: Douglas et al. 1989, Cody 1996 (drawing), Hitchcock and Cronquist 1973 (drawing).

Chenopodium leptophyllum var. ***oblongifolium*** Narrow-leaved goosefoot. (red-listed). The goosefoots are typically species of disturbed soils on warm sites at low elevations. The most common ones are introduced species associated with farmlands, roadsides and waste places, and in the wild, often found around packrat dens. Narrow-leaved goosefoot is a rare, native species associated with saline or alkaline soils in the dry southern interior. It has been found on steep, dry grassland at Cheslatta Lake. This is an erect, not a prostrate plant. The leaves are narrow ($\pm$4mm wide), tapered at both ends, with few, if any, lobes or teeth, and usually 3 parallel veins. White granules are always present on lower leaf surfaces. It looks quite a bit like some narrow-leaved versions of *Chenopodium album,* the ubiquitous and highly variable lambs-quarters, but has narrower leaves, and the wall of the fruit is not tightly attached to the seed. References: Douglas et al. 1989; Hitchcock and Cronquist 1973 (drawing).

Rumex paucifolius Alpine sorrel. Several species of sorrel are common in the Lakes District at low to alpine elevations. This rare species of moist to wet subalpine and alpine meadows differs from other *Rumex* species in having leaves that are tapered at both ends -never arrow-shaped. It

also has a thick taproot rather than being rhizomatous -but otherwise looks like a *Rumex.* Don't confuse it with knotweeds (*Polygonum* spp.) which have 5 sepals and stamens rather than 6, nor with the common mountain sorrel (*Oxyria dygyna)* which has round leaves and naked flowering stems. This is mainly a southern species that rarely extends north into the central interior mountains.
References: Douglas et al. 1990; Hitchcock and Cronquist 1973(drawing).

Monocotyledons
Carex saximontana Rocky Mountain sedge. Also known as *Carex backii*, this rare sedge has been found in moist shaded crevices on Tetzalto (Grizzly) Mountain and amid stunted aspen on the grassy slopes at Colleymount. Other likely habitats are in the moist understory of rich spruce swamp forests, along streambanks or seep areas within moist rich meadows. This sedge has broad flat leaves. When flowering it is unlike any other local sedge because the lower pistillate scales look like large leafy bracts with long tapered tips, enclosing the perigynia which are large ($\pm$5mm), plump and held erect.
References: Douglas et al. 1994; Taylor 1983 (drawing).

Eriophorum vaginatum ssp. ***spissum*** Sheathed cotton-grass. Cotton-grasses are those fluffy white-headed plants that commonly grow in wetlands. *E. vaginatum* is widespread in the arctic and boreal zone, but the subspecies *spissum* seems to be fairly rare, extending occasionally into northern and central B.C. Like the common Chamisso's cottongrass, it has only a single flowering head (spikelet) per stem, but sheathed cotton-grass forms fairly large, very compact tussocks whereas Chamisso's is a spreading, rhizomatous plant. Sheathed cotton-grass also has long rusty brown sheaths at the base of the stem. The spikelets in ssp. *spissum* are very globular (quite showy) and the scales at the base of the spikelet have broad pale margins, a dark centre and are bent outwards from the stem. Found in wetlands and peaty tundra at middle to alpine elevations, it should be fairly conspicuous.
References: Douglas et al. 1994; Taylor 1983; Hulten 1968 (drawing).

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APPENDICES

CDC Field Observation Form (Plant Communities)

CDC Field Observation Form (Plants)

B.C. Conservation Data Centre

FIELD OBSERVATION FORM (PLANT COMMUNITIES)

Complete only for communities on CDC tracking list. Information is not required for all fields, but please fill out at least the fields in bold face.

Name of observer _____

Address/phone # _____

_____

Location *(be as precise as possible, preferably to within 100 m; even very general information will be used, however)*

_____

_____

UTM grid reference (from blue grid on 1:50,000 NTS map):

ZONE (e.g. 10U)____ ___ EASTING ___ ___ ___ ___ NORTHING ___ ___ ___ ___ ___

Date day ____ month _____ year _____

Community type:

Dominant plant species:

Trees _____ _____ _____

Shrubs _____ _____ _____

Grass _____ _____ _____

Forbs _____ _____ _____

Moss (if possible and appropriate) _____ _____

Habitat *(a general description of area)*

_____

Elevation _____ metres feet *(circle one)* **Slope**_____ **Aspect**_____

Comments/Remarks (collections, threats to habitat, etc.) _____

Our primary need is for location to be as precise as possible. A photocopy of a topographic map, showing exact or approximate location would be appreciated, altho necessary. You can indicate precision of location with the letters: S = wi radius; M = within 1 km; G = within about 10 km.

Please return forms to:

Conservation Data Centre
Ministry of Environment
780 Blanshard St.
Victoria, B.C. V8V 1X4

THANK YOU!

(To obtain a copy of this form, please print from your web browser)

B.C. Conservation Data Centre

FIELD OBSERVATION FORM (PLANTS)

Complete only for species on CDC tracking list. Information is not required for fields, but please fill out at least the fields in bold face.

Species _____

Name of recorder/reporter _____

Address & phone # _____

_____

Numbers/size of population _____

Location (be as precise as possible, preferably to within 100m; even very general information will be used, however)

_____

_____

_____

UTM grid reference (from blue grid on 1:50,000 NTS map): MAP GRID: _

ZONE (e.g. 10U) ____ ___ EASTING ___ ___ ___ ___ NORTHING _____ ___ ___ ___

Habitat *(incl. dominant plants if possible; a general description of area)*

_____

_____

Elevation_____ metres feet *(circle one)* Slope_____ Aspect_____

Comments/Remarks *(any additional information you can provide will be useful eg acce*

habitat disturbance or other threats, health of plants, etc)

_____

_____

Our primary need is for location to be as precise as possible. A photocopy of topographic map, showing exact or approximate location would be appreciated, alth necessary.You can indicate precision of location with the letters: S = wi

radius; M = within 1 km; G = within about 10 km.

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THANK YOU!