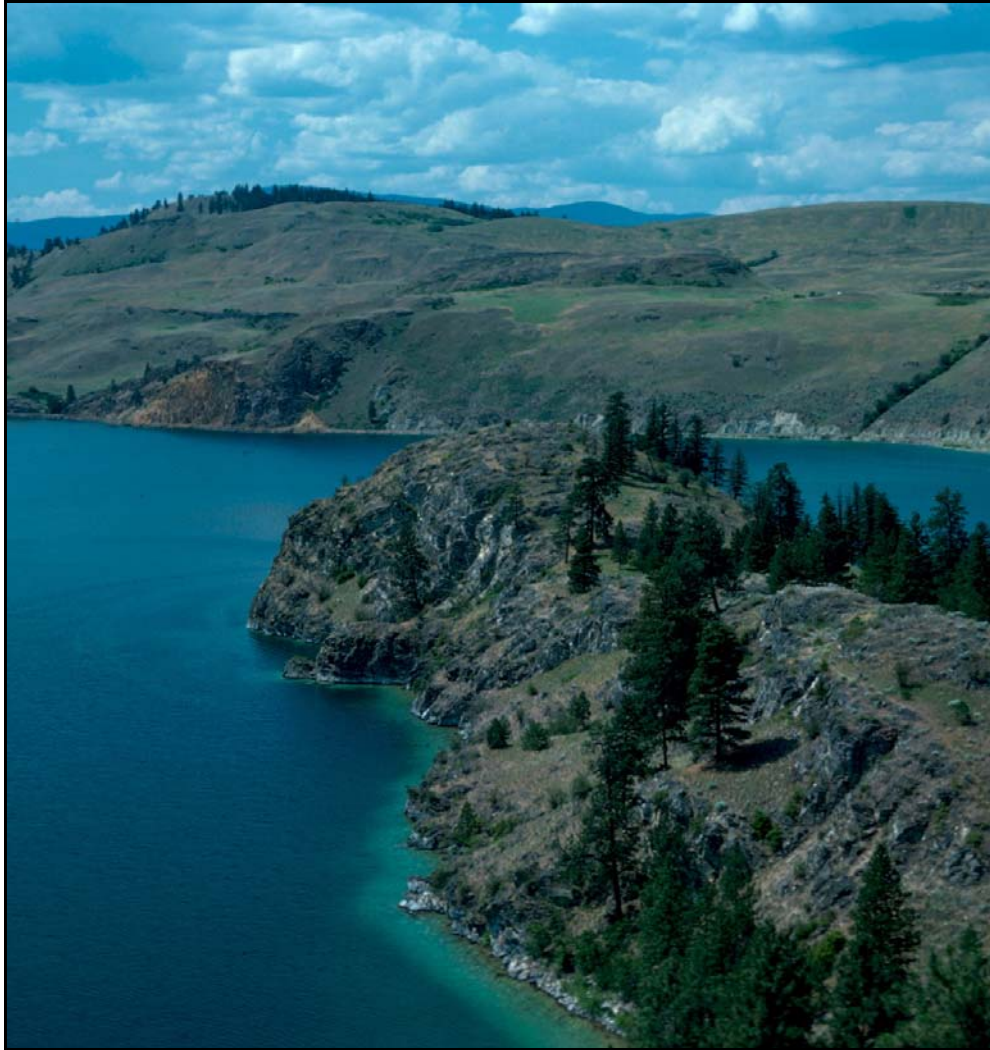


# BC GRASSLANDS MAPPING PROJECT: A CONSERVATION RISK ASSESSMENT

FINAL REPORT



Rattlesnake Point on Kalamalka Lake

BC Parks



Grasslands Conservation Council  
of British Columbia

MAY 2004

## ACKNOWLEDGEMENT OF FUNDING PARTNERS

The *BC Grasslands Mapping Project* has been made possible through the generous contributions and support of numerous organizations. The Grasslands Conservation Council of British Columbia recognizes the following organizations as instrumental to the success of this project. Thank you!

- ✓ Ministry of Forests
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- ✓ Vancouver Foundation
- ✓ Wildlife Habitat Canada
- ✓ The Real Estate Foundation
- ✓ Columbia Basin Trust
- ✓ The Nature Trust of British Columbia
- ✓ Environment Canada
- ✓ Lignum



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**ORGANIZATION:** Grasslands Conservation Council of British Columbia (GCC)  
**PROJECT NAME:** BC Grasslands Mapping Project—A Conservation Risk Assessment  
**TYPE OF REPORT:** Final  
**FISCAL YEAR:** 2003 – 2004 / YEAR 4 OF 4 YEARS  
**LOCATION:** Kamloops, BC

## 1. INTRODUCTION

Grasslands are a small but significant component of British Columbia's (BC) natural landscape. Although they represent less than 1% of the province's land base, they provide critical habitat for over 30% of BC's threatened and endangered species. In fact, BC's grasslands are considered one of Canada's most endangered ecosystems.

Grasslands not only provide habitat for a wide variety of species, but they also provide a significant forage base for BC's ranching industry. Roughly 90% of BC's grasslands are grazed by domestic livestock, either through deeded private rangelands, grazing tenures on provincial crown land or grazing regimes on First Nations land. Ranching in BC has been practiced for generations and has played a major role in shaping the province's economic, social and cultural fabric.

A variety of factors such as urban expansion, subdivision and development, agricultural conversion, abusive recreation, inappropriate land management practices, non-native invasive plants and forest encroachment are threatening grasslands. Loss and degradation of grasslands proceeds at an unprecedented rate as these threats manifest themselves across grassland landscapes from the East Kootenay Trench to the Liard Highland. Many significant values associated with BC's grasslands are at risk such as biodiversity, forage production, tourism, recreation, heritage and spiritual values. In addition to the sanctuary provided for rare plants and animals, natural grasslands provide benefit for the rancher, hunter, naturalist and even the urban dweller.

The Grasslands Conservation Council of British Columbia (GCC) recognized the need for a provincial assessment of grasslands during the Council's inaugural meeting at Big Bar Ranch in 1996. At that time, the province did not have adequate information and a clear picture on the abundance, distribution and status of its grasslands. With so many threats facing these endangered landscapes, the founding members saw an urgent need for a provincial evaluation. Only with a thorough assessment of BC's grasslands could the Council hope to forge ahead with the development of appropriate strategies for conservation and stewardship. These strategies would help to ensure the long term sustainability of grasslands throughout the province.



discussion among GCC directors Bruno Delesalle

In April 2000, the GCC initiated the *BC Grasslands Mapping Project – A Conservation Risk Assessment*, a four year effort to map the grasslands of the province in a Geographic Information

System (GIS).<sup>1</sup> With the completion of the GIS and the key data layers in place, the GCC is now in a position to identify priority areas for grasslands conservation and stewardship. The creation of the GIS has set the foundation for a prioritization process that will target high value grasslands under imminent threat. This information will allow the GCC and its partners to focus on specific areas where conservation and stewardship efforts are most needed.

The main purpose of this report is to document the accomplishments of the *BC Grasslands Mapping Project* and to describe the results of analyses conducted using the grasslands GIS. Recommendations for future work, such as priority grasslands mapping, are also included.

## 2. PROJECT GOALS

The goal of the *BC Grasslands Mapping Project* was to provide information and a clear provincial picture on the abundance, distribution and status of BC's grasslands. To this end, the project compiled existing information and inventories for the creation of a GIS with all necessary data layers to identify, analyze and model BC's grasslands, specifically those areas considered high value or threatened. The following key questions were addressed:

1. How many hectares of native grassland remain in British Columbia?
2. What types of grassland occur in BC and where do they occur?
3. What is the land status of BC's grasslands? (privately owned, provincial crown land, protected areas, Indian Reserves, Agricultural Land Reserve, regional districts, municipalities)
4. How much of BC's grasslands are under a range tenure? (crown grazing leases, licenses and permits)
5. How many hectares of grassland have been lost to urbanization, agricultural conversion and forest encroachment?
6. What is the abundance and distribution of non-native invasive plants on BC's grasslands?
7. What species at risk are associated with BC's grasslands and where are they located?

Although much was accomplished over the past four years, there remain four key questions that the GCC continues to address as part of the overall goals of this project:

1. What is the abundance and distribution of the various grassland seral communities in BC?
2. What condition are BC's grasslands in?
3. Which grasslands are considered most threatened or at risk?
4. What are the priority areas for conservation and stewardship?

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<sup>1</sup> The production of *Grasslands of British Columbia*, a comprehensive ecological description for all grasslands in the province, was a key component of this project. This textual reference is to be used in conjunction with the spatial and attribute data in the GIS for a complete picture of grasslands provincially.

Wikeem, B. and S. Wikeem, 2004. Grasslands of British Columbia. Report prepared for the Grasslands Conservation Council of British Columbia. Kamloops, B.C.

### 3. PROJECT OBJECTIVES

The following objectives of the *BC Grasslands Mapping Project* were addressed:

1. Use a GIS to map BC's native grasslands and associated habitats at a scale of 1:20,000.
2. Describe and characterize the different grassland types found in each region of the province.
3. Map overlapping land status information, including private land, provincial crown land, protected areas, Indian Reserves, Agricultural Land Reserve, regional districts and municipalities.
4. Map overlapping range tenure information, including crown grazing leases, licenses and permits.
5. Map the historical extent of grasslands for all regions to evaluate loss of grassland to urbanization, agricultural conversion and forest encroachment.
6. Incorporate available data on species at risk locations and non-native invasive plant infestations.
7. Complete a long-term strategy for the grasslands GIS including data warehousing, distribution and maintenance.
8. Produce a comprehensive communication and extension plan for the *BC Grasslands Mapping Project*.

There remain two key objectives that the GCC continues to fulfill as part of this project:

1. Identify and prioritize specific grassland ecosystems which are most threatened by urbanization, agricultural conversion, subdivision and development, forest encroachment, non-native invasive plants, inappropriate land management practices and abusive recreation (current and potential threats).
2. Develop conservation and stewardship recommendations for action on priority grassland areas.

### 4. REGIONAL DESCRIPTIONS

BC's grasslands can be separated into ten, relatively distinct ecological regions. These include the East Kootenay Trench, Okanagan, Thompson-Pavilion, Southern Thompson Upland, Cariboo-Chilcotin, Peace, Muskwa Foothills-Liard Highland, Bulkley Basin, East Vancouver Island-Gulf Islands, and Northern Boreal Mountains-Plateaus (Figure 1). These regions are defined either by a single ecosection, as is the case with the East Kootenay Trench and Southern Thompson Upland, or by groupings of ecosections in a particular geographic area. Below are descriptions of the grasslands in each of these regions.

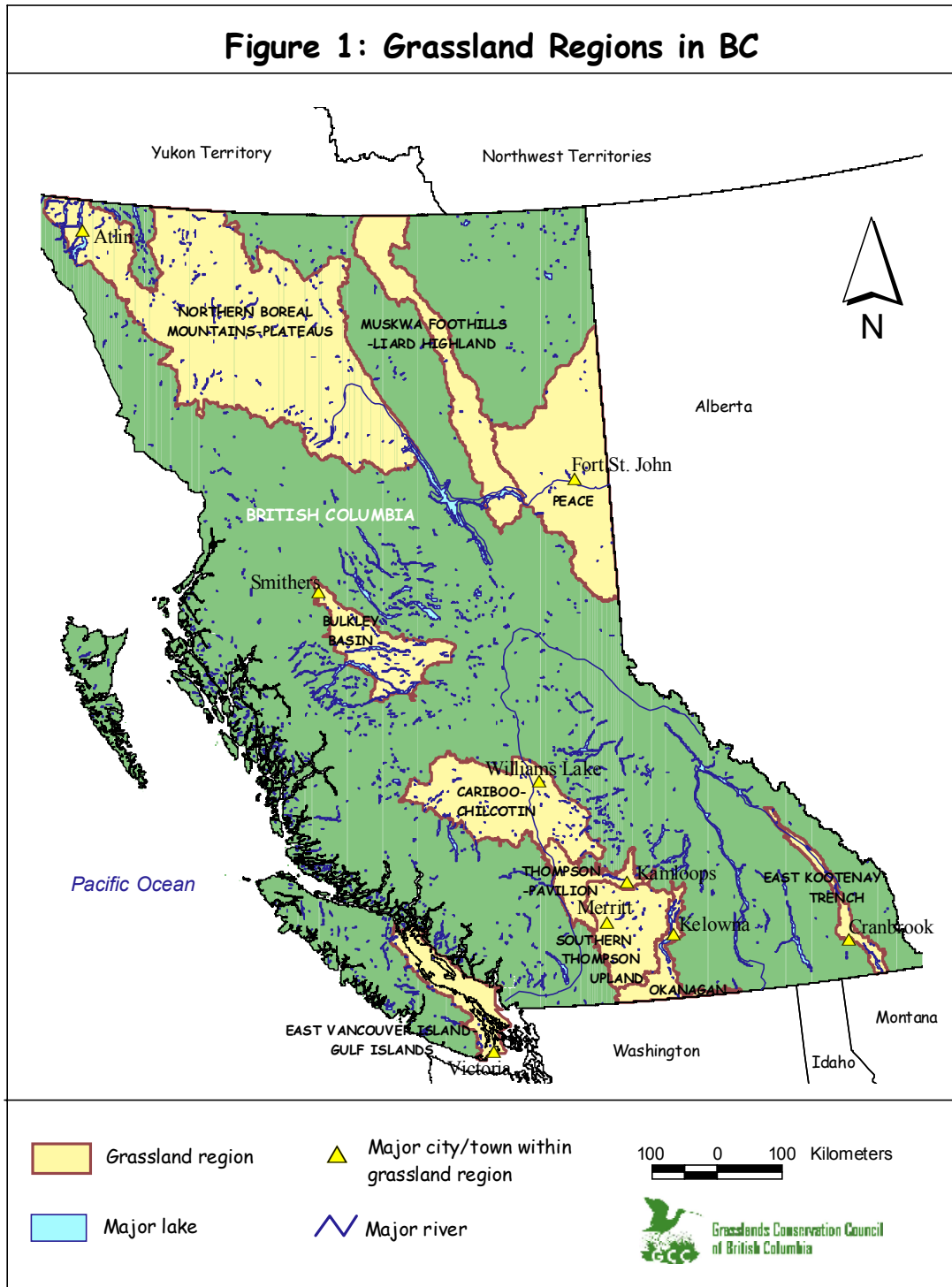
#### **4.1 East Kootenay Trench**

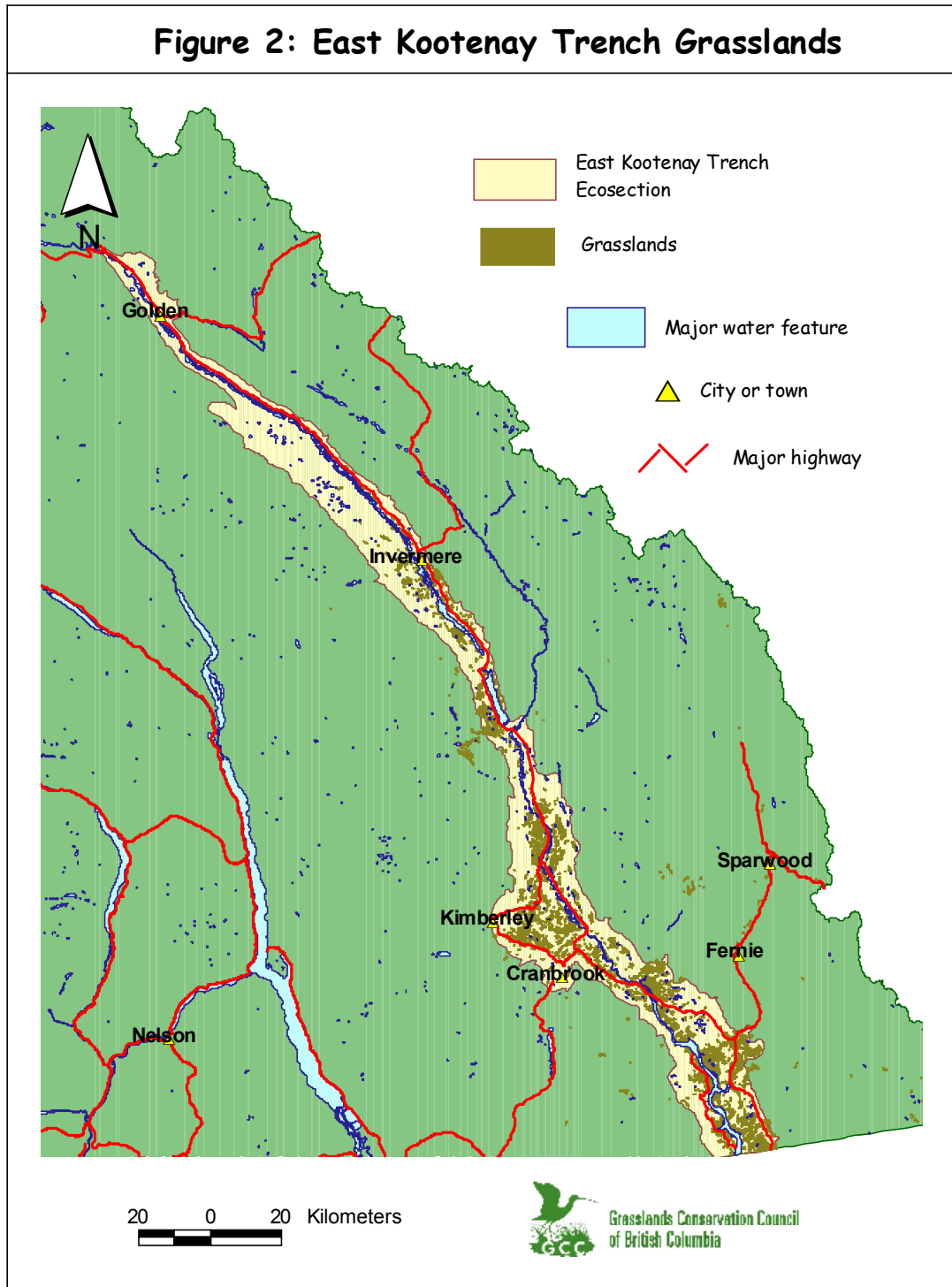
##### **4.1.1 The Grassland Landscape<sup>2</sup>**

Most of the 44,000 hectares (ha) of grassland in the East Kootenay region occur within the East Kootenay Trench (Table 1), a valley extending from the Canada/US border north to Golden. Bounded by the Rocky Mountains to the east and the Purcell Mountains to the west, the Trench's

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<sup>2</sup> with adaptations (with permission) from Wikeem, B. and S. Wikeem, 2004. Grasslands of British Columbia. Report prepared for the Grasslands Conservation Council of British Columbia. Kamloops, B.C.





major features include the Kootenay and Columbia rivers, Lake Koocanusa, Columbia Lake and Windermere Lake. Most of the grasslands in the Trench occur along the meandering river breaks and on the benches above the Kootenay, Columbia and St. Mary’s rivers (Figure 2).

Table 1. East Kootenay: Grassland Area by Ecosection and Biogeoclimatic Unit

Ecosection	Area of GrsInd. (ha)	% of total for region
East Kootenay Trench	40,990	93.3%
Eastern Purcell Mountains	1,103	2.5%
McGillivray Range	282	0.6%
Crown of the Continent	31	0.1%
Border Ranges	967	2.2%
Southern Park Ranges	566	1.3%
TOTAL	43,939	100.0%

Biogeoclimatic Unit	Area of Grassland (ha)	% of total for region
PP dh 2	15,881	36.1%
IDF un	2,249	5.1%
IDF dm 2	23,111	52.6%
ICH mk 1	209	0.5%
MS dk	2,047	4.7%
ESSF dk	427	1.0%
ESSF wm	14	0.0%
AT	1	0.0%
TOTAL	43,939	100.0%

In the southern part of the Trench, open grasslands follow the Bull and Elk rivers at their lowest elevations as they enter the main valley. Larger grassland openings intermingled with ponderosa pine savannah become more prominent as the elevation drops to the Kootenay River and the shores of Lake Koocanusa. These openings can be found in the Pickering Hills, Baynes Lake, lower Gold Creek and Tobacco Plains areas.

Extensive tracts of grassland also extend north from Cranbrook to Skookumchuk Prairie on the west side of the Kootenay River. St. Mary’s Prairie, one of the largest contiguous grasslands in the region, extends north of the St. Mary’s River to Skookumchuk Creek.



St. Mary’s Prairie

Brian Wikeem

North of Skookumchuk Prairie, small patches of grassland are often associated with steep, south facing slopes and benches along Columbia Lake, Windermere Lake and the Columbia River. The grasslands along the steep, south facing slopes of Sinclair Creek near Radium represent the most northerly area of sizeable grassland in the Trench, with smaller patches occurring north to Brisco.

Grassland vegetation in the Trench can be divided into three broad types: the lower elevation open grasslands, the slightly higher elevation shrub-steppe, and the open savannah dominated by either ponderosa pine or Interior Douglas-fir. Open grassland and savannah associated with ponderosa pine in the PPdh2 Biogeoclimatic unit are dominated by rough fescue, Idaho fescue and bluebunch wheatgrass whereas antelope-brush and bluebunch wheatgrass are more characteristic of Interior Douglas-fir grasslands and savannah in the IDFun, IDFdm2 and MSdk Biogeoclimatic units.

Open grasslands occur in association with many other ecosystems in the East Kootenay Trench. Cottonwood stands, aspen copses, wetlands, clay banks and rocky, broken terrain all contribute

to the diversity of the larger grassland landscape in this region (Table 2).

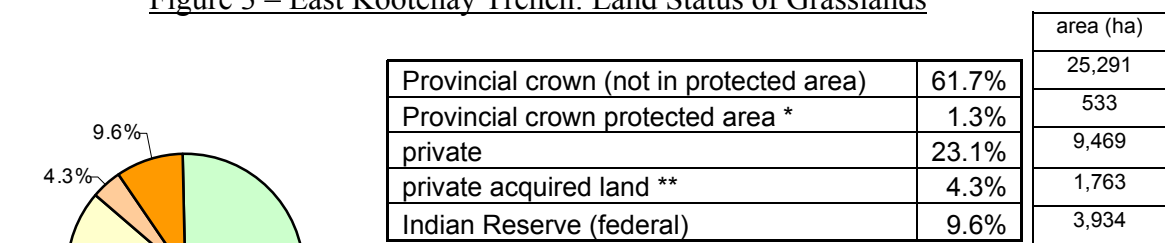
**Table 2. East Kootenay: Selected Grassland Associated Habitats by Biogeoclimatic Unit**

	aspen copses (ha)	cottonwood stands (ha)	cliffs, clay banks & rocky terrain (ha)	meadows, riparian brush & wetlands (ha)	ponds < 3 ha (number)	ponds < 1/2 ha (number)
PP dh 2	856	72	403	1,399	22	11
IDF un	97	103	909	1,875	3	1
IDF dm 2	1,872	146	4,009	1,936	46	25
MS dk	183	0	99	4	0	0

**4.1.2 Land Status and Range Tenure**

The majority (63%) of the grasslands in the East Kootenay Trench are on provincial crown land (Figure 3). Of these, almost 90% (~22,800 ha) are under a grazing tenure, mostly grazing licenses (Figure 4). Crown grasslands with no grazing tenure are found within some parks and protected areas such as Kikomun Creek and Columbia Lake. Wigwam Flats, although it is not a park, also has no tenure. Furthermore, there are a few small, untenured crown grasslands distributed throughout the valley bottom<sup>3</sup>, many of which are too small to support a viable livestock operation. In addition to cattle and horses, wild ungulates also graze the open grasslands of the Trench. Bighorn Sheep, Elk, White-tailed Deer and Mule Deer all rely on this important forage base. In the East Kootenay, combined use by domestic livestock and wild ungulates has resulted in significant grazing pressure on the grasslands.

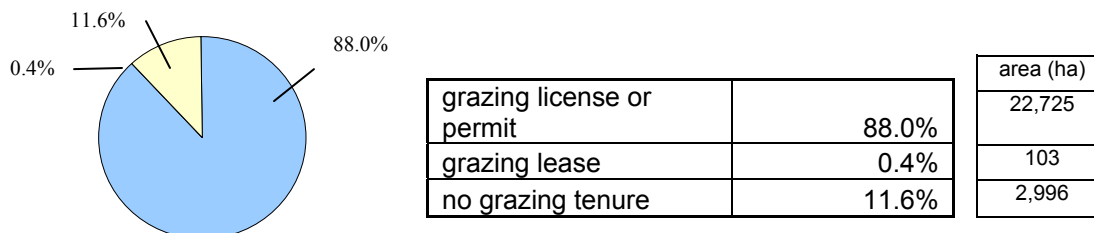
**Figure 3 – East Kootenay Trench: Land Status of Grasslands**



\* protected area – provincial park, protected area, wildlife reserve or ecological reserve.

\*\* acquired land – land acquired or managed for conservation purposes with groups such as The Nature Trust of BC, The Land Conservancy of BC, The Nature Conservancy of Canada and the Canadian Wildlife Service.

**Figure 4 – East Kootenay Trench: Range Tenure on Provincial Crown Grasslands**



<sup>3</sup> ownership data sources somewhat out of date; some of these untenured crown parcels may now be private lands.

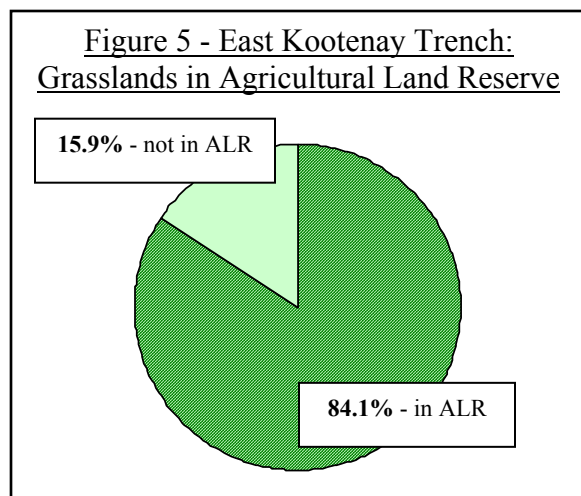


A very small percentage (1.3%) of the grasslands in the East Kootenay Trench are within provincial parks or protected areas. Kikomun Creek protects the largest area, 316 ha of native grassland (Appendix 3). Grasslands in the PPdh2, IDfM2 and IDFun Biogeoclimatic units are underrepresented in the provincial protected areas system (Appendix 5).

Roughly 11,230 ha of grassland in the Trench are privately owned, with many of these lands supporting cattle ranching operations. Large areas of private grassland occur on St. Mary’s Prairie and Skookumchuk Prairie as well as around Columbia Lake and Baynes Lake.

Properties acquired or managed in partnership with organizations such as The Nature Trust of British Columbia and The Land Conservancy of British Columbia make up a small portion (15.7%) of the privately owned grasslands in the Trench. Key parcels including those on St. Mary’s Prairie (Wycliffe), West Columbia Lake and Sheep Mountain have been secured due to their high ecological value. More grassland is protected in these parcels than is protected in provincial parks in the Trench, a circumstance unique to this region.

Indian Reserves account for over 98% of the federal grasslands in the East Kootenay Trench. The remaining 2% (59 ha) is made up of small upland habitats adjacent to some Columbia River wetland acquisitions (Canadian Wildlife Service) as well as slivers of grassland on the edge of Kootenay National Park. The Tobacco Plains, St. Mary’s and Shuswap bands collectively hold title over 3,934 ha of grassland in the Trench. Three large Indian Reserves are located on the Tobacco Plains near Grasmere, on St. Mary’s Prairie west of Fort Steele, and on the east side of Windermere Lake.



Approximately 84% of the grasslands in the Trench are in the Agricultural Land Reserve (ALR) (Figure 5), a designation intended to preserve productive lands for agricultural purposes. The ALR covers all lands including federal, provincial crown and private. Regulations limit building and development within the ALR, however there are several instances where lands have been taken out of the ALR, subdivided and developed. Furthermore, grasslands within the ALR may still be ploughed and cultivated to convert them to cultivated hayfields, orchards and market crops.

#### 4.1.3 Historical Extent

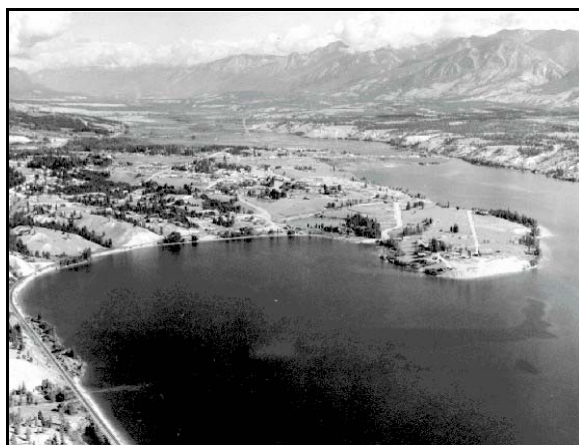
The historical extent of grasslands in the Trench is discussed in terms of areas lost to forest encroachment, agricultural conversion, urban development and the flooding of land by reservoirs. All of these factors have decreased the extent of grassland over time.



*Changes in the Grassland-Forest Interface*<sup>4</sup> has been developed to document and describe forest encroachment and ingrowth in the East Kootenay Trench. Please refer to this report for a more in-depth review.

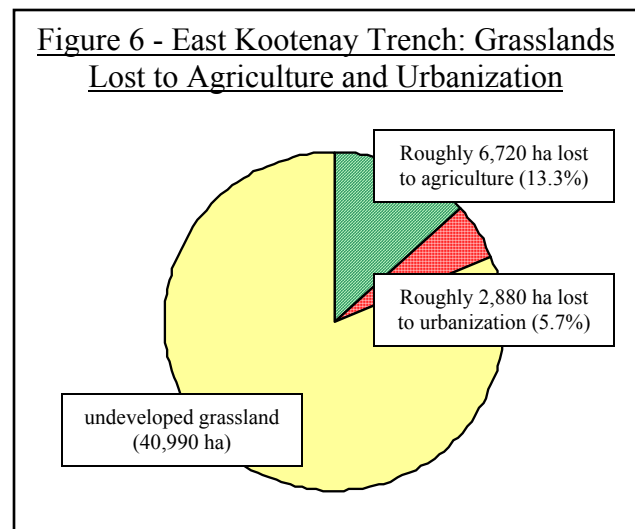
Approximately 6,720 ha of grassland have been lost to agricultural conversion in the Trench. Cultivated hayfields, pastures, plantations and other such land clearings have converted 13.3% of the Trench’s native grasslands into agricultural areas (Figure 6)<sup>5</sup>. With a high percentage of the region’s grasslands in the ALR and a possible shift to more intensive types of agriculture over the next few decades, native grasslands will likely continue to be lost.

Urban and industrial development represents another significant threat to the grasslands of the East Kootenay Trench. To date, roughly 2,880 ha have been lost to communities, industrial sites and golf courses in this region. Cities and towns such as Invermere, Kimberley, Marysville and Cranbrook account for the greatest loss (Appendix 2). Loss of grassland due to linear developments such as roads and railways has not been quantified.



Invermere in the 1950s

BC Archives (G-03188)



Large areas of grassland were lost to Lake Koocanusa as a result of the construction of the Libby Dam in 1972. Open prairies that once existed along the Kootenay River from Wardner to the Canada/US border and south into Montana are now under water. It is not known how many hectares were lost to the reservoir, although the number is likely significant.

#### 4.1.4 Species at Risk

There are a number of threatened and endangered species occurring in the grassland and open dry forest ecosystems of the East Kootenay Trench. Specific locations of some of these animal and plant species as well as plant communities have been mapped by the British Columbia Conservation Data Centre (CDC). The CDC focuses mainly on the classification and locations of

<sup>4</sup> Grasslands Conservation Council of BC. 2003. *Changes in the Grassland-Forest Interface: A BC Grasslands Conservation Risk Assessment Communication Tool*. Kamloops, B.C.

<sup>5</sup> agricultural use, in this instance, does not include the practice of livestock grazing on native grassland.

red- and blue-listed species. The CDC’s red list includes species that have been legally designated as Endangered or Threatened under the *Wildlife Act*, are extirpated, or are candidates for such designation. The blue list includes species not immediately threatened, but of concern because of characteristics that make them particularly sensitive to human activities or natural events<sup>6</sup>. In addition to the CDC provincial ranking, some species have also been assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). COSEWIC ranks species in Canada as either Endangered (facing imminent extirpation or extinction); Threatened (likely to become endangered if limiting factors are not reversed); Special Concern (particularly sensitive to human activities or natural events); Data Deficient (inadequate information to assess risk of extinction); or Not at Risk (evaluated and found not to be at risk)<sup>7</sup>. Many plant and animal species associated with BC’s grasslands are being added to the COSEWIC list as new information becomes available.

Species locations have been compiled along with additional animal sightings gathered from wildlife biologists in the Ministry of Water, Land and Air Protection. These locations have been compiled and mapped for grassland and associated ecosystems.

An analysis determined which species have been mapped on grassland or immediately adjacent habitats in the East Kootenay region (Table 3). The larger grassland landscape was considered in this analysis, as the richness and diversity of a grassland environment is often found in the associated cottonwood stands, aspen copses, wetlands, clay banks, rocky terrain and open dry forests that make up the landscape mosaic.

For more information on grassland associated species and their habitats in the East Kootenay Trench, refer to *The Grasslands of British Columbia*<sup>8</sup>.

Table 3. East Kootenay: Species at Risk Mapped on Grassland and Associated Habitats

	Common Name	Scientific Name	COSEWIC Status	CDC Status
<b>AMPHIBIANS</b>				
	ROCKY MOUNTAIN TAILED FROG	<i>ASCAPHUS MONTANUS</i>	E (May 2000)	RED
<b>BIRDS</b>				
	BOBOLINK	<i>DOLICHONYX ORYZIVORUS</i>		BLUE
	FLAMMULATED OWL	<i>OTUS FLAMMEOLUS</i>	SC (NOV 2001)	BLUE
	LEWIS'S WOODPECKER	<i>MELANERPES LEWIS</i>	SC (NOV 2001)	BLUE
	LONG-BILLED CURLEW	<i>NUMENIUS AMERICANUS</i>	SC (1992)	BLUE
	NORTHERN GOSHAWK	<i>ACCIPITER GENTILIS</i>		RED
	SHARP-TAILED GROUSE, COLUMBIANUS SUBSPECIES	<i>TYMPANUCHUS PHASIENELLUS COLUMBIANUS</i>		BLUE

<sup>6</sup> BC Conservation Data Centre. 2002. Species Ranking in British Columbia. Province of British Columbia. Victoria, BC.

<sup>7</sup> Species Listing. 2003. Committee on the Status of Endangered Wildlife in Canada. May 14, 2004. <[http://www.cosewic.gc.ca/eng/sct0/Assessment\\_process\\_tbl6\\_e.cfm](http://www.cosewic.gc.ca/eng/sct0/Assessment_process_tbl6_e.cfm)>

<sup>8</sup> Wikeem, B. and S. Wikeem, 2004. Grasslands of British Columbia. Report prepared for the Grasslands Conservation Council of British Columbia. Kamloops, B.C.

	SHORT-EARED OWL	<i>ASIO FLAMMEUS</i>	SC (1994)	BLUE
	WHITE-THROATED SWIFT	<i>AERONAUTES SAXATALIS</i>		BLUE
<b>BUTTERFLIES AND SKIPPERS</b>				
	GILLETTE'S CHECKERSPOT	<i>EUPHYDRYAS GILLETII</i>		BLUE
<b>DRAGONFLIES AND DAMSELFLIES</b>				
	VIVID DANCER	<i>ARGIA VIVIDA</i>		RED
<b>FISH</b>				
	CHISELMOUTH	<i>ACROCHEILUS ALUTACEUS</i>	DD (1997)	BLUE
	COLUMBIA MOTTLED SCULPIN, HUBBSI SUBSPECIES	<i>COTTUS BAIRDI HUBBSI</i>	SC (MAY 2000)	BLUE
<b>MAMMALS</b>				
	AMERICAN BADGER	<i>TAXIDEA TAXUS</i>	E (MAY 2000)	RED
	BIGHORN SHEEP	<i>OVIS CANADENSIS</i>		BLUE
<b>REPTILES</b>				
	PAINTED TURTLE	<i>CHRYSEMYS PICTA</i>		BLUE
<b>VASCULAR PLANTS</b>				
	ALKALI PLANTAIN	<i>PLANTAGO ERIOPODA</i>		RED
	ANNUAL PAINTBRUSH	<i>CASTILLEJA MINOR SSP MINOR</i>		RED
	ARCTIC PLANTAIN	<i>PLANTAGO CANESCENS</i>		BLUE
	BEAKED SPIKE-RUSH	<i>ELEOCHARIS ROSTELLATA</i>		BLUE
	BLUE GRAMA	<i>BOUTELOUA GRACILIS</i>		RED
	BLUNT-SEPALED STARWORT	<i>STELLARIA OBTUSA</i>		BLUE
	BOOTH'S WILLOW	<i>SALIX BOOTHII</i>		BLUE
	CANADA ANEMONE	<i>ANEMONE CANADENSIS</i>		BLUE
	COMMON TWINPOD	<i>PHYSARIA DIDYMOCARPA VAR DIDYMOCARPA</i>		BLUE
	DRUMMOND'S CAMPION	<i>SILENE DRUMMONDII VAR DRUMMONDII</i>		BLUE
	DRY-LAND SEDGE	<i>CAREX XERANTICA</i>		BLUE
	ELK SEDGE	<i>CAREX GEYERI</i>		BLUE
	ELK THISTLE	<i>CIRSIIUM SCARIOSUM</i>		BLUE
	FLAT-TOPPED BROOMRAPE	<i>OROBANCHE CORYMBOSA SSP MUTABILIS</i>		RED
	GASTONY'S CLIFF-BRAKE	<i>PELLAEA GASTONYI</i>		RED
	GROUND PLUM	<i>ASTRAGALUS CRASSICARPUS</i>		RED
	HAIRSTEM GROUNDSMOKE	<i>GAYOPHYTUM RAMOSISSIMUM</i>		RED
	HETEROCODON	<i>HETEROCODON RARIFLORUM</i>		BLUE
	HOOKE'S TOWNSENDIA	<i>TOWNSENDIA HOOKERI</i>		RED
	LARGE-FLOWERED BRICKELLIA	<i>BRICKELLIA GRANDIFLORA</i>	NAR (1996)	RED
	LITTLE BLUESTEM	<i>SCHIZACHYRIUM SCOPARIUM</i>		RED
	LONG-LEAVED ASTER	<i>ASTER ASCENDENS</i>		BLUE
	MANY-HEADED SEDGE	<i>CAREX SYCHNOCEPHALA</i>		BLUE
	MARSH MUHLY	<i>MUHLENBERGIA GLOMERATA</i>		BLUE
	MEADOW ARNICA	<i>ARNICA CHAMISSONIS SSP INCANA</i>		BLUE
	MOCK-PENNYROYAL	<i>HEDEOMA HISPIDA</i>		RED
	MONTANA LARKSPUR	<i>DELPHINIUM BICOLOR SSP BICOLOR</i>		BLUE
	MONTANA LUPINE	<i>LUPINUS ARBUSTUS SSP PSEUDOPARVIFLORUS</i>		RED
	MOUNTAIN SNEEZEWEED	<i>HELENIUM AUTUMNALE VAR GRANDIFLORUM</i>		BLUE
	NARROW-LEAVED SKULLCAP	<i>SCUTELLARIA ANGUSTIFOLIA</i>		BLUE
	NORTHERN LINANTHUS	<i>LINANTHUS SEPTENTRIONALIS</i>		BLUE
	NUTTALL'S SUNFLOWER	<i>HELIANTHUS NUTTALLII VAR NUTTALLII</i>		RED
	NUTTALL'S WATERWEED	<i>ELODEA NUTTALLII</i>		BLUE

OBSURE CRYPTANTHA	<i>CRYPTANTHA AMBIGUA</i>		RED
PALE BULRUSH	<i>SCIRPUS PALLIDUS</i>		RED
PARRY'S TOWNSENDIA	<i>TOWNSENDIA PARRYI</i>		RED
PINEWOOD PEAVINE	<i>LATHYRUS BIJUGATUS</i>		RED
PINK WATER SPEEDWELL	<i>VERONICA CATENATA</i>		RED
PLAINS REEDGRASS	<i>CALAMAGROSTIS MONTANENSIS</i>		RED
PRAIRIE GENTIAN	<i>GENTIANA AFFINIS</i>		BLUE
PRAIRIE GOLDEN BEAN	<i>THERMOPSIS RHOMBIFOLIA</i>		RED
PURPLE ONIONGRASS	<i>MELICA SPECTABILIS</i>		BLUE
RACEMED GROUNDSMOKE	<i>GAYOPHYTUM RACEMOSUM</i>		RED
RIVERGRASS	<i>SCOLOCHLOA FESTUCACEA</i>		RED
ROCKY MOUNTAIN SEDGE	<i>CAREX SAXIMONTANA</i>		BLUE
ROCKY MOUNTAIN WILLOWHERB	<i>EPILOBIUM SAXIMONTANUM</i>		BLUE
SALTWATER CRESS	<i>ARABIDOPSIS SALSUGINEA</i>		RED
SANDBERG'S DESERT-PARSLEY	<i>LOMATIUM SANDBERGII</i>		BLUE
SCARLET GAURA	<i>GAURA COCCINEA</i>		RED
SHINING PENSTEMON	<i>PENSTEMON NITIDUS VAR NITIDUS</i>		RED
SLENDER WEDGEGRASS	<i>SPHENOPHOLIS INTERMEDIA</i>		RED
SLENDER-SPIKED MANNAGRASS	<i>GLYCERIA LEPTOSTACHYA</i>		BLUE
SMALL-FRUITED WILLOWHERB	<i>EPILOBIUM LEPTOCARPUM</i>		BLUE
SPALDING'S CAMPION	<i>SILENE SPALDINGII</i>		RED
SPURLESS TOUCH-ME-NOT	<i>IMPATIENS ECALCARATA</i>		BLUE
STIFF-LEAVED PONDWEED	<i>POTAMOGETON STRICTIFOLIUS</i>		BLUE
SWEET-MARSH BUTTERWEED	<i>SENECIO HYDROPHILOIDES</i>		RED
WATER MARIGOLD	<i>MEGALODONTA BECKII VAR BECKII</i>		BLUE
WESTERN DOGBANE	<i>APOCYNUM X FLORIBUNDUM</i>		BLUE
WESTERN MUGWORT	<i>ARTEMISIA LUDOVICIANA VAR INCOMPTA</i>		BLUE
WILD LICORICE	<i>GLYCYRRHIZA LEPIDOTA</i>		RED

Committee on the Status of Endangered Wildlife in Canada (COSEWIC) ranks:  
E (Endangered); T (Threatened); SC (Special Concern); NAR (Not at Risk); DD (Data Deficient)

**note** – list includes all species mapped within 2 km of a native grassland polygon.

#### 4.1.5 Non-Native Invasive Plants<sup>9</sup>

There are numerous non-native plant species associated with the grasslands of the East Kootenay Trench, some of which are invasive species capable of overtaking native grasslands.

Diffuse and spotted knapweed are the most common non-native invasive plants on grasslands in the East Kootenay Trench. Populations are widespread throughout the Ponderosa Pine and Interior Douglas-fir Biogeoclimatic Zones in disturbed areas. In addition, knapweed can be found in upper grassland environments on steep, warm aspect slopes such as those from Elko to Wardner. Hound's-tongue is also widely distributed throughout the Trench, occupying moister

<sup>9</sup> with adaptations (with permission) from Wikeem, B. and S. Wikeem, 2004. Grasslands of British Columbia. Report prepared for the Grasslands Conservation Council of British Columbia. Kamloops, B.C.

habitats in higher elevation grasslands, but also commonly found in lower elevation grasslands, savannah and associated aspen copses.

Other alien invasive plants including St. John's-wort, silvery cinquefoil and sulphur cinquefoil are common in the region. St. John's-wort is prevalent in the southern part of the Trench from the Tobacco Plains to Baynes Lake, and is often associated with silvery cinquefoil and sulphur cinquefoil. Silvery cinquefoil and sulphur cinquefoil are nearly ubiquitous in the southern part of the Trench where they have invaded most grasslands and savannahs. These species frequently colonize disturbed sites, but are often able to thrive even in late seral grassland communities.

Significant populations of Dalmatian toadflax have been identified from Wardner north to St. Mary's Prairie on both sides of the Kootenay river. Leafy spurge, another extremely invasive species, has been found in abundance on grasslands near Radium.

## **4.2 Okanagan**

### **4.2.1 The Grassland Landscape<sup>10</sup>**

The Okanagan region contains nearly 120,000 ha of grassland distributed over the Okanagan, Kettle and Similkameen valleys (Figure 7). These valleys are contained within the Southern Okanagan Basin, Northern Okanagan Basin, Southern Okanagan Highland, Northern Okanagan Highland and Okanagan Range Ecoregions (Table 4).

Extending north from the Columbia Plateau in Washington State, the Okanagan Valley runs north and south to the height of land north of Armstrong that separates the Columbia and Fraser river drainages. The Okanagan Depression is one of the most striking physiographic features in the region and contains the major lakes including Osoyoos Lake, Vaseux Lake, Skaha Lake, Okanagan Lake, Wood Lake, Kalamalka Lake and Swan Lake. In the portion of the valley south of Summerland in the BGxh1 Biogeoclimatic unit, lower grassland, shrub-steppe communities dominated by either antelope-brush or big sagebrush in association with bluebunch wheatgrass and other bunchgrasses extend from the valley floor to the adjacent benches and steep cliffs. Ponderosa pine savannah in the PPxh1 Biogeoclimatic unit often forms a band on the rugged terrain above the lower grasslands, with bluebunch wheatgrass, Idaho fescue and rough fescue often co-dominating the herb layer. Above the Ponderosa Pine savannah, grasslands sprawl onto the lower margins of the plateau surfaces on both sides of the Okanagan Valley where they often abut dense forest. Here there is a shift from steep slopes and rugged terrain to gently rolling topography where upper grasslands dominated by rough fescue mix with deciduous and coniferous forest in the IDFxh1 Biogeoclimatic unit.

Grasslands in the Northern Okanagan Basin are transitional between the rough fescue-bluebunch wheatgrass communities of the upper grassland in the Thompson and Southern Okanagan Basins. However, there is virtually no vertical zonation of plant communities comparable to those in the Thompson and south Okanagan. Most of the grasslands north of Kelowna to Armstrong, and in the Coldstream Valley, are classified as part of the Interior Douglas-fir zone even at their lowest elevations.

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<sup>10</sup> with adaptations (with permission) from Wikeem, B. and S. Wikeem, 2004. Grasslands of British Columbia. Report prepared for the Grasslands Conservation Council of British Columbia. Kamloops, B.C.

**Figure 7: Okanagan Grasslands**

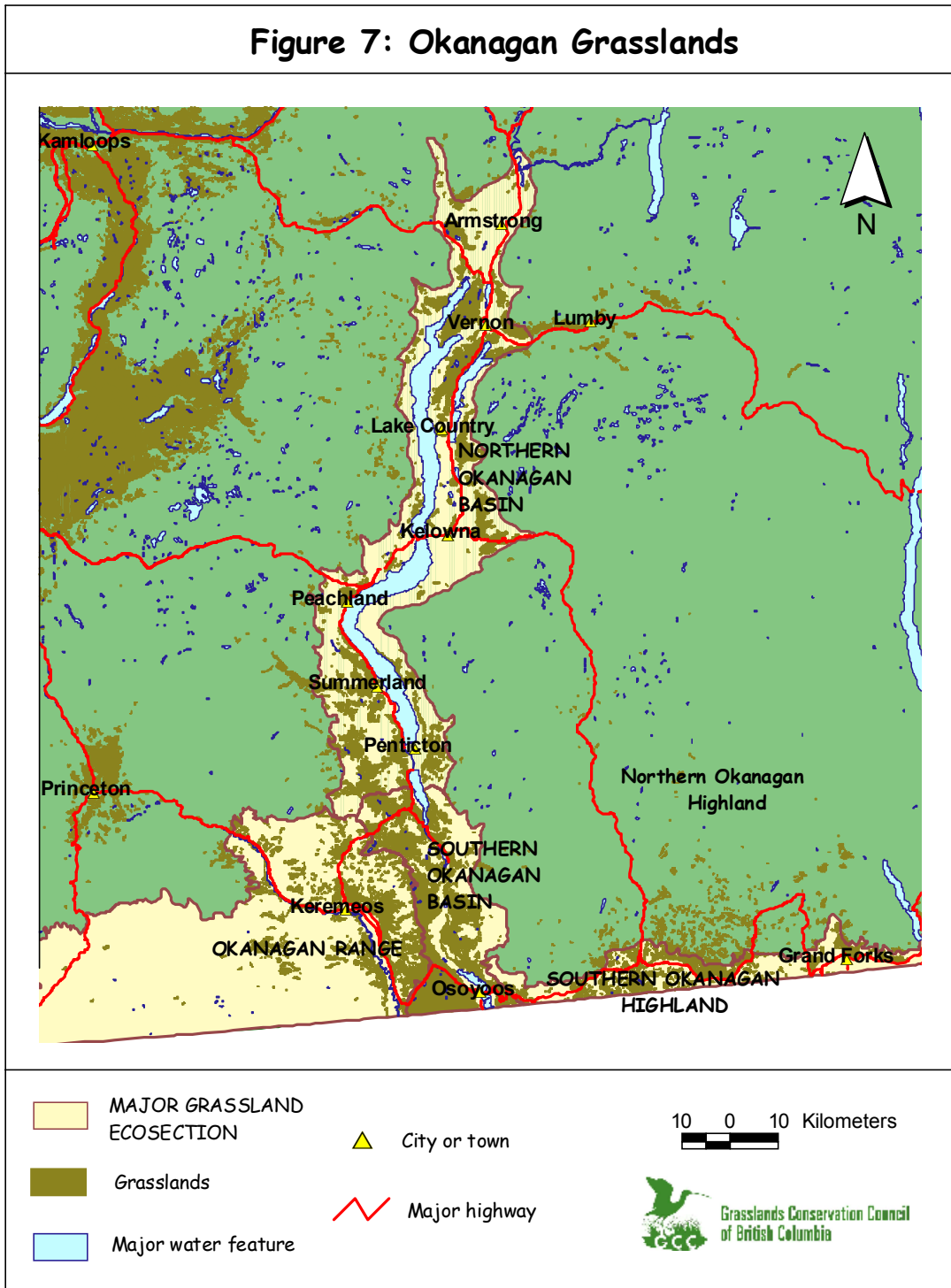




Table 4. Okanagan: Grassland Area by Ecosection and Biogeoclimatic Unit

Ecosection	Area of Grassland (ha)	% of total for region
Northern Okanagan Highland	10,188	8.7%
Northern Okanagan Basin	39,759	34.1%
Southern Okanagan Basin	33,416	28.6%
Okanagan Range	20,727	17.8%
Southern Okanagan Highland	12,553	10.8%
TOTAL	116,643	100.0%



lower grassland benches above Osoyoos Lake

Brian Wikeem

Biogeoclimatic unit	Area of Grassland (ha)	% of total for region
BG xh 1	22,543	19.3%
PP xh 1	25,364	21.7%
PP xh 1a	3,249	2.8%
PP dh 1	5,154	4.4%
IDF xh 1	27,694	23.7%
IDF xh 1a	16,527	14.2%
IDF xh 1b	302	0.3%
IDF dm 1	6,508	5.6%
IDF dk 1	2,439	2.1%
IDF dk 1b	433	0.4%
IDF dk 2	367	0.3%
IDF mw 1	1,836	1.6%
ICH mk 1	909	0.8%
MS xk	1,623	1.4%
MS dm 1	953	0.8%
MS dm 2	176	0.2%
ESSFxc	546	0.5%
ESSFdc 1	17	0.0%
AT p	2	0.0%
TOTAL	116,643	100.0%

Grasslands in the Similkameen Valley (Okanagan Range Ecosection) occur mostly in the Ponderosa Pine and Interior Douglas-fir zones, but large areas of grassland also occur from the Montane Spruce zone to the alpine. Lower grassland, shrub-steppe communities and ponderosa pine savannah with big sagebrush and bluebunch wheatgrass at climax occupy the lower slopes and terraces in a narrow band above the Similkameen River from the Canada/US border upstream to Hedley. At higher elevations in the Ponderosa Pine and Interior Douglas-fir zones, the shrub layer disappears and rough fescue and Idaho fescue become climax co-dominants. Unusual shrub-steppe communities dominated by Vasey's sage and bluebunch wheatgrass are sometimes found in the Interior Douglas-fir and Montane Spruce zones in the highest elevation grasslands such as those in the Ashnola and Mount Kobau areas.

Virtually all grasslands and ponderosa pine savannah in the Kettle Valley are associated with the valley bottom and rolling terrain along the slopes of the Kettle River. Grasslands and savannah dominated by rough fescue, Idaho fescue and bluebunch wheatgrass occur from Rock Creek east to Christina Lake in the PPdh1, IDFxh1 and IDFdm1 Biogeoclimatic units in the Southern and Northern Okanagan Highland Ecosections.

The Okanagan region contains a rich mix of plant communities and landscape features ranging from open grasslands, shrub-steppe and savannah to wetland and riparian ecosystems to cliffs and talus slopes (Table 5). This mosaic of grassland associated features and flora provides habitat for a multitude of rare and endangered insects, mammals, birds, reptiles and amphibians.

Table 5. Okanagan: Selected Grassland Associated Habitats by Biogeoclimatic Unit

	aspen copses (ha)	cottonwood stands (ha)	cliffs, clay banks and rocky terrain (ha)	meadows, riparian brush and wetlands (ha)	ponds < 3 ha (number)	ponds < 1/2 ha (number)
BG xh 1	95	233	2,283	360	25	18
PP xh 1	151	216	9,394	197	27	17
PP xh 1a	117	8	72	6	3	3
PP dh 1	73	15	1,300	0	1	1
IDF xh 1	600	260	12,606	223	32	23
IDF xh 1a	106	26	82	73	66	51
IDF dm 1	268	46	7,314	129	7	6
IDF dk 1	27	0	1,210	35	0	0
IDF mw 1	65	57	1,069	7	0	0
MS xk	22	0	85	86	0	0

#### 4.2.2 Land Status and Range Tenure

Approximately 31.6% of the Okanagan region's grasslands are on provincial crown land, yet these areas are not evenly distributed among the major sub-regions, or ecosections (Table 6). The majority of grasslands in the Okanagan Range and Northern Okanagan Highland Ecosections are publicly owned at 56.5% and 58.8%, respectively. Most of the grasslands in these two sub-regions are higher elevation types. In the valley bottoms of the Northern and Southern Okanagan Basins as well as the Southern Okanagan Highland Ecosections, the crown land figures drop to 18.3%, 28.5% and 18.6%, respectively. Most of the grasslands in these areas are lower elevation grasslands and ponderosa pine savannah types overlapping with large tracts of private land and Indian Reserves.

Of the 37,000 ha of crown grassland in the Okanagan region, 83.3% overall are under a grazing tenure, mostly grazing licenses. However, when considering just the Northern and Southern Okanagan Basins, 71.5% and 72.3% are under range tenures, respectively (Table 7). Crown grasslands with no range tenure in these basins can generally be found in provincial parks, protected areas, wildlife reserves and ecological reserves, although a few small parcels occur outside protected areas amongst the patchwork of private lands and Indian Reserves. Some of these small crown grasslands may not have an active grazing tenure, but may still be designated as either a crown reserve, recreational area or woodlot. Those crown grasslands without any type of tenure or reserve represent the remainder, amounting to approximately 2,400 ha in the Northern and Southern Okanagan Basins<sup>11</sup>. These grasslands are particularly threatened by development as they may be sold to private interests by the provincial government. Grazing leases, amounting to 352 ha in the Okanagan Basin, are also subject to private purchase and development.

<sup>11</sup> ownership data sources somewhat out of date; some of these untenured crown parcels may now be private lands.



Table 6. Okanagan: Land Status of Grasslands by Ecosection

	Southern Okanagan Basin		Northern Okanagan Basin		Southern Okanagan Highland		Okanagan Range		Northern Okanagan Highland	
	grassland (ha)	% of ecosec total	grassland (ha)	% of ecosec total	grassland (ha)	% of ecosec total	grassland (ha)	% of ecosec total	grassland (ha)	% of ecosec total
Provincial crown (not in protected area)	5,035	15.1%	6,242	15.7%	2,277	18.1%	8,747	42.2%	5,730	56.2%
Provincial crown protected area	4,486	13.4%	1,037	2.6%	66	0.5%	2,958	14.3%	267	2.6%
private	13,536	40.5%	23,035	57.9%	10,199	81.2%	5,276	25.5%	4,191	41.1%
private acquired land	1,863	5.6%	27	0.1%	0	0.0%	46	0.2%	0	0.0%
Indian Reserve (federal)	8,497	25.4%	9,417	23.7%	11	0.1%	3,700	17.9%	0	0.0%
TOTAL	33,416	100.0%	39,759	100.0%	12,553	100.0%	20,727	100.0%	10,188	100.0%

Table 7. Okanagan: Range Tenure on Provincial Crown Grasslands by Ecosection

	Southern Okanagan Basin		Northern Okanagan Basin		Southern Okanagan Highland		Okanagan Range		Northern Okanagan Highland	
	grassland (ha)	% of total crown	grassland (ha)	% of total crown	grassland (ha)	% of total crown	grassland (ha)	% of total crown	grassland (ha)	% of total crown
grazing license or permit	6,643	69.8%	5,098	70.0%	2,178	92.9%	10,954	93.6%	5,483	91.4%
grazing lease	241	2.5%	111	1.5%	0	0.0%	0	0.0%	0	0.0%
no grazing tenure	2,637	27.7%	2,070	28.4%	165	7.1%	751	6.4%	514	8.6%
TOTAL	9,521	100.0%	7,279	100.0%	2,343	100.0%	11,705	100.0%	5,997	100.0%

With respect to provincial parks and protected areas, the Southern Okanagan Basin and Okanagan Range account for the greatest percentage of grasslands protected. Protected areas designated under the Okanagan-Shuswap Land and Resource Management Plan (LRMP) such as the South Okanagan Grasslands, White Lake Grasslands and Snowy Protected Areas have significantly increased the percentage of publicly protected grasslands (Appendix 3). In addition, a new national park reserve is proposed for the South Okanagan, potentially increasing the percentage of protected areas in the region. South Okanagan grasslands in the BGxh1, PPxh1 and PPxh1a Biogeoclimatic units are fairly well-represented in the protected areas system (Appendix 5), although many of these parks are small and fragmented across the landscape. Conservation and stewardship of all lands, whether they are in or out of parks, is necessary for the long term sustainability of natural grassland landscapes, including the many rare and endangered species that inhabit these areas. This is particularly true for the South Okanagan.

In the Northern Okanagan Basin, Northern Okanagan Highland and Southern Okanagan Highland Ecosections, grasslands are severely underrepresented in the protected areas system. In the Northern Okanagan Basin, Kalamalka Lake protects 533 ha of grassland and accounts for over half of the crown grassland in protected areas in this ecosection. With most of the IDFxh1

grasslands from Kelowna to Armstrong on private land or Indian Reserves, there are few large protected areas in the north Okanagan valley bottom; even fewer contain grassland. The ponderosa pine savannah and upper grasslands of the Boundary country (Southern and Northern Okanagan Highlands) are the most underrepresented grasslands in the Okanagan region with respect to protected areas. East of Anarchist Mountain, a mere 13 ha of PPdh1 savannah is protected in Johnstone Creek Provincial Park.

Privately owned grasslands are concentrated in the valley bottoms of the Okanagan, Similkameen and Kettle Valleys. In the Northern Okanagan Basin, large blocks occur in the Coldstream Valley, on the Bella Vista-Goose Lake range, on the west side of Kalamalka Lake, in the hills east of Winfield, and east of Kelowna in the Black Knight Mountain area. In fact, from Oyama to Kelowna, nearly all remaining grasslands are privately owned. In the southern portion of the Okanagan Valley, large areas of privately owned grassland occur around Summerland, south of Summerland along Shingle and Shafford Creek, east of Penticton, in the White Lake area, and from Kaleden to Osoyoos on both sides of the main valley. In the Similkameen Valley, the largest areas of private grassland are found north of Keremeos, east of Cawston and to a lesser extent, in the Mount Kobau and Richter Mountain areas. The Kettle Valley contains the largest percentage of private grassland in the Okanagan region at 81.2%. The Overton-Moody range unit contains the only sizeable area of crown grassland (1054 ha) along the Kettle from Rock Creek to Christina Lake.



Gilpin Creek grasslands east of Grand Forks

Brian Wikeem

With a significant portion of the Okanagan's grasslands existing as privately owned rangelands, ranchers are stewards over a considerable amount of area in this region. This is particularly true in the highly productive valley bottoms of the Okanagan Basin and Kettle River. In order to ensure the conservation of grasslands in the Okanagan region as a whole, support must be given to the ranching community to achieve the sustainability of large tracts of working rangeland.

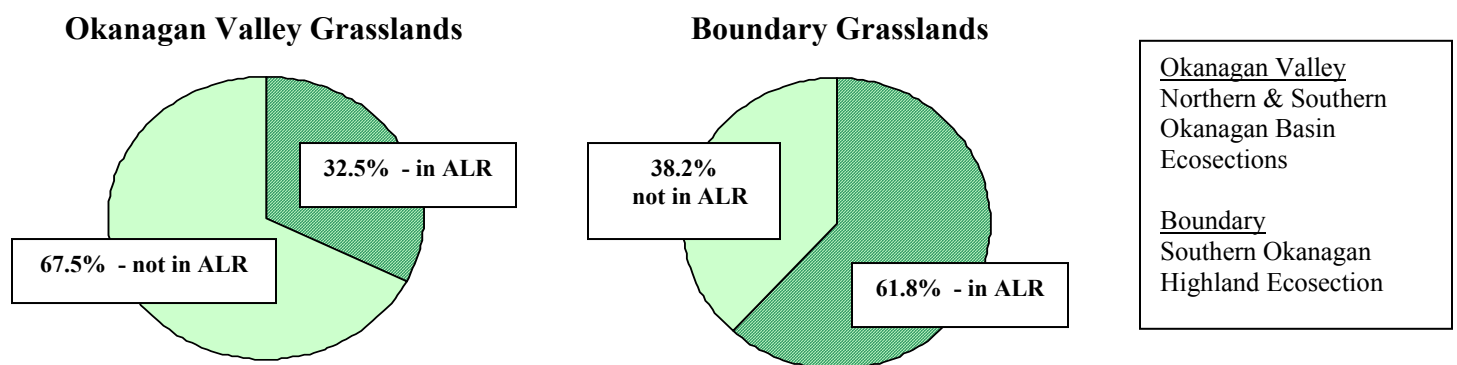
Nearly 2,000 ha of grassland in the Okanagan region have been acquired and are being managed for conservation by The Nature Trust of BC (TNT), The Land Conservancy of BC (TLC) and the Canadian Wildlife Service (CWS) (Appendix 4). The TNT Okanagan Falls-Vaseux Lake and White Lake biodiversity ranches contain sizeable tracts of lower grassland and ponderosa pine savannah critical for the survival of a significant number of endangered species including the Pallid Bat, Prairie Falcon, Brewer's Sparrow, Sage Thrasher, White-headed Woodpecker, Yellow-breasted Chat, Tiger Salamander and Vivid Dancer. Properties held by the Canadian Wildlife Service along Vaseux Lake also contain considerable areas of critical native grassland habitat. Smaller acquired grasslands in the Okanagan and Similkameen Valleys can be found in the Trust Creek (TNT), Skaha Lake (TNT), Kilpoola Lake (TNT) and Harper (TLC) properties.

Nearly 25% of the grasslands in the Okanagan and Similkameen Valleys occur on Indian Reserves, the highest percentage of all grassland regions in the province. In the south Okanagan, large areas of grassland held by First Nations are found south of Vaseux Lake on the east side of

Okanagan Valley (Osoyoos Band) and west of Penticton over Mount Nkwala (Penticton Band). In the north Okanagan, the Okanagan Band holds title over sizeable tracts of grassland around Mount Swanson, on the Bella Vista-Goose Lake range, and east across the lake in the Equisis Creek area. The Westbank First Nation holds a small but significant piece of grassland in the Westbank area amongst the urban sprawl and development of Kelowna. Another significant area of First Nations land is found north of Mount Swanson above the Salmon River where the Spallumcheen Band owns a large chunk (591 ha) of the most northerly patch of grassland in the Okanagan Valley. Finally, in the Similkameen Valley from Hedley to the Canada/US border, considerable areas of grassland are held by the Lower Similkameen Band at the Ashnola, Keremeos Forks, Range, Narcisse’s Farm, Lower Similkameen, Blind Creek and Chopaka Indian Reserves. Just as support must be given to ranchers operating on private and crown lands, First Nations must also be given support for effective grassland stewardship on Indian Reserves and traditional territories.

In the Okanagan Valley, only 32.5% (23,760 ha) of the grasslands are in the Agricultural Land Reserve (ALR) (Figure 8). With the extreme heat and dryness of this region coupled with shallow soils in numerous areas, there are many large tracts of grassland not capable of supporting agriculture except with very intensive irrigation. The majority of historical grasslands in the valley bottoms and on the adjacent benches have already been converted to orchards, vineyards and cultivated fields. Remaining native grasslands in the ALR are at high risk to agricultural development. In the Boundary country (Southern Okanagan Highlands), 61.8% of the grasslands are in the ALR, almost double the percentage for the Okanagan Valley. Due to the development and building restrictions on ALR lands, it would seem that the grasslands along the Kettle River, even though they may be subject to agricultural conversion, are less at risk to subdivision and development than are the grasslands of the Okanagan Valley. There are roughly 81,635 ha of grassland outside the ALR in the Okanagan Valley, with 17.7% (14,490 ha) on Indian Reserve, 42.8% (34,860 ha) on private land and 30.5% (24,895 ha) on crown land outside parks or protected areas. These areas may be subject to subdivision, development and urbanization as population levels and growth rates continue to rise dramatically in the Okanagan Valley. One such area at risk is the Bella Vista-Goose Lake range west of Vernon, where 87% of the 4,443 ha of grassland are outside the ALR.

Figure 8 – Okanagan Valley and Boundary: Grasslands in Agricultural Land Reserve

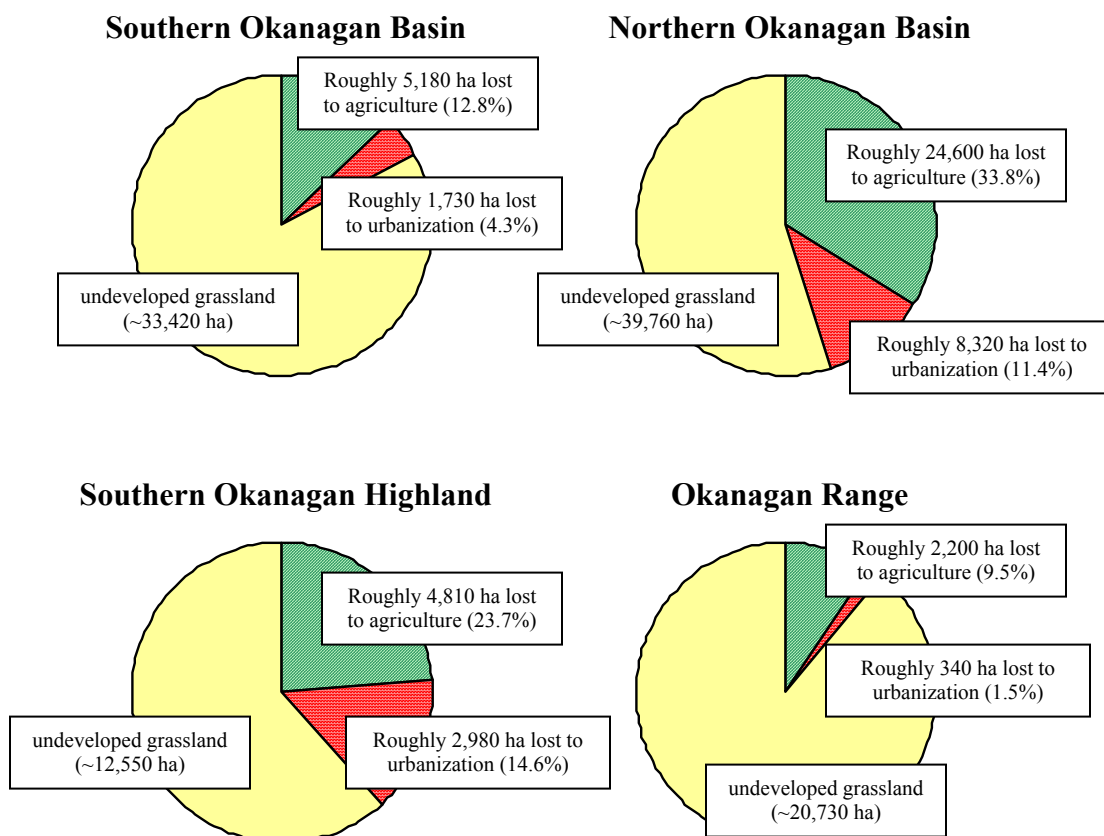


### 4.2.3 Historical Extent

The historical extent of grasslands in the Okanagan region is discussed in terms of areas lost to forest encroachment, agricultural conversion and urban development. All of these factors have decreased the extent of grassland over time<sup>12</sup>.

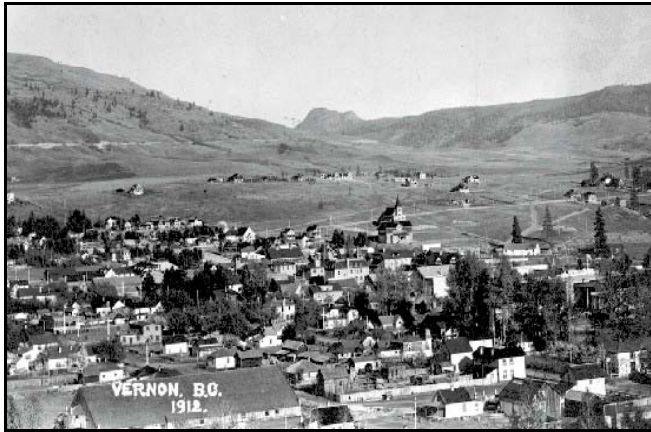
Nearly 40,000 ha of grassland have been lost to agricultural conversion in the Okanagan region, with the biggest losses suffered in the Southern and Northern Okanagan Basins (Figure 9). Large vineyards, orchards and cultivated fields have replaced native grassland environments throughout the valley bottoms and upland benches from Osoyoos to Enderby. The loss to cultivation is particularly striking in the Northern Okanagan Basin where the climate is generally cooler and moister than in the south, making this part of the valley more suited to agriculture. The grasslands on deep, rich soils north of Vernon to Enderby were amongst the first to be ploughed in the Okanagan region (B. Wikeem, pers. comm. 2003). Large losses have also occurred in the Southern Okanagan Highland where nearly 25% of the area’s grasslands have been converted to cultivated hayfields, pastures and range seedings.

Figure 9 – Okanagan: Grasslands Lost to Agriculture and Urbanization by Ecosection



<sup>12</sup> *Changes in the Grassland-Forest Interface* has been developed to document and describe forest encroachment and ingrowth in the Okanagan region. Please refer to this report for a more in-depth review.

Urban and industrial development in the Okanagan has led to the disappearance of roughly 13,500 ha of the region's grassland, with over half of this loss occurring around towns and cities in the Northern Okanagan Basin. The municipalities of Peachland, Kelowna and Vernon in particular have experienced a tremendous loss of grassland (Appendix 2). There are also large



Vernon in 1912

BC Archives (G-07143)

losses around other Okanagan cities and towns. Summerland, Penticton, Okanagan Falls, Osoyoos and Grand Forks all had historical areas of native grassland that are now under pavement. Some towns, such as Armstrong, Keremeos and Oliver, have lost over 95% of their historical grassland. Loss of grassland to roads and railways, although this has not been quantified, is expected to be significant in the Okanagan.

As the population of the Okanagan region continues to grow, native grasslands will continue to be lost to subdivision and urban

sprawl. Grasslands within municipalities may be subject to development, while areas outside the ALR may face a similar fate. With the market value of lands skyrocketing in the Okanagan Valley, there are fewer ranching operations and more intensive agricultural areas, residential communities, golf courses and commercial developments.

#### 4.2.4 Species at Risk

The Okanagan region contains the greatest number of species at risk associated with grasslands in the province. Many plant and animal species are unique to the region and others are at, or near, their northern distribution in the Okanagan Valley<sup>13</sup>.

There have been many species inventories in the Okanagan Valley, especially in the Southern Okanagan Basin. There are hundreds of rare and endangered species observations south of Penticton, most of which have been documented by government wildlife specialists and consulting biologists. A significant number of sightings have also been documented by naturalists and the interested public. The Conservation Data Centre (CDC) has compiled, documented and mapped over 300 separate occurrences of red and blue listed species in the Southern Okanagan Basin, many of which are associated with grassland environments.

An analysis determined which species have been mapped on grassland or immediately adjacent habitats in the Okanagan region (Table 8). There is significant variability among the different ecoregions, or sub-regions.

<sup>13</sup> For more information on grassland associated species and their habitats in this region, refer to *The Grasslands of British Columbia*.



Table 8. Okanagan: Species at Risk Mapped on Grassland & Associated Habitats by Ecosection  
**Southern Okanagan Highlands**

	Scientific Name	Common Name	COSEWIC Status	CDC Status
<b>AMPHIBIANS</b>				
	<i>AMBYSTOMA TIGRINUM</i>	TIGER SALAMANDER	E (Nov 2001)	RED
<b>BIRDS</b>				
	<i>TYTO ALBA</i>	BARN OWL	SC (NOV 2001)	BLUE
	<i>DOLICHONYX ORYZIVORUS</i>	BOBOLINK		BLUE
	<i>CATHERPES MEXICANUS</i>	CANYON WREN	NAR (1992)	BLUE
	<i>OTUS FLAMMEOLUS</i>	FLAMMULATED OWL	SC (NOV 2001)	BLUE
	<i>MELANERPES LEWIS</i>	LEWIS'S WOODPECKER	SC (NOV 2001)	BLUE
	<i>BUTEO SWAINSONI</i>	SWAINSON'S HAWK		BLUE
	<i>PICOIDES ALBOLARVATUS</i>	WHITE-HEADED WOODPECKER	E (Nov 2000)	RED
	<i>SPHYRAPICUS THYROIDEUS THYROIDEUS</i>	WILLIAMSONS SAPSUCKER, THYROIDEUS SUBSPECIES		BLUE
<b>DRAGONFLIES AND DAMSELFLIES</b>				
	<i>ARGIA EMMA</i>	NEZ PERCE DANCER		BLUE
	<i>STYLURUS OLIVACEUS</i>	OLIVE CLUBTAIL		RED
	<i>CALOPTERYX AEQUABILIS</i>	RIVER JEWELWING		BLUE
	<i>MACROMIA MAGNIFICA</i>	WESTERN RIVER CRUISER		RED
<b>FISH</b>				
	<i>ACROCHEILUS ALUTACEUS</i>	CHISELMOUTH	DD (1997)	BLUE
	<i>COTTUS PUNCTULATUS</i>	ROCKY MOUNTAIN SCULPIN		BLUE
	<i>COTTUS CONFUSUS</i>	SHORTHEAD SCULPIN	T (MAY 2001)	BLUE
	<i>RHINICHTHYS OSCULUS</i>	SPECKLED DACE	SC (1980)	RED
	<i>RHINICHTHYS UMATILLA</i>	UMATILLA DACE	SC (1988)	RED
<b>MAMMALS</b>				
	<i>TAXIDEA TAXUS</i>	AMERICAN BADGER	E (MAY 2000)	RED
	<i>OVIS CANADENSIS</i>	BIGHORN SHEEP		BLUE
	<i>PEROGNATHUS PARVUS</i>	GREAT BASIN POCKET MOUSE		BLUE
	<i>LASIURUS BLOSSEVILLII</i>	WESTERN RED BAT		RED
	<i>MYOTIS CILIOLABRUM</i>	WESTERN SMALL-FOOTED MYOTIS		BLUE
<b>REPTILES</b>				
	<i>COLUBER CONSTRICTOR MORMON</i>	RACER		BLUE
<b>VASCULAR PLANTS</b>				
	<i>MIMULUS BREWERI</i>	BREWER'S MONKEY-FLOWER		BLUE
	<i>PYRROCOMA CARTHAMOIDES VAR CARTHAMOIDES</i>	COLUMBIAN GOLDENWEED		RED
	<i>TRIFOLIUM CYATHIFERUM</i>	CUP CLOVER		RED
	<i>VALERIANA EDULIS SSP EDULIS</i>	EDIBLE VALERIAN		BLUE
	<i>FLOERKEA PROSERPINACOIDES</i>	FALSE-MERMAID	NAR (1984)	BLUE
	<i>GAYOPHYTUM RAMOSISSIMUM</i>	HAIRSTEM GROUNDSMOKE		RED
	<i>HETEROCODON RARIFLORUM</i>	HETEROCODON		BLUE
	<i>RIBES MONTIGENUM</i>	MOUNTAIN PRICKLY GOOSEBERRY		RED
	<i>BRICKELLIA OBLONGIFOLIA SSP OBLONGIFOLIA</i>	NARROW-LEAVED BRICKELLIA		RED
	<i>AGASTACHE URTICIFOLIA</i>	NETTLE-LEAVED GIANT-HYSSOP		BLUE
	<i>RIBES OXYACANTHOIDES SSP COGNATUM</i>	NORTHERN GOOSEBERRY		RED

<i>LINANTHUS SEPTENTRIONALIS</i>	NORTHERN LINANTHUS	BLUE
<i>CRYPTANTHA AMBIGUA</i>	OBSCURE CRYPTANTHA	RED
<i>HACKELIA CILIATA</i>	OKANOANOGAN STICKSEED	RED
<i>MELICA BULBOSA</i> VAR <i>BULBOSA</i>	ONIONGRASS	RED
<i>GENTIANA AFFINIS</i>	PRAIRIE GENTIAN	BLUE
<i>LEPIDIUM DENSIFLORUM</i> VAR <i>PUBICARPUM</i>	PRAIRIE PEPPER-GRASS	RED
<i>GILIA TENERRIMA</i>	SLENDER GILIA	RED
<i>SENECIO HYDROPHILOIDES</i>	SWEET-MARSH BUTTERWEED	RED
<i>MEGALODONTA BECKII</i> VAR <i>BECKII</i>	WATER MARIGOLD	BLUE

### Northern Okanagan Highlands

	Scientific Name	Common Name	COSEWIC Status	CDC Status
<b>BIRDS</b>				
	<i>HALIAEETUS LEUCOCEPHALUS</i>	BALD EAGLE	NAR (1984)	BLUE
	<i>DOLICHONYX ORYZIVORUS</i>	BOBOLINK		BLUE
	<i>ARDEA HERODIAS HERODIAS</i>	GREAT BLUE HERON, HERODIAS SUBSPECIES		BLUE
	<i>OTUS KENNICOTTII</i> <i>MACFARLANEI</i>	WESTERN SCREECH-OWL, MACFARLANEI SUBSPECIES	E (MAY 2002)	RED
	<i>AERONAUTES SAXATALIS</i>	WHITE-THROATED SWIFT		BLUE
	<i>SPHYRAPICUS THYROIDEUS</i> <i>THYROIDEUS</i>	WILLIAMSONS SAPSUCKER, THYROIDEUS SUBSPECIES		BLUE
	<i>ICTERIA VIRENS</i>	YELLOW-BREADED CHAT	E (Nov 2000)	RED
<b>FISH</b>				
	<i>RHINICHTHYS OSCULUS</i>	SPECKLED DACE	SC (1980)	RED
<b>MAMMALS</b>				
	<i>TAXIDEA TAXUS</i>	AMERICAN BADGER	E (MAY 2000)	RED
	<i>OVIS CANADENSIS</i>	BIGHORN SHEEP		BLUE
	<i>URSUS ARCTOS HORRIBILIS</i>	GRIZZLY BEAR	SC (MAY 2002)	BLUE
	<i>EUDERMA MACULATUM</i>	SPOTTED BAT	SC (1988)	BLUE
<b>REPTILES</b>				
	<i>CROTALUS VIRIDIS</i>	WESTERN RATTLESNAKE		BLUE
<b>VASCULAR PLANTS</b>				
	<i>RUMEX PAUCIFOLIUS</i>	ALPINE SORREL		BLUE
	<i>CYPERUS SQUARROSUS</i>	AWNED CYPERUS		BLUE
	<i>CAREX AMPLIFOLIA</i>	BIGLEAF SEDGE		BLUE
	<i>SALIX BOOTHII</i>	BOOTH'S WILLOW		BLUE
	<i>DRYOPTERIS CRISTATA</i>	CRESTED WOOD FERN		BLUE
	<i>TRIFOLIUM CYATHIFERUM</i>	CUP CLOVER		RED
	<i>FLOERKEA</i> <i>PROSERPINACOIDES</i>	FALSE-MERMAID	NAR (1984)	BLUE
	<i>OROBANCHE CORYMBOSA</i> SSP <i>MUTABILIS</i>	FLAT-TOPPED BROOMRAPE		RED
	<i>CAREX VULPINOIDEA</i>	FOX SEDGE		BLUE
	<i>NAVARRETIA INTERTEXTA</i>	NEEDLE-LEAVED NAVARRETIA		RED
	<i>LINANTHUS SEPTENTRIONALIS</i>	NORTHERN LINANTHUS		BLUE
	<i>CRYPTANTHA AMBIGUA</i>	OBSCURE CRYPTANTHA		RED
	<i>CAREX PEDUNCULATA</i>	PEDUNCLED SEDGE		BLUE
	<i>HESPEROSTIPA SPARTEA</i>	PORCUPINEGRASS		RED

MELICA SMITHII

SMITH'S MELIC

BLUE

## Southern Okanagan Basin

	Scientific Name	Common Name	COSEWIC Status	CDC Status
<b>AMPHIBIANS</b>				
	<i>SPEA INTERMONTANA</i>	GREAT BASIN SPADEFOOT	T (NOV 2001)	BLUE
	<i>AMBYSTOMA TIGRINUM</i>	TIGER SALAMANDER	E (Nov 2001)	RED
<b>BIRDS</b>				
	<i>BOTAURUS LENTIGINOSUS</i>	AMERICAN BITTERN		BLUE
	<i>PELECANUS ERYTHORHYNCHOS</i>	AMERICAN WHITE PELICAN	NAR (1987)	RED
	<i>HALIAEETUS LEUCOCEPHALUS</i>	BALD EAGLE	NAR (1984)	BLUE
	<i>TYTO ALBA</i>	BARN OWL	SC (NOV 2001)	BLUE
	<i>ARCHILOCHUS ALEXANDRI</i>	BLACK-CHINNED HUMMINGBIRD		BLUE
	<i>DOLICHONYX ORYZIVORUS</i>	BOBOLINK		BLUE
	<i>SPIZELLA BREWERI BREWERI</i>	BREWERS SPARROW, BREWERI SUBSPECIES		RED
	<i>ATHENE CUNICULARIA</i>	BURROWING OWL	E (May 2000)	RED
	<i>CATHERPES MEXICANUS</i>	CANYON WREN	NAR (1992)	BLUE
	<i>BUTEO REGALIS</i>	FERRUGINOUS HAWK	SC (1995)	RED
	<i>OTUS FLAMMEOLUS</i>	FLAMMULATED OWL	SC (NOV 2001)	BLUE
	<i>EMPIDONAX WRIGHTII</i>	GRAY FLYCATCHER	NAR (1992)	BLUE
	<i>AMMODRAMUS SAVANNARUM</i>	GRASSHOPPER SPARROW		RED
	<i>ARDEA HERODIAS HERODIAS</i>	GREAT BLUE HERON, HERODIAS SUBSPECIES		BLUE
	<i>CHONDESTES GRAMMACUS</i>	LARK SPARROW		RED
	<i>CHONDESTES GRAMMACUS</i>	LARK SPARROW		BLUE
	<i>MELANERPES LEWIS</i>	LEWIS'S WOODPECKER	SC (NOV 2001)	BLUE
	<i>NUMENIUS AMERICANUS</i>	LONG-BILLED CURLEW	SC (1992)	BLUE
	<i>FALCO PEREGRINUS ANATUM</i>	PEREGRINE FALCON, ANATUM SUBSPECIES	T (MAY 2000)	RED
	<i>FALCO MEXICANUS</i>	PRAIRIE FALCON	NA	RED
	<i>CENTROCERCUS UROPHASIANUS</i>	SAGE GROUSE	XT (MAY 2000)	RED
	<i>OREOSCOPTES MONTANUS</i>	SAGE THRASHER	E (Nov 2000)	RED
	<i>GRUS CANADENSIS</i>	SANDHILL CRANE	NAR (1979) G. canadensis tabida assessed	BLUE
	<i>TYMPANUCHUS PHASIENELLUS COLUMBIANUS</i>	SHARP-TAILED GROUSE, COLUMBIANUS SUBSPECIES		BLUE
	<i>TACHYCINETA BICOLOR</i>	TREE SWALLOW		BLUE
	<i>CATHARTES AURA</i>	TURKEY VULTURE		BLUE
	<i>POOECETES GRAMINEUS</i>	VESPER SPARROW		YELLOW
	<i>OTUS KENNICOTTII MACFARLANEI</i>	WESTERN SCREECH-OWL, MACFARLANEI SUBSPECIES	E (MAY 2002)	RED
	<i>PICOIDES ALBOLARVATUS</i>	WHITE-HEADED WOODPECKER	E (Nov 2000)	RED
	<i>AERONAUTES SAXATALIS</i>	WHITE-THROATED SWIFT		BLUE
	<i>SPHYRAPICUS THYROIDEUS THYROIDEUS</i>	WILLIAMSONS SAPSUCKER, THYROIDEUS SUBSPECIES		BLUE
	<i>ICTERIA VIRENS</i>	YELLOW-BREADED CHAT	E (Nov 2000)	RED
<b>BUTTERFLIES AND SKIPPERS</b>				
	<i>SATYRIUM BEHRII</i>	BEHR'S HAIRSTREAK	T (NOV 2000)	RED
	<i>SATYRIUM CALIFORNICUM</i>	CALIFORNIA HAIRSTREAK		BLUE
	<i>CALLOPHRYS AFFINIS</i>	IMMACULATE GREEN HAIRSTREAK		BLUE
	<i>SATYRIUM FULIGINOSUM</i>	SOOTY HAIRSTREAK		RED



DRAGONFLIES AND DAMSELFLIES				
	<i>AESHNA CONSTRICTA</i>	LANCE-TAILED DARNER		RED
	<i>ARGIA EMMA</i>	NEZ PERCE DANCER		RED
	<i>STYLURUS OLIVACEUS</i>	OLIVE CLUBTAIL		BLUE
	<i>GOMPHUS GRASLINELLUS</i>	PRONGHORN CLUBTAIL		BLUE
	<i>ARGIA VIVIDA</i>	VIVID DANCER		BLUE
FISH				
	<i>ACROCHEILUS ALUTACEUS</i>	CHISELMOUTH	DD (1997)	BLUE
MAMMALS				
	<i>TAXIDEA TAXUS</i>	AMERICAN BADGER	E (MAY 2000)	RED
	<i>OVIS CANADENSIS CALIFORNIANA</i>	BIGHORN SHEEP		BLUE
	<i>MYOTIS THYSANODES</i>	FRINGED MYOTIS	SC (1988)	BLUE
	<i>MYOTIS THYSANODES</i>	FRINGED MYOTIS	SC	BLUE
	<i>PEROGNATHUS PARVUS</i>	GREAT BASIN POCKET MOUSE		BLUE
	<i>SOREX MERRIAMI</i>	MERRIAM'S SHREW		RED
	<i>SYLVILAGUS NUTTALLII</i>	NUTTALL'S COTTONTAIL	SC (1994)	BLUE
	<i>ANTROZOUS PALLIDUS</i>	PALLID BAT	T (MAY 2000)	RED
	<i>EUDERMA MACULATUM</i>	SPOTTED BAT	SC (1988)	BLUE
	<i>CORYNORHINUS TOWNSENDII</i>	TOWNSEND'S BIG-EARED BAT		BLUE
	<i>REITHRODONTOMYS MEGALOTIS</i>	WESTERN HARVEST MOUSE	SC (1994)	BLUE
	<i>LASIURUS BLOSSEVILLII</i>	WESTERN RED BAT		RED
	<i>MYOTIS CILIOLABRUM</i>	WESTERN SMALL-FOOTED MYOTIS		BLUE
	<i>LEPUS TOWNSENDII</i>	WHITE-TAILED JACKRABBIT		RED
REPTILES				
	<i>PITUOPHIS MELANOLEUCUS</i>	GOPHER SNAKE	T (MAY 2002)	BLUE
	<i>PITUOPHIS CATENIFER DESERTICOLA</i>	GOPHER SNAKE, DESERTICOLA SUBSPECIES	T (MAY 2002)	BLUE
	<i>HYP SIGLENA TORQUATA</i>	NIGHT SNAKE	E	RED
	<i>CHRYSEMYS PICTA</i>	PAINTED TURTLE		BLUE
	<i>COLUBER CONSTRICTOR MORMON</i>	RACER		BLUE
	<i>CHARINA BOTTAE</i>	RUBBER BOA	SC (MAY 2003)	YELLOW
	<i>CROTALUS VIRIDIS</i>	WESTERN RATTLESNAKE	T (2004)	BLUE
VASCULAR PLANTS				
	<i>CAMISSONIA ANDINA</i>	ANDEAN EVENING-PRIMROSE		RED
	<i>CASTILLEJA MINOR SSP MINOR</i>	ANNUAL PAINTBRUSH		RED
	<i>COREOPSIS TINCTORIA VAR ATKINSONIANA</i>	ATKINSON'S COREOPSIS		RED
	<i>CYPERUS SQUARROSUS</i>	AWNED CYPERUS		BLUE
	<i>ELEOCHARIS ROSTELLATA</i>	BEAKED SPIKE-RUSH		BLUE
	<i>CAREX COMOSA</i>	BEARDED SEDGE		BLUE
	<i>VERBENA HASTATA VAR SCABRA</i>	BLUE VERVAIN		RED
	<i>PHACELIA RAMOSISSIMA</i>	BRANCHED PHACELIA		RED
	<i>MYOSURUS APETALUS VAR BOREALIS</i>	BRISTLY MOUSETAIL		RED
	<i>POTENTILLA PARADOXA</i>	BUSHY CINQUEFOIL		RED
	<i>CRYPTANTHA CELOSIODES</i>	COCKSCOMB CRYPTANTHA		RED
	<i>PYRROCOMA CARTHAMOIDES VAR CARTHAMOIDES</i>	COLUMBIAN GOLDENWEED		RED
	<i>ERIGERON POLIOSPERMUS VAR POLIOSPERMUS</i>	CUSHION FLEABANE		BLUE
	<i>LINDERNIA DUBIA VAR ANAGALLIDEA</i>	FALSE-PIMPERNEL		BLUE
	<i>CUSCUTA PENTAGONA</i>	FIELD DODDER		BLUE

<i>OROBANCHE CORYMBOSA</i> SSP <i>MUTABILIS</i>	FLAT-TOPPED BROOMRAPE		RED
<i>CAREX VULPINOIDEA</i>	FOX SEDGE		BLUE
<i>EPIPACTIS GIGANTEA</i>	GIANT HELLEBORINE	SC (1998)	BLUE
<i>ORTHOCARPUS BARBATUS</i>	GRAND COULEE OWL-CLOVER		RED
<i>SPOROBOLUS AIROIDES</i>	HAIRGRASS DROPSEED		RED
<i>MARSILEA VESTITA</i>	HAIRY WATER-CLOVER		RED
<i>EPILOBIUM HALLEANUM</i>	HALL'S WILLOWHERB		BLUE
<i>HUTCHINSIA PROCUMBENS</i>	HUTCHINSIA		RED
<i>CALOCHORTUS LYALLII</i>	LYALL'S MARIPOSA LILY	T (MAY 2001)	RED
<i>CAREX SYCHNOCEPHALA</i>	MANY-HEADED SEDGE		BLUE
<i>MUHLENBERGIA GLOMERATA</i>	MARSH MUHLY		BLUE
<i>SPHAERALCEA MUNROANA</i>	MUNROE'S GLOBE-MALLOW		RED
<i>AGASTACHE URTICIFOLIA</i>	NETTLE-LEAVED GIANT-HYSSOP		BLUE
<i>LINANTHUS SEPTENTRIONALIS</i>	NORTHERN LINANTHUS		BLUE
<i>ELODEA NUTTALLII</i>	NUTTALL'S WATERWEED		BLUE
<i>CRYPTANTHA AMBIGUA</i>	OBSCURE CRYPTANTHA		RED
<i>SALIX AMYGDALOIDES</i>	PEACH-LEAF WILLOW		RED
<i>LEPIDIUM DENSIFLORUM</i> VAR <i>PUBICARPUM</i>	PRAIRIE PEPPER-GRASS		RED
<i>ELEOCHARIS ATROPURPUREA</i>	PURPLE SPIKE-RUSH		RED
<i>CYPERUS ERYTHORRHIZOS</i>	RED-ROOTED CYPERUS		RED
<i>JUNCUS REGELII</i>	REGEL'S RUSH		BLUE
<i>BOLBOSCHOENUS FLUVIATILIS</i>	RIVER BULRUSH		BLUE
<i>AMMANNIA ROBUSTA</i>	SCARLET AMMANNIA	E (2001)	RED
<i>GAURA COCCINEA</i>	SCARLET GAURA		RED
<i>SPHAERALCEA COCCINEA</i>	SCARLET GLOBE-MALLOW		RED
<i>PHLOX SPECIOSA</i> SSP <i>OCCIDENTALIS</i>	SHOWY PHLOX		RED
<i>GILIA SINUATA</i>	SHY GILIA		RED
<i>ATRIPLEX ARGENTEA</i> SSP <i>ARGENTEA</i>	SILVERY ORACHE		RED
<i>LIPOCARPHA MICRANTHA</i>	SMALL-FLOWERED LIPOCARPHA	T (1992)	RED
<i>ASTRAGALUS SPALDINGII</i> VAR <i>SPALDINGII</i>	SPALDING'S MILK-VETCH		RED
<i>ALLIUM VALIDUM</i>	SWAMP ONION		RED
<i>ASTRAGALUS SCLEROCARPUS</i>	THE DALLES MILK-VETCH		RED
<i>THELYPODIUM LACINIATUM</i> VAR <i>LACINIATUM</i>	THICK-LEAVED THELYPODY		BLUE
<i>ASTRAGALUS FILIPES</i>	THREADSTALK MILK-VETCH		BLUE
<i>CHAMAESYCE SERPYLLIFOLIA</i> SSP <i>SERPYPYLLIFOLIA</i>	THYME-LEAVED SPURGE		BLUE
<i>ROTALA RAMOSIOR</i>	TOOTH CUP MEADOW-FOAM	E (May 2000)	RED
<i>ERAGROSTIS PECTINACEA</i>	TUFTED LOVEGRASS		RED
<i>CENTAURIUM EXALTATUM</i>	WESTERN CENTAURY		RED
<i>APOCYNUM X FLORIBUNDUM</i>	WESTERN DOGBANE		BLUE
<i>LAPPULA OCCIDENTALIS</i> VAR <i>CUPULATA</i>	WESTERN STICKSEED		RED
<i>HALIMOLOBOS WHITEDII</i>	WHITED'S HALIMOLOBOS		RED
<i>PECTOCARYA PENICILLATA</i>	WINGED COMBSEED		RED
<b>COMMUNITIES</b>			
<i>ARTEMISIA TRIDENTATA</i> / <i>PSEUDOROEGNERIA SPICATA</i> - <i>BALSAMORHIZA SAGITTATA</i>	BIG SAGE / BLUEBUNCH WHEATGRASS - BALSAMROOT		RED
<i>POPULUS BALSAMIFERA</i> SSP. <i>TRICHOCARPA</i> / <i>BETULA</i>	BLACK COTTONWOOD / WATER BIRCH		RED

OCCIDENTALIS		
PSEUDOROEGNERIA SPICATA - BALSAMORHIZA SAGITTATA	BLUEBUNCH WHEATGRASS - BALSAMROOT	RED
PSEUDOTSUGA MENZIESII - PINUS PONDEROSA / FESTUCA IDAHOENSIS	DOUGLAS-FIR - PONDEROSA PINE / IDAHO FESCUE	BLUE
MARSILEA VESTITA - SCHOENOPLECTUS AMERICANUS	HAIRY WATER-CLOVER - AMERICAN BULRUSH	RED
FESTUCA IDAHOENSIS - PSEUDOROEGNERIA SPICATA	IDAHO FESCUE - BLUEBUNCH WHEATGRASS	RED
PINUS PONDEROSA / ARISTIDA PURPUREA VAR LONGISETA	PONDEROSA PINE / RED THREE-AWN	BLUE
PINUS PONDEROSA / RHUS GLABRA	PONDEROSA PINE / SMOOTH SUMAC	RED
SALIX EXIGUA - SALIX AMYGDALOIDES	SANDBAR WILLOW - PEACH-LEAF WILLOW	RED

## Northern Okanagan Basin

	Scientific Name	Common Name	COSEWIC Status	CDC Status
<b>AMPHIBIANS</b>				
	SPEA INTERMONTANA	GREAT BASIN SPADEFOOT	T (NOV 2001)	BLUE
	AMBYSTOMA TIGRINUM	TIGER SALAMANDER	E (Nov 2001)	RED
<b>BIRDS</b>				
	RECURVIROSTRA AMERICANA	AMERICAN AVOCET		RED
	PELECANUS ERYTHRORHYNCHOS	AMERICAN WHITE PELICAN	NAR (1987)	RED
	DOLICHONYX ORYZIVORUS	BOBOLINK		BLUE
	ATHENE CUNICULARIA	BURROWING OWL	E (May 2000)	RED
	CATHERPES MEXICANUS	CANYON WREN	NAR (1992)	BLUE
	OTUS FLAMMEOLUS	FLAMMULATED OWL	SC (NOV 2001)	BLUE
	AMMODRAMUS SAVANNARUM	GRASSHOPPER SPARROW		RED
	EMPIDONAX WRIGHTII	GRAY FLYCATCHER	NAR (1992)	BLUE
	MELANERPES LEWIS	LEWIS'S WOODPECKER	SC (NOV 2001)	BLUE
	NUMENIUS AMERICANUS	LONG-BILLED CURLEW	SC (1992)	BLUE
	FALCO MEXICANUS	PRAIRIE FALCON	NA	RED
	OREOSCOPTES MONTANUS	SAGE THRASHER	E (Nov 2000)	RED
	GRUS CANADENSIS	SANDHILL CRANE	NAR (1979) G. canadensis tabida assessed	BLUE
	TYMPANUCHUS PHASIENELLUS COLUMBIANUS	SHARP-TAILED GROUSE, COLUMBIANUS SUBSPECIES		BLUE
	CATHARTES AURA	TURKEY VULTURE		BLUE
	AECHMOPHORUS OCCIDENTALIS	WESTERN GREBE		RED
	OTUS KENNICOTTII MACFARLANEI	WESTERN SCREECH-OWL, MACFARLANEI SUBSPECIES	E (MAY 2002)	RED
	PICOIDES ALBOLARVATUS	WHITE-HEADED WOODPECKER	E (Nov 2000)	RED
	AERONAUTES SAXATALIS	WHITE-THROATED SWIFT		BLUE
	SPHYRAPICUS THYROIDEUS THYROIDEUS	WILLIAMSONS SAPSUCKER, THYROIDEUS SUBSPECIES		BLUE
	ICTERIA VIRENS	YELLOW-BREADED CHAT	E (Nov 2000)	RED
<b>BUTTERFLIES AND SKIPPERS</b>				
	CALLOPHRYS AFFINIS	IMMACULATE GREEN HAIRSTREAK		BLUE
<b>DRAGONFLIES AND DAMSELFLIES</b>				
	AESHNA CONSTRICTA	LANCE-TAILED DARNER		RED
	ARGIA EMMA	NEZ PERCE DANCER		BLUE
	GOMPHUS GRASLINELLUS	PRONGHORN CLUBTAIL		BLUE

	<i>ARGIA VIVIDA</i>	VIVID DANCER		BLUE
<b>MAMMALS</b>				
	<i>TAXIDEA TAXUS</i>	AMERICAN BADGER	E (MAY 2000)	RED
	<i>PEROGNATHUS PARVUS</i>	GREAT BASIN POCKET MOUSE		BLUE
	<i>SYLVILAGUS NUTTALLII</i>	NUTTALL'S COTTONTAIL	SC (1994)	BLUE
	<i>EUDERMA MACULATUM</i>	SPOTTED BAT	SC (1988)	BLUE
	<i>CORYNORHINUS TOWNSENDII</i>	TOWNSEND'S BIG-EARED BAT		BLUE
	<i>REITHRODONTOMYS MEGALOTIS</i>	WESTERN HARVEST MOUSE	SC (1994)	BLUE
	<i>LASIURUS BLOSSEVILLII</i>	WESTERN RED BAT		RED
	<i>MYOTIS CILIOLABRUM</i>	WESTERN SMALL-FOOTED MYOTIS		BLUE
<b>REPTILES</b>				
	<i>PITUOPHIS MELANOLEUCUS</i>	GOPHER SNAKE	T (MAY 2002)	BLUE
	<i>CHRYSEMYS PICTA</i>	PAINTED TURTLE		BLUE
	<i>COLUBER CONSTRICTOR MORMON</i>	RACER		BLUE
	<i>CHARINA BOTTAE</i>	RUBBER BOA	SC (MAY 2003)	YELLOW
	<i>CROTALUS VIRIDIS</i>	WESTERN RATTLESNAKE	T (2004)	BLUE
<b>VASCULAR PLANTS</b>				
	<i>CYPERUS SQUARROSUS</i>	AWNED CYPERUS		BLUE
	<i>VERBENA HASTATA VAR SCABRA</i>	BLUE VERVAIN		RED
	<i>PYRROCOMA CARTHAMOIDES VAR CARTHAMOIDES</i>	COLUMBIAN GOLDENWEED		RED
	<i>PHYSARIA DIDYMOCARPA VAR DIDYMOCARPA</i>	COMMON TWINPOD		BLUE
	<i>POLYGONUM PUNCTATUM</i>	DOTTED SMARTWEED		BLUE
	<i>CAREX XERANTICA</i>	DRY-LAND SEDGE		BLUE
	<i>POLYGONUM DOUGLASII SSP ENGELMANNII</i>	ENGELMANN'S KNOTWEED		BLUE
	<i>LINDERNIA DUBIA VAR ANAGALLIDEA</i>	FALSE-PIMPERNEL		BLUE
	<i>CUSCUTA PENTAGONA</i>	FIELD DODDER		BLUE
	<i>OROBANCHE CORYMBOSA SSP MUTABILIS</i>	FLAT-TOPPED BROOMRAPE		RED
	<i>CAREX VULPINOIDEA</i>	FOX SEDGE		BLUE
	<i>EPIPACTIS GIGANTEA</i>	GIANT HELLEBORINE	SC (1998)	BLUE
	<i>GAYOPHYTUM RAMOSISSIMUM</i>	HAIRSTEM GROUNDSMOKE		RED
	<i>MARSILEA VESTITA</i>	HAIRY WATER-CLOVER		RED
	<i>CAREX SYCHNOCEPHALA</i>	MANY-HEADED SEDGE		BLUE
	<i>VIOLA SEPTENTRIONALIS</i>	NORTHERN VIOLET		BLUE
	<i>CRYPTANTHA AMBIGUA</i>	OBSCURE CRYPTANTHA		RED
	<i>TALINUM SEDIFORME</i>	OKANOGAN FAMEFLOWER	NAR (1990)	BLUE
	<i>IMPATIENS AURELLA</i>	ORANGE TOUCH-ME-NOT		BLUE
	<i>SALIX AMYGDALOIDES</i>	PEACH-LEAF WILLOW		RED
	<i>GENTIANA AFFINIS</i>	PRAIRIE GENTIAN		BLUE
	<i>CYPERUS ERYTHORRHIZOS</i>	RED-ROOTED CYPERUS		RED
	<i>LEERSIA ORYZOIDES</i>	RICE CUTGRASS		BLUE
	<i>AMSINCKIA RETRORSA</i>	RIGID FIDDLENECK		RED
	<i>CAREX SAXIMONTANA</i>	ROCKY MOUNTAIN SEDGE		BLUE
	<i>CREPIS ATRIBARBA SSP ATRIBARBA</i>	SLENDER HAWKSBEARD		RED
	<i>ASTRAGALUS SCLEROCARPUS</i>	THE DALLES MILK-VETCH		RED
	<i>ELATINE RUBELLA</i>	THREE-FLOWERED WATERWORT		BLUE

	<i>POLEMONIUM OCCIDENTALE</i> <i>SSP OCCIDENTALE</i>	WESTERN JACOB'S-LADDER	BLUE
<b>COMMUNITIES</b>			
	<i>ARTEMISIA TRIDENTATA</i> / <i>PSEUDOROEGNERIA SPICATA</i> - <i>BALSAMORHIZA SAGITTATA</i>	BIG SAGE / BLUEBUNCH WHEATGRASS - BALSAMROOT	RED

### Okanagan Range

	Scientific Name	Common Name	COSEWIC Status	CDC Status
<b>AMPHIBIANS</b>				
	<i>AMBYSTOMA TIGRINUM</i>	TIGER SALAMANDER	E (Nov 2001)	RED
<b>BIRDS</b>				
	<i>NUMENIUS AMERICANUS</i>	LONG-BILLED CURLEW	SC (1992)	BLUE
	<i>DOLICHONYX ORYZIVORUS</i>	BOBOLINK		BLUE
	<i>SPIZELLA BREWERI BREWERI</i>	BREWERS SPARROW, BREWERI SUBSPECIES		RED
	<i>CATHERPES MEXICANUS</i>	CANYON WREN	NAR (1992)	BLUE
	<i>OTUS FLAMMEOLUS</i>	FLAMMULATED OWL	SC (NOV 2001)	BLUE
	<i>AMMODRAMUS SAVANNARUM</i>	GRASSHOPPER SPARROW		RED
	<i>EMPIDONAX WRIGHTII</i>	GRAY FLYCATCHER	NAR (1992)	BLUE
	<i>ARDEA HERODIAS HERODIAS</i>	GREAT BLUE HERON, HERODIAS SUBSPECIES		BLUE
	<i>CHONDESTES GRAMMACUS</i>	LARK SPARROW		RED
	<i>CHONDESTES GRAMMACUS</i>	LARK SPARROW		BLUE
	<i>MELANERPES LEWIS</i>	LEWIS'S WOODPECKER	SC (NOV 2001)	BLUE
	<i>OREOSOPTES MONTANUS</i>	SAGE THRASHER	E (Nov 2000)	RED
	<i>PICOIDES ALBOLARVATUS</i>	WHITE-HEADED WOODPECKER	E (Nov 2000)	RED
	<i>AERONAUTES SAXATALIS</i>	WHITE-THROATED SWIFT		BLUE
	<i>SPHYRAPICUS THYROIDEUS</i> <i>THYROIDEUS</i>	WILLIAMSONS SAPSUCKER, THYROIDEUS SUBSPECIES		BLUE
	<i>ICTERIA VIRENS</i>	YELLOW-BREADED CHAT	E (Nov 2000)	RED
<b>BUTTERFLIES AND SKIPPERS</b>				
	<i>APODEMIA MORMO</i>	MORMON METALMARK		RED
<b>DRAGONFLIES AND DAMSELFLIES</b>				
	<i>ARGIA VIVIDA</i>	VIVID DANCER		RED
<b>FISH</b>				
	<i>CATOSTOMUS</i> <i>PLATYRHYNCHUS</i>	MOUNTAIN SUCKER	NAR (1991)	BLUE
	<i>COTTUS PUNCTULATUS</i>	ROCKY MOUNTAIN SCULPIN		BLUE
	<i>RHINICHTHYS UMATILLA</i>	UMATILLA DACE	SC (1988)	RED
<b>MAMMALS</b>				
	<i>TAXIDEA TAXUS</i>	AMERICAN BADGER	E (MAY 2000)	RED
	<i>OVIS CANADENSIS</i>	BIGHORN SHEEP		BLUE
	<i>URSUS ARCTOS HORRIBILIS</i>	GRIZZLY BEAR	SC (MAY 2002)	BLUE
	<i>SYLVILAGUS NUTTALLII</i>	NUTTALL'S COTTONTAIL	SC (1994)	BLUE
	<i>SOREX PREBLEI</i>	PREBLE'S SHREW		RED
	<i>EUDERMA MACULATUM</i>	SPOTTED BAT	SC (1988)	BLUE
	<i>CORYNORHINUS TOWNSENDII</i>	TOWNSEND'S BIG-EARED BAT		BLUE
	<i>REITHRODONTOMYS</i> <i>MEGALOTIS</i>	WESTERN HARVEST MOUSE	SC (1994)	BLUE
	<i>LASIURUS BLOSSEVILLII</i>	WESTERN RED BAT		RED
	<i>MYOTIS CILIOLABRUM</i>	WESTERN SMALL-FOOTED MYOTIS		BLUE
<b>REPTILES</b>				

	<i>PITUOPHIS MELANOLEUCUS</i>	GOPHER SNAKE	T (MAY 2002)	BLUE
	<i>HYP SIGLENA TORQUATA</i>	NIGHT SNAKE	E	RED
	<i>CHRYSEMYS PICTA</i>	PAINTED TURTLE		BLUE
	<i>COLUBER CONSTRICTOR MORMON</i>	RACER		BLUE
	<i>CHARINA BOTTAE</i>	RUBBER BOA	SC (MAY 2003)	YELLOW
	<i>PHRYNOSOMA DOUGLASI</i>	SHORT-HORNED LIZARD	XT (MAY 2000)	RED
	<i>CROTALUS VIRIDIS</i>	WESTERN RATTLESNAKE	T (2004)	BLUE
<b>VASCULAR PLANTS</b>				
	<i>RUMEX PAUCIFOLIUS</i>	ALPINE SORREL		BLUE
	<i>CAMISSONIA ANDINA</i>	ANDEAN EVENING-PRIMROSE		RED
	<i>CAREX EPAPILLOSA</i>	BLACKENED SEDGE		RED
	<i>VERBENA HASTATA VAR SCABRA</i>	BLUE VERVAIN		RED
	<i>LOMATIUM BRANDEGEEI</i>	BRANDEGEE'S LOMATIUM		RED
	<i>LOMATIUM BRANDEGEEI</i>	BRANDEGEE'S LOMATIUM		RED
	<i>PYRROCOMA CARTHAMOIDES VAR CARTHAMOIDES</i>	COLUMBIAN GOLDENWEED		BLUE
	<i>CHENOPODIUM ATROVIRENS</i>	DARK LAMB'S-QUARTERS		RED
	<i>POTENTILLA DIVERSIFOLIA VAR PERDISSECTA</i>	DIVERSE-LEAVED CINQUEFOIL		RED
	<i>CAREX XERANTICA</i>	DRY-LAND SEDGE		RED
	<i>GAYOPHYTUM HUMILE</i>	DWARF GROUNDSMOKE		RED
	<i>OROBANCHE CORYMBOSA SSP MUTABILIS</i>	FLAT-TOPPED BROOMRAPE		BLUE
	<i>CAREX VULPINOIDEA</i>	FOX SEDGE		BLUE
	<i>ASTRAGALUS LENTIGINOSUS</i>	FRECKLED MILK-VETCH		BLUE
	<i>SPOROBOLUS AIROIDES</i>	HAIRGRASS DROPSEED		BLUE
	<i>CAREX SCOPULORUM VAR BRACTEOSA</i>	HOLM'S ROCKY MOUNTAIN SEDGE		BLUE
	<i>ERIGERON LEIBERGII</i>	LEIBERG'S FLEABANE		RED
	<i>DELPHINIUM BICOLOR SSP BICOLOR</i>	MONTANA LARKSPUR		BLUE
	<i>BRICKELLIA OBLONGIFOLIA SSP OBLONGIFOLIA</i>	NARROW-LEAVED BRICKELLIA		RED
	<i>AGASTACHE URTICIFOLIA</i>	NETTLE-LEAVED GIANT-HYSSOP		RED
	<i>LINANTHUS SEPTENTRIONALIS</i>	NORTHERN LINANTHUS		BLUE
	<i>CRYPTANTHA AMBIGUA</i>	OBSCURE CRYPTANTHA		BLUE
	<i>AGOSERIS LACKSCHEWITZII</i>	PINK AGOSERIS		RED
	<i>MELICA SPECTABILIS</i>	PURPLE ONIONGRASS		RED
	<i>CAREX SAXIMONTANA</i>	ROCKY MOUNTAIN SEDGE		RED
	<i>PHLOX SPECIOSA SSP OCCIDENTALIS</i>	SHOWY PHLOX		BLUE
	<i>IPOMOPSIS MINUTIFLORA</i>	SMALL-FLOWERED IPOMOPSIS		BLUE
	<i>ERIOGONUM STRICTUM VAR PROLIFERUM</i>	STRICT BUCKWHEAT		BLUE
	<i>ASTRAGALUS SCLEROCARPUS</i>	THE DALLES MILK-VETCH		BLUE
	<i>THELYPODIUM LACINIATUM VAR LACINIATUM</i>	THICK-LEAVED THELYPODY		BLUE
	<i>SALIX TWEEDYI</i>	TWEEDY'S WILLOW		BLUE
	<i>BOTRYCHIUM PARADOXUM</i>	TWO-SPIKED MOONWORT		BLUE
	<i>CRYPTANTHA WATSONII</i>	WATSON'S CRYPTANTHA		RED
	<i>APOCYNUM X FLORIBUNDUM</i>	WESTERN DOGBANE		RED
	<i>LAPPULA OCCIDENTALIS VAR CUPULATA</i>	WESTERN STICKSEED		RED



	<i>HALIMOLOBOS WHITEDII</i>	WHITED'S HALIMOLOBOS	BLUE
<b>COMMUNITIES</b>			
	<i>ARTEMISIA TRIDENTATA / PSEUDOROEGNERIA SPICATA</i>	BIG SAGE / BLUEBUNCH WHEATGRASS	RED
	<i>ARTEMISIA TRIDENTATA / PSEUDOROEGNERIA SPICATA - BALSAMORHIZA SAGITTATA</i>	BIG SAGE / BLUEBUNCH WHEATGRASS - BALSAMROOT	RED
	<i>PINUS PONDEROSA - POPULUS BALSAMIFERA SSP. TRICHOCARPA / RHUS RADICANS</i>	PONDEROSA PINE - BLACK COTTONWOOD / POISON IVY	RED
	<i>PINUS PONDEROSA / RHUS GLABRA</i>	PONDEROSA PINE / SMOOTH SUMAC	RED

Committee on the Status of Endangered Wildlife in Canada (COSEWIC) ranks:  
E (Endangered); T (Threatened); SC (Special Concern); NAR (Not at Risk); DD (Data Deficient)

**note** – list includes all species mapped within 2 km of a native grassland polygon.

#### 4.2.5 Non-native Invasive Plants<sup>14</sup>

Non-native invasive plants are prevalent on grasslands throughout the Okanagan, Similkameen and Kettle Valleys. The higher elevations of the Ashnola drainage may contain the only sizeable areas of relatively weed-free grassland in the entire region.

Grasslands in the Okanagan have the highest diversity of noxious weeds and non-native plants in the province with a long history of presence. For example, hound's-tongue was found near Keremeos in 1922. Diffuse knapweed was collected as early as 1936 near Oyama but was known to exist in Okanogon County, Washington State before 1900. Diffuse knapweed has also had a long history of presence in the grasslands along the Kettle River. The diversity and abundance of noxious weeds and non-native plants in the Okanagan region supports the theory that areas with the longest histories of human occupation and the largest population densities tend to have the highest weed populations.

Diffuse knapweed, spotted knapweed, sulphur cinquefoil and hound's-tongue are invasive species of particular concern in the Okanagan region, but Dalmatian toadflax, common toadflax, leafy spurge and nodding thistle are also common. Diffuse knapweed, sulphur cinquefoil and Dalmatian toadflax are widespread on low elevation grasslands in the Bunchgrass and Ponderosa Pine zones. Hound's-tongue occupies moister habitats on high elevation grasslands and open forests in the Kettle Valley, Similkameen and north Okanagan. Rush skeletonweed is a relatively recent immigrant to British Columbia; its distribution on grasslands is presently limited to the Northern Okanagan Basin.

### 4.3 Thompson-Pavilion

#### 4.3.1 The Grassland Landscape<sup>15</sup>

The Thompson-Pavilion region contains approximately 140,000 ha of grassland distributed from

<sup>14</sup> with adaptations (with permission) from Wikeem, B. and S. Wikeem, 2004. Grasslands of British Columbia. Report prepared for the Grasslands Conservation Council of British Columbia. Kamloops, B.C.

<sup>15</sup> with adaptations (with permission) from Wikeem, B. and S. Wikeem, 2004. Grasslands of British Columbia. Report prepared for the Grasslands Conservation Council of British Columbia. Kamloops, B.C.

Chase east to Spences Bridge in the Thompson Basin and from Lytton north to Big Bar in the Pavilion Ranges (Figure 10). Over 70% of the region’s grasslands are found within the Thompson Basin where they are associated with the valley bottoms, valley slopes and benches along the Thompson River and its tributaries. Most of the remaining grasslands in this region are found in the Hat Creek Valley and along the Fraser River from Lillooet to Big Bar in the Pavilion Ranges Ecosection (Table 9).

Table 9. Thompson-Pavilion: Grassland Area by Ecosection and Biogeoclimatic Unit

Ecosection	Area of Grassland (ha)	% of total for region
Thompson Basin	98,340	70.8%
Pavilion Ranges	36,886	26.6%
Northern Thompson Upland	3,697	2.7%
TOTAL	138,922	100.0%



lower grasslands along the Thompson River Brian Wikeem



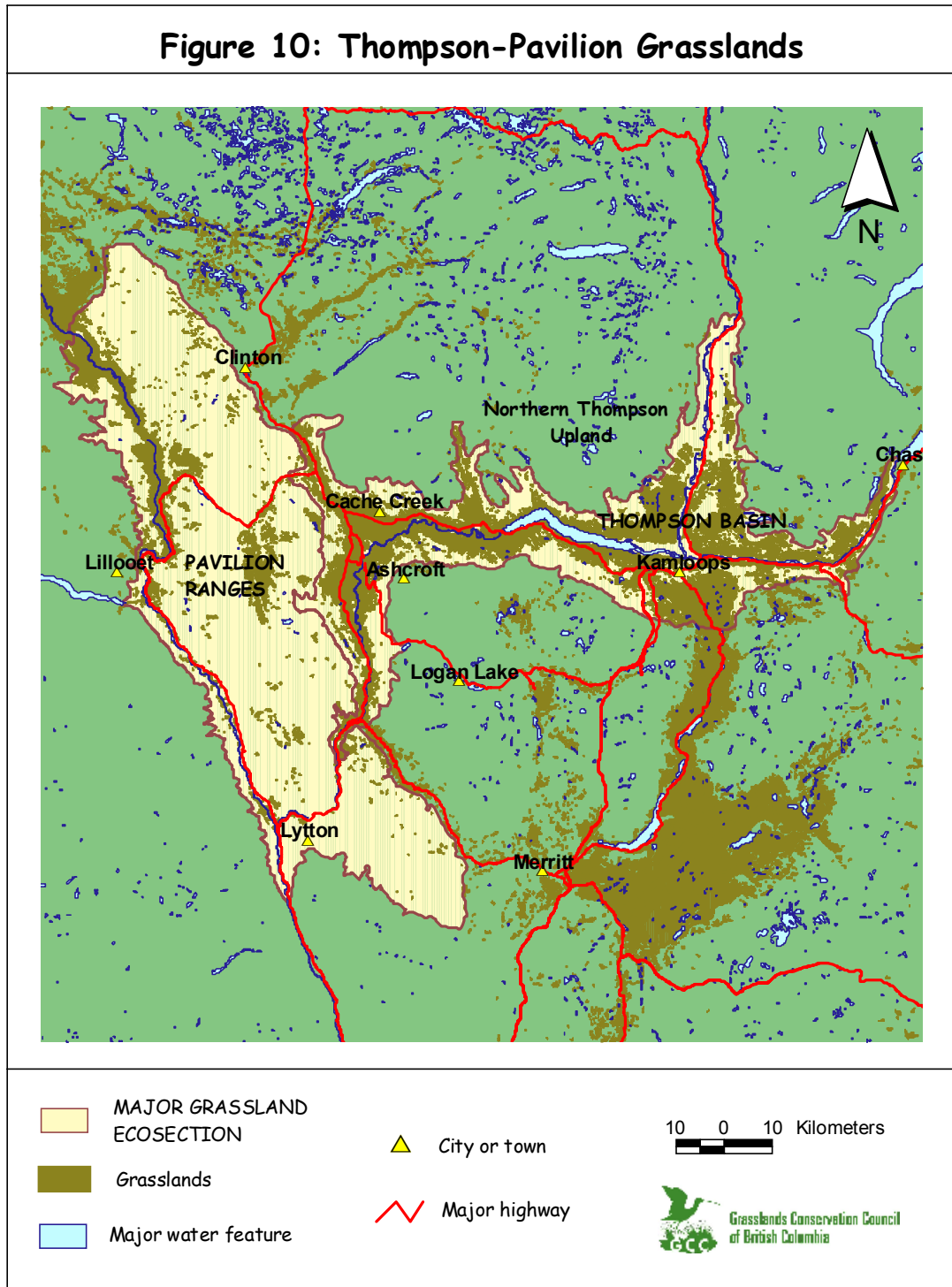
middle and upper grasslands in Lac du Bois B. Needham

Biogeoclimatic Unit	Area of Grassland (ha)	% of total for region
BG xh 2	45,564	32.8%
BG xh 3	3,477	2.5%
BG xw 1	29,593	21.3%
PP xh 2	19,605	14.1%
PP xh 2a	685	0.5%
IDF xh 1	78	0.1%
IDF xh1a	868	0.6%
IDF xh 2	13,933	10.0%
IDF xh 2a	10,205	7.3%
IDF xh 2b	137	0.1%
IDF xw	2,426	1.7%
IDF xm	1,324	1.0%
IDF dk 1	3,164	2.3%
IDF dk 1a	2,537	1.8%
IDF dk 2	375	0.3%
IDF dk 3	1,124	0.8%
IDF mw 1	751	0.5%
IDF mw 2	643	0.5%
IDF mw 2a	15	0.0%
IDF unk	13	0.0%
ICH mw 2	12	0.0%
MS xk	1,595	1.1%
MS dm 2	250	0.2%
SBPS mk	5	0.0%
ESSF xc	454	0.3%
ESSF xcp	53	0.0%
ESSF dc 2	30	0.0%
AT	4	0.0%
TOTAL	138,922	100.0%

The influence of elevation is pronounced throughout the Thompson Basin with a gradual transition from the very hot and dry lower grasslands to the relatively cooler and moister upper grasslands. Shrub-steppe communities dominated by big sagebrush and bluebunch wheatgrass occur at the lowest elevations in the BGxh2 Biogeoclimatic unit and are found alongside the Thompson River from Pritchard east to Spences Bridge. Fingers of lower grassland also extend up the tributaries of the Thompson at Tranquille River, Deadman River and Nicola River where



**Figure 10: Thompson-Pavilion Grasslands**



these drainages enter the main valley. At roughly 45,500 ha, lower grasslands account for nearly  $\frac{1}{3}$  of the region's total grasslands. At middle elevations above the Thompson River in the BGxw1 Biogeoclimatic unit, conditions become relatively cooler and moister, plants become more closely spaced, and bluebunch wheatgrass and junegrass co-dominate. Middle grasslands in the Thompson Basin most often occur above the lower grasslands and can be found in larger patches in the hills above Pritchard, around Knutsford and Cherry Creek, on the Lac du Bois range, on Elephant and Rattlesnake Hills, and on the Skeetchestn and Kamloops Indian Reserves. Above the middle grasslands, upper grassland communities dominated by rough fescue occur in the IDFxh2 and IDFdk1 Biogeoclimatic units. In the Thompson Basin, these 'meadow-steppe' grasslands are found in the Sullivan Valley, the Indian Gardens area, and in the upper elevations around the Kamloops Indian Reserve, Lac du Bois Grasslands Protected Area and Chase. On the southern margin of the Thompson Basin, meadow-steppe communities blend with the vast expanse of grassland on the Southern Thompson Upland where the topography becomes more moderately sloped and the terrain a gentle, rolling prairie.

Approximately 20,000 ha of ponderosa pine savannah occur in the Thompson Basin and Pavilion Ranges Ecosections in bands above the Thompson River, Fraser River, Deadman River, Bonaparte River, Nicola River and Hat Creek. These open grassland communities occur in the PPxh2 Biogeoclimatic unit and are dominated by bluebunch wheatgrass and rough fescue with a sparse overstory of ponderosa pine.

Grasslands in the Pavilion Ranges Ecosection occur mostly along the Fraser River from Lytton to Big Bar, although a large, contiguous area of upper grassland can be found in the Hat Creek Valley. Lower grasslands extend from the confluence of Fountain Creek and the Fraser River to Big Bar, with ponderosa pine savannah occurring in a band above them. In addition to the Hat Creek Valley, larger areas of upper grassland in the Pavilion Ranges occur along Pavilion Creek, Watson Bar Creek, and south of Spences Bridge in the Soap Lake area.

High elevation grasslands in the Montane Spruce and Englemann Spruce-Subalpine Fir zones account for a small but significant portion of the region's grasslands. Nearly 2,400 ha are distributed mainly in the Pavilion Ranges Ecosection, with sizeable areas occurring in the Marble Range, Cornwall Hills, and east of the Fraser River from Edge Hills to Skwaha Lake on upper elevation, south facing slopes.

Grasslands in the Thompson-Pavilion occur in association with numerous habitat types including cliffs, talus slopes, rocky outcrops, aspen copses, cottonwood stands, riparian areas, wetlands and ponds (Table 10). The physical and topographic diversity of the region's landscape is reflected in the many ecosystems and habitats that together comprise the grassland environment.

Table 10. Thompson-Pavilion: Selected Grassland Associated Habitats by Biogeoclimatic Unit

	aspen copses (ha)	cottonwood stands (ha)	cliffs, clay banks and rocky terrain (ha)	meadows, riparian brush and wetlands (ha)	ponds < 3 ha (number)	ponds < 1/2 ha (number)
BG xh 2	141	429	2,161	201	24	17
BG xw 1	445	138	488	164	169	96
PP xh 2	385	260	7,102	139	77	45
IDF xh 2	1,329	63	6,282	167	84	50
IDF xh 2a	370	47	21	107	116	86
IDF xw	217	0	588	18	13	10
IDF dk 1	688	0	3,875	94	27	23
IDF dk 1a	351	0	0	21	27	24
MS xk	55	0	544	53	2	1

### 4.3.2 Land Status and Range Tenure

In the Thompson Basin<sup>16</sup> and Pavilion Ranges, 47.5% and 63.4% of the grasslands are on crown land, respectively (Table 11 and Figure 11). Of the 48,500 ha of crown grassland in the Thompson Basin, 86.3% are under a grazing tenure, with grazing leases making up a significant portion of this (Table 12 and Figure 12). In fact, over 50% of the province’s grasslands that occur on grazing leases are found in the Thompson Basin. Roughly 17,880 ha of grassland are distributed on leases throughout the Basin, with some tenures covering sizeable grassland areas. For example, the Indian Gardens leases covers over 7,500 ha of grassland mainly on the south side of the Thompson River from Six Mile Ranch to Barnes Creek. In the Pavilion Ranges, 94% of the crown grasslands are under a grazing tenure, with grazing licenses making up the bulk of these.

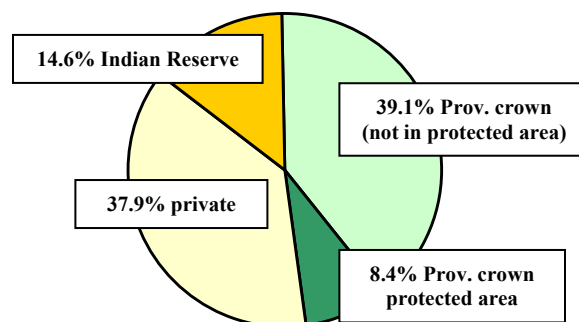
Table 11. Thompson-Pavilion: Land Status of Grasslands

	Thompson Basin		Pavilion Ranges	
	grassland (ha)	% of ecosec total	grassland (ha)	% of ecosec total
Provincial crown (not in protected area)	39,900	39.1%	20,801	56.4%
Provincial crown protected area	8,571	8.4%	2,600	7.0%
private	38,641	37.9%	8,255	22.4%
private acquired land *	0	0.0%	50	0.1%
Indian Reserve (IR) (federal)	14,909	14.6%	5,180	14.0%
other federal lands ** (not IR)	15	0.0%	0	0.0%
TOTAL	102,036	100.0%	36,886	100.0%

\* includes Reynolds Ranch grazing lease held by TLC

\*\* includes Dominion Government Blocks, Military Reserves and National Parks

Figure 11 – Thompson-Pavilion: Land Status of Thompson Basin Grasslands



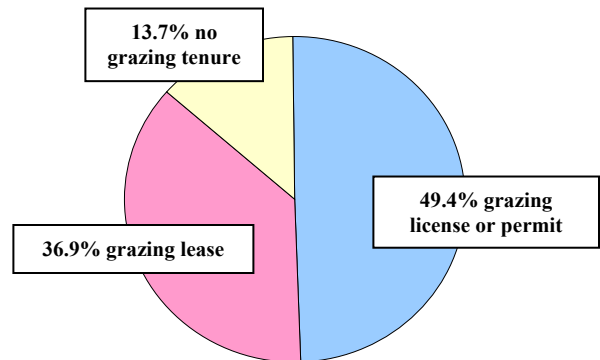
<sup>16</sup> for the purposes of sections 4.3.2, 4.3.3, 4.3.4 and 4.3.5, grasslands in the “Thompson Basin” refer to those areas in the Thompson Basin and Northern Thompson Upland Ecosections.

Table 12. Thompson-Pavilion: Range Tenure on Provincial Crown Grasslands

	Thompson Basin		Pavilion Ranges	
	grassland (ha)	% of total crown	grassland (ha)	% of total crown
grazing license or permit	23,957	49.4%	19,616	83.8%
grazing lease *	17,881	36.9%	2,360	10.1%
no grazing tenure	6,633	13.7%	1,425	6.1%
TOTAL	48,471	100.0%	23,401	100.0%

\* does not include Reynolds Ranch grazing lease held by TLC

Figure 12 – Thompson-Pavilion: Range Tenure on Provincial Crown Grasslands in the Thompson Basin



Approximately 8,060 ha of grassland in the Thompson Basin and Pavilion Ranges have no grazing tenure. A significant portion of these occur within protected areas such as Skwaha Lake Ecological Reserve, Soap Lake Ecological Reserve, Tranquille Ecological Reserve, Elephant Hill Provincial Park and Juniper Beach Provincial Park. Parks within the municipality of Kamloops such as Peterson Creek and Kenna Cartwright are also untenured. The remaining untenured areas occur mostly in the Thompson Basin and are small, fragmented patches situated within the matrix of private lands, Indian Reserves and grazing leases<sup>17</sup>. A 1000 ha, nearly contiguous patch of untenured crown grassland occurs on the north side of Kamloops Lake from Doherty Creek to Painted Bluffs Provincial Park, interrupted by only a few parcels of private land. In this area, there are examples of lower grassland and ponderosa pine communities in pristine condition (B. Wikeem, pers. comm. 2004).

Approximately 8.4% and 7.0% of the grasslands are in parks or protected areas in the Thompson Basin and Pavilion Ranges, respectively. Larger grassland areas are protected in Lac du Bois Grasslands, Edge Hills and Elephant Hill, while the remaining parks in the region protect less than 300 ha of grassland each (Appendix 3). Although the Kamloops LRMP set aside relatively sizeable areas of middle grassland in Lac du Bois and Elephant Hill, the region still lacks a good, representative example of the BGxh2 lower grasslands (Appendix 5). The upper grasslands in the IDFxh2 Biogeoclimatic unit are also severely underrepresented. There are 24,275 ha of IDFxh2 upper grassland in the Thompson-Pavilion, with 10,320 ha on crown land, and a mere 643 ha scattered amongst 8 parks in the region.

Privately owned grasslands account for 37.9% and 22.4% of the total grassland area in the Thompson Basin and Pavilion Ranges, respectively (Table 11). In the Thompson Basin, large private land blocks occur in the Cache Creek Hills, south of Cornwall Creek, along Cherry Creek, around Pritchard, and north of the Kamloops Indian Reserve to Heffley Creek. In the upper grasslands south of Kamloops from Knutsford to Shumway Lake, the overwhelming majority of lands are privately held. Only a few crown parcels remain in this area, with most

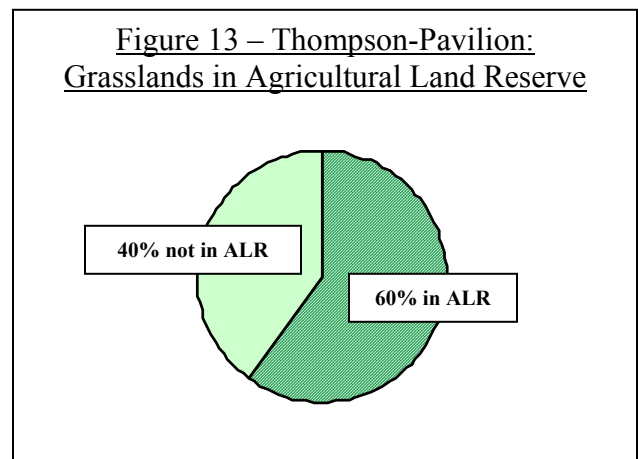
<sup>17</sup> ownership data sources somewhat out of date; some of these untenured crown parcels may now be private lands.

under grazing leases that may be subject to sell-off. In the Pavilion Ranges, larger blocks of privately owned grassland can be found in the Hat Creek Valley and along the Fraser River at Pavilion Creek, Butcher Creek, and from Watson Bar to Big Bar Creek. Just northwest of Pavilion Lake along Gillon Creek is the largest contiguous patch of privately owned native grassland in the Pavilion Ranges. This upper grassland landscape is roughly 1,800 ha in size and is dotted with aspen copses, coniferous forest patches, riparian areas and small wetlands.

At the northern tip of the Pavilion Ranges Ecosection along Ward Creek, The Land Conservancy (TLC) has acquired 50 ha of upper grassland; roughly 35 ha are privately owned while 15 ha are under lease by TLC. These properties are part of the larger Talking Mountain Ranch, or Reynolds Ranch, which includes both private holdings and 30,350 ha of crown range tenure on the west side of the Fraser River south of Churn Creek Protected Area. Talking Mountain Ranch properties and tenures straddle the Thompson-Pavilion and Cariboo-Chilcotin regions.

Grasslands within Indian Reserves account for 14.6% and 14.0% of the total grasslands in the Thompson Basin and Pavilion Ranges, respectively. In the Thompson Basin, large areas of grassland held by First Nations occur northeast of the city of Kamloops (Kamloops Band), up the Deadman River from its confluence with the Thompson River to Criss Creek (Skeetchestn Band), and west of Ashcroft at the 105 Mile Post (Ashcroft Band). Smaller areas of grassland are also held by the Bonaparte, Neskonlith and Oregon Jack Creek Bands. In the Pavilion Ranges, larger grassland areas held by First Nations occur at High Bar (High Bar Band), Leon and Pavilion Creek (Ts'ky'aylaxw Band), and Fountain Valley (Xaxlip Band). South of the Lillooet area along the Fraser River to Lytton, there are numerous small Indian Reserves, some of which overlap with grassland.

Roughly 60% of the grasslands in the Thompson-Pavilion region are in the Agricultural Land Reserve (Figure 13). The ALR overlaps with benches and flatter grassland areas above the Thompson River from Chase to Spences Bridge, and above the Fraser River from Pavilion to Big Bar. In the Hat Creek Valley, nearly all of the grasslands are in the ALR. Grasslands outside the ALR are generally in areas of rugged or steep terrain or occur within municipalities. Within the boundaries of the City of Kamloops, less than half of the 12,650 ha of native grassland remaining are in the ALR. Without this designation to restrict building and development, the citizens of Kamloops will continue to have less and less grassland to enjoy. For those grasslands in the ALR in the region as a whole, agricultural development is ever-present threat.

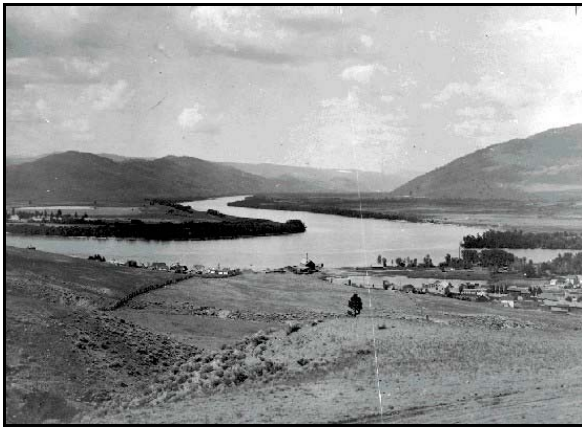


The Thompson-Pavilion, unlike the Okanagan region, still has some large areas of relatively flat, valley bottom grassland on crown and private land that have not been converted for intensive agricultural use.

### 4.3.3 Historical Extent

The historical extent of grasslands in the Thompson-Pavilion region is discussed in terms of areas lost to forest encroachment, agricultural conversion and urban development. All of these factors have decreased the extent of grassland over time<sup>18</sup>.

Approximately 11.8% and 6.7% of the grasslands have been lost to agricultural conversion in the Thompson Basin and Pavilion Ranges, respectively (Figure 14). This amounts to a total loss of nearly 17,500 ha across the region. For the most part, converted lands include irrigated hayfields, pastures and ginseng farms located in valley bottoms and on upland benches. Range seedings are also a factor; in the Ashcroft area alone, close to 1,500 ha of grassland have been seeded to crested wheatgrass. Sixty percent of the region's grasslands are in the ALR with many areas capable of supporting some type of intensive agriculture. Given a good market for agricultural products, flat grassland benches above the Thompson and Fraser Rivers with a suitable water supply and access to roads may be converted. Although orchards and vineyards may not currently be an urgent threat in this region, they well could be in the future with less and less room for production in the Okanagan.



Kamloops in 1892

BC Archives (F-02630)



Kamloops in 2003

Ryan Holmes

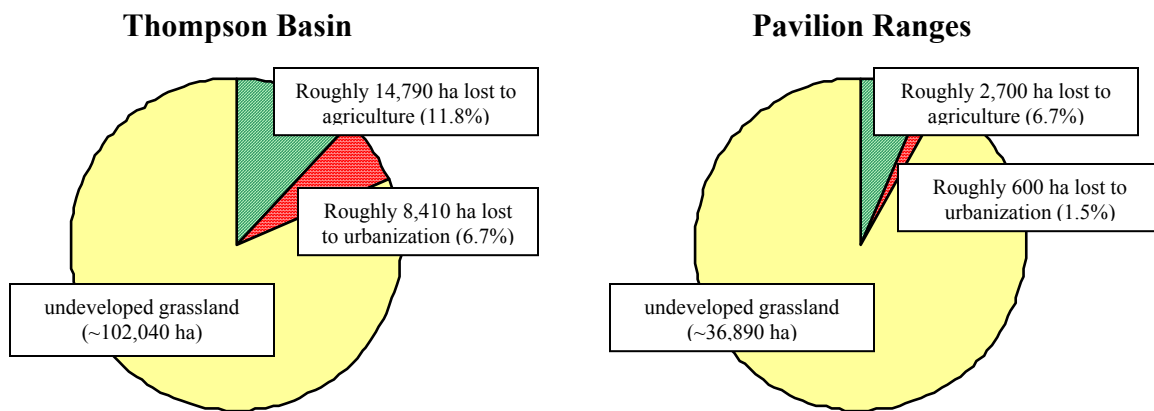
Over 9,000 ha of native grassland have been lost to urban and industrial development in the Thompson-Pavilion region, with nearly 75% of this loss occurring within the municipal boundaries of the City of Kamloops (Appendix 2). Development within and around smaller towns such as Lillooet, Ashcroft, Cache Creek and Savona makes up most of the remainder, with the smallest portion lost to gravel pits and mines in the region. Loss of grassland to roads and railways has not been quantified in this region, yet it is likely significant.

In addition to those areas already lost, there are still more plans to subdivide and develop grasslands for hobby farms, recreational lots and golf courses. With lots selling at Cherry Creek, Walhachin and Ashcroft and plans for a large scale development at Six Mile Ranch, grasslands in the region are facing increasing pressure.

<sup>18</sup> *Changes in the Grassland-Forest Interface* has been developed to document and describe forest encroachment and ingrowth in the Thompson-Nicola region. Please refer to this report for a more in-depth review.



Figure 14 – Thompson-Pavilion: Grasslands Lost to Agriculture and Urbanization



#### 4.3.4 Species at Risk

The grasslands and associated habitats of the Thompson-Pavilion are home to a number of threatened and endangered species including several species unique to the region. Other plants and animals reach their northern distribution here<sup>19</sup>. As the Thompson-Pavilion has not been inventoried as intensively as the Okanagan, many rare and endangered species in this region may have not yet been found.

An analysis determined which species have been mapped on grassland or immediately adjacent habitats in the Thompson-Pavilion region (Table 13). Many animal species use a variety of habitats within the grassland environment to complete their life cycle.

Table 13. Thompson-Pavilion: Species at Risk Mapped on Grassland and Associated Habitats

	Scientific Name	Common Name	COSEWIC Status	CDC Status
<b>AMPHIBIANS</b>				
	<i>SPEA INTERMONTANA</i>	GREAT BASIN SPADEFOOT	T (NOV 2001)	BLUE
<b>BIRDS</b>				
	<i>DOLICHONYX ORYZIVORUS</i>	BOBOLINK		BLUE
	<i>ATHENE CUNICULARIA</i>	BURROWING OWL	E (May 2000)	RED
	<i>OTUS FLAMMEOLUS</i>	FLAMMULATED OWL	SC (NOV 2001)	BLUE
	<i>MELANERPES LEWIS</i>	LEWIS'S WOODPECKER	SC (NOV 2001)	BLUE
	<i>NUMENIUS AMERICANUS</i>	LONG-BILLED CURLEW	SC (1992)	BLUE
	<i>GRUS CANADENSIS</i>	SANDHILL CRANE	NAR (1979) G. canadensis tabida assessed	BLUE
	<i>TYMPANUCHUS PHASIENELLUS COLUMBIANUS</i>	SHARP-TAILED GROUSE, COLUMBIANUS SUBSPECIES		BLUE
	<i>STRIX OCCIDENTALIS</i>	SPOTTED OWL	E	RED
	<i>AERONAUTES SAXATALIS</i>	WHITE-THROATED SWIFT		BLUE
	<i>SPHYRAPICUS THYROIDEUS THYROIDEUS</i>	WILLIAMSONS SAPSUCKER, THYROIDEUS SUBSPECIES		BLUE
<b>FISH</b>				

<sup>19</sup> For more information on grassland associated species and their habitats in this region, refer to *The Grasslands of British Columbia*.

	CATOSTOMUS PLATYRHYNCHUS	MOUNTAIN SUCKER	NAR (1991)	BLUE
<b>MAMMALS</b>				
	TAXIDEA TAXUS	AMERICAN BADGER	E (MAY 2000)	RED
	URSUS ARCTOS HORRIBILIS	GRIZZLY BEAR	SC (MAY 2002)	BLUE
	EUDERMA MACULATUM	SPOTTED BAT	SC (1988)	BLUE
	MYOTIS CILIOLABRUM	WESTERN SMALL-FOOTED MYOTIS		BLUE
<b>REPTILES</b>				
	PITUOPHIS CATENIFER	GOPHER SNAKE	T (MAY 2002)	BLUE
	COLUBER CONSTRICTOR	RACER		BLUE
	MORMON			
	CROTALUS VIRIDIS	WESTERN RATTLESNAKE		BLUE
<b>VASCULAR PLANTS</b>				
	GAYOPHYTUM HUMILE	DWARF GROUNDSMOKE		BLUE
	ASTRAGALUS LENTIGINOSUS	FRECKLED MILK-VETCH		RED
	ALLIUM GEYERI VAR TENERUM	GEYER'S ONION		RED
	EPIPACTIS GIGANTEA	GIANT HELLEBORINE	SC (1998)	BLUE
	HUTCHINSIA PROCUMBENS	HUTCHINSIA		RED
	CREPIS MODOCENSIS SSP MODOCENSIS	LOW HAWKSBEARD		RED
	CAREX SYCHNOCEPHALA	MANY-HEADED SEDGE		BLUE
	HEDEOMA HISPIDA	MOCK-PENNYROYAL		RED
	POA FENDLERIANA SSP FENDLERIANA	MUTTON GRASS		RED
	NAVARRETIA INTERTEXTA	NEEDLE-LEAVED NAVARRETIA		RED
	TALINUM SEDIFORME	OKANOGAN FAMEFLOWER	NAR (1990)	BLUE
	SIDALCEA OREGANA VAR PROCERA	OREGON CHECKER-MALLOW		RED
	CAREX HYSTRICINA	PORCUPINE SEDGE		BLUE
	IVA AXILLARIS SSP ROBUSTIOR	POVERTY-WEED		RED
	EPILOBIUM CILIATUM SSP WATSONII	PURPLE-LEAVED WILLOWHERB		BLUE
	SPOROBOLUS COMPOSITUS VAR COMPOSITUS	ROUGH DROPSEED		RED
	MUHLENBERGIA RACEMOSA	SATIN GRASS		RED
	GAURA COCCINEA	SCARLET GAURA		RED
	SPHAERALCEA COCCINEA	SCARLET GLOBE-MALLOW		RED
	ATRIPLEX ARGENTEA SSP ARGENTEA	SILVERY ORACHE		RED
	CREPIS ATRIBARBA SSP ATRIBARBA	SLENDER HAWKSBEARD		RED
	IPOMOPSIS MINUTIFLORA	SMALL-FLOWERED IPOMOPSIS		RED
	BIDENS VULGATA	TALL BEGGARTICKS		RED
	ASTRAGALUS FILIPES	THREADSTALK MILK-VETCH		BLUE
	CHAMAESYCE SERPYLLIFOLIA SSP SERPYLLIFOLIA	THYME-LEAVED SPURGE		BLUE
	ROOTALA RAMOSIOR	TOOTHCUP MEADOW-FOAM	E (May 2000)	RED
	SALIX TWEEDYI	TWEEDY'S WILLOW		BLUE
	POLEMONIUM OCCIDENTALE SSP OCCIDENTALE	WESTERN JACOB'S-LADDER		BLUE
	CREPIS MODOCENSIS SSP ROSTRATA	WESTERN LOW HAWKSBEARD		RED
	DRABA VENTOSA	WIND RIVER DRABA		BLUE
	ARABIS LIGNIFERA	WOODY-BRANCHED ROCKCRESS		BLUE
<b>COMMUNITIES</b>				
	ARTEMISIA TRIDENTATA / PSEUDOROEGNERIA SPICATA	BIG SAGE / BLUEBUNCH WHEATGRASS		RED

FESTUCA CAMPESTRIS - PSEUDOROEGNERIA SPICATA	ROUGH FESCUE - BLUEBUNCH WHEATGRASS	RED
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Committee on Status of Endangered Wildlife in Canada (COSEWIC) ranks:  
E (Endangered); T (Threatened); SC (Special Concern); NAR (Not at Risk); DD (Data Deficient)

**note** – list includes all species mapped within 2 km of a native grassland polygon.

#### 4.3.5 Non-native Invasive Plants<sup>20</sup>

Diffuse knapweed, spotted knapweed and Dalmatian toadflax are the most prevalent non-native invasive plants on grasslands throughout the Thompson-Pavilion region. Diffuse knapweed and Dalmatian toadflax thrive in low- to mid-elevation grasslands, while large infestations of spotted knapweed are found mostly in the upper grasslands, savannah and forest openings in the Ponderosa Pine, Interior Douglas-fir and Montane Spruce zones. All three of these species can be found in grasslands from the driest to wettest conditions.

Diffuse knapweed has formed dense, persistent stands on lower and middle grasslands throughout the region, with sizeable infestations around Pritchard, Kamloops, Cache Creek, Ashcroft, Lillooet, and along the Deadman River north of Savona. Dalmatian toadflax occupies similar habitats and is widely distributed through the Thompson and Fraser River Valleys. Spotted knapweed normally occupies relatively moist grasslands in the Interior Douglas-fir zone, but large infestations have been found from Walhachin to Ashcroft in some of the driest grasslands in the province.

Other prevalent non-native invasive plants in the Thompson-Pavilion grasslands include Russian knapweed, hound's-tongue, sulphur cinquefoil and leafy spurge. Russian knapweed, a close ally of diffuse and spotted knapweed, was historically common in cultivated fields, orchards, pastures, riparian areas, and along roadsides. More recently, this species appears to be moving into moister environments in the middle and upper grasslands. Hound's-tongue is also found in abundance in the middle and upper grasslands of the region, with concentrations on the Duck Range south of Monte Creek, along Paul Creek, at Buse Lakes, upper Lac du Bois, and in the hills above McLure on the northernmost grasslands of the North Thompson Valley. North of Pavilion on the west side of the Fraser River, hound's-tongue occupies several grasslands associated with moist draws and creeks. Sulphur cinquefoil has been identified on middle and upper grasslands along the North Thompson River from Rayleigh to McLure. Other sizeable populations of this species occur in the grasslands along Paul Creek and from Monte Creek to Chase on the north side of the South Thompson River. Leafy spurge is well adapted to a range of conditions and can form dense stands on the driest to wettest grasslands. Populations of this non-native invasive plant occur along the Thompson Valley but the highest concentrations occupy grassland and ponderosa pine savannah east of Kamloops on both sides of the South Thompson River.

<sup>20</sup> with adaptations (with permission) from Wikeem, B. and S. Wikeem, 2004. Grasslands of British Columbia. Report prepared for the Grasslands Conservation Council of British Columbia. Kamloops, B.C.

## 4.4 Southern Thompson Upland

### 4.4.1 The Grassland Landscape<sup>21</sup>

The Southern Thompson Upland contains roughly 132,620 ha of grassland distributed across a rolling landscape defined by the Coast Mountains to the west and the Thompson Valley to the north (Figure 15). The Similkameen Valley, and the height of land between the Okanagan and Nicola Valley systems, delimits the southern and eastern edges of the region, respectively.

Roughly 67% of the region's grasslands are found in the Bunchgrass (BGxw1 unit) and Interior Douglas-fir zones (IDFhx2a and IDFdk1a units) of the Nicola Valley and Douglas Plateau (Table 14). Taken together, these grasslands comprise a large, contiguous area of rolling prairie that extends east of Merritt to the headwaters of the Nicola River and south from Stump Lake to Aspen Grove. North of Stump Lake, a corridor of grassland winds its way through the valley to the Thompson Basin. At the lowest elevations in the Nicola Valley, the vegetation is similar to the middle grasslands of the Thompson Basin with widely spaced bluebunch wheatgrass mixed with a variety of forbs and occasional rabbit-brush. With increasing elevation above the valley floor in slightly cooler and moister conditions, bluebunch wheatgrass is slowly replaced by rough fescue as the climax dominant of the upper grasslands.

Table 14. Southern Thompson Upland: Grassland Area by Biogeoclimatic Unit

Biogeoclimatic Unit	Area of Grassland (ha)	% of total for region
BG xh 2	1,103	0.8%
BG xw 1	27,651	20.8%
PP xh 2	4,230	3.2%
IDF xh 1	4,297	3.2%
IDF xh 1a	3,708	2.8%
IDF xh 1b	83	0.1%
IDF xh 2	6,385	4.8%
IDF xh 2a	33,131	25.0%
IDF dk 1	20,079	15.1%
IDF dk 1a	28,051	21.2%
IDF dk 2	1,679	1.3%
IDF mw 1	257	0.2%
ICH mk 2	51	0.0%
MS xk	1,064	0.8%
MS dm 2	366	0.3%
ESSF xc	295	0.2%
ESSF dc 2	191	0.1%
TOTAL	132,621	100.0%



Hamilton Commonage grasslands

Dennis Lloyd

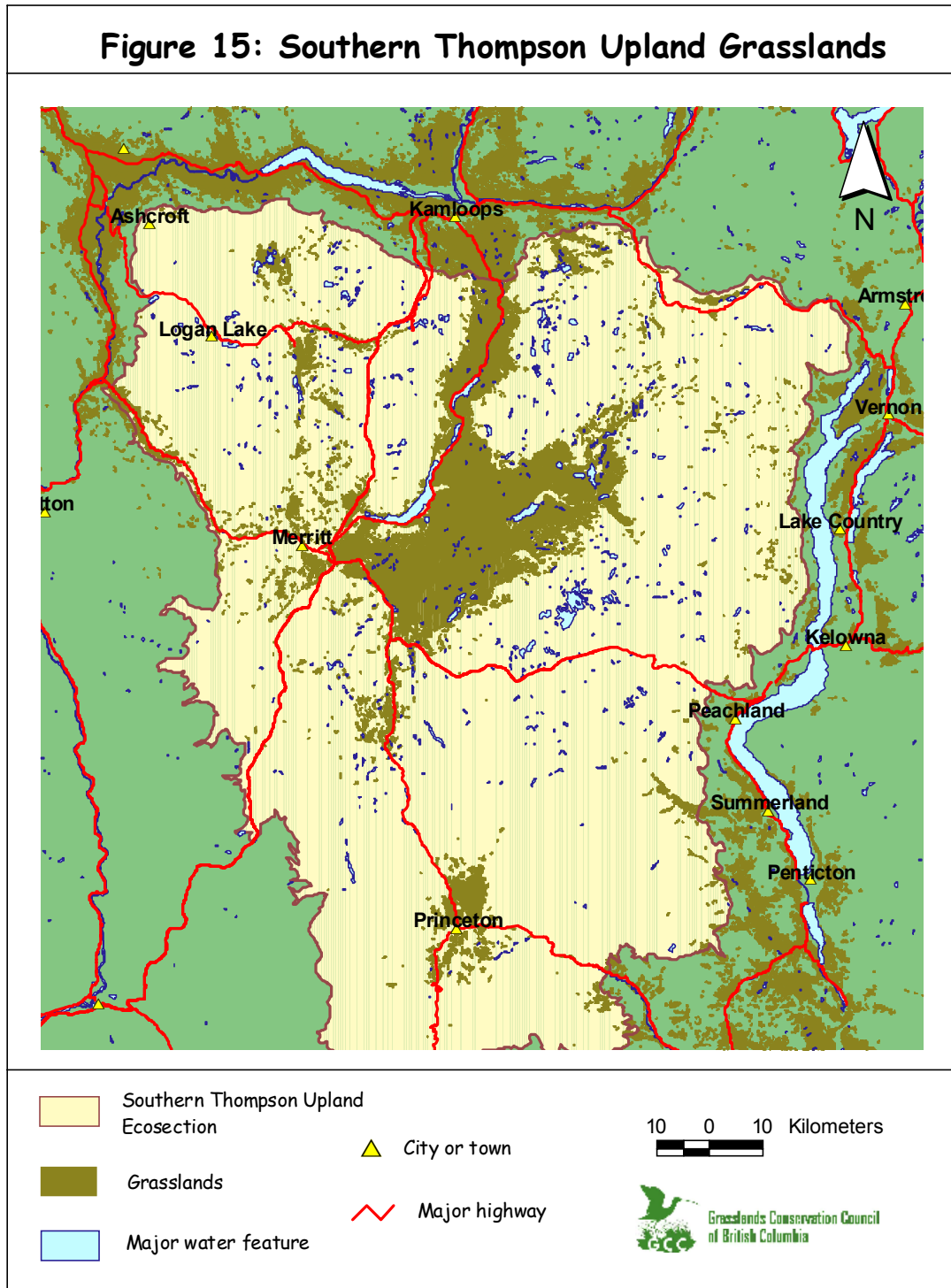


Hamilton Commonage grasslands

Bruno Delesalle

<sup>21</sup> with adaptations (with permission) from Wikeem, B. and S. Wikeem, 2004. Grasslands of British Columbia. Report prepared for the Grasslands Conservation Council of British Columbia. Kamloops, B.C.

**Figure 15: Southern Thompson Upland Grasslands**



Outside the main grassland region in upper elevations, steppe vegetation can be found in small pockets. These pockets of upper grassland occur throughout the Southern Thompson Upland, with sizeable patches at Tunkwa Lake and in the Mamit Valley. Along the steep valley walls of the Nicola River near its confluence with the Thompson River, lower grasslands dominated by big sagebrush and bluebunch wheatgrass occur in association with ponderosa pine savannah.

The Princeton Basin forms the southern limit of extensive grasslands on the Southern Thompson Upland. Topography here is much more variable, with an often abrupt transition from grassland to forest. Grasslands in the Princeton Basin are generally middle and upper grassland communities that are transitional between the Okanagan Valley and those higher on the plateau above the Nicola Valley. Rough fescue is the usual climax dominant, but bluebunch wheatgrass often occupies dry, south facing slopes. Idaho fescue, an infrequent species in the Nicola Valley, is commonly found on grasslands in the Princeton Basin.

Grasslands on the Southern Thompson Upland occur in association with a number of ecosystems. Aspen copses, riparian areas, wetlands and ponds dot the landscape of the Nicola Valley and Douglas Plateau (BGxw, IDFxh2 and IDFdk1 units), while rocky terrain and cottonwood stands occur in association with grasslands along the lower Nicola River (BGxh and PPxh units) and the Similkameen River (IDFxh1 unit) (Table 15).

**Table 15. Southern Thompson Upland:  
Selected Grassland Associated Habitats by Biogeoclimatic Unit**

	aspen copses (ha)	cottonwood stands (ha)	cliffs, clay banks and rocky terrain (ha)	meadows, riparian brush and wetlands (ha)	ponds < 3 ha (number)	ponds < 1/2 ha (number)
BG xh 2	0	33	112	0	0	0
BG xw 1	326	582	195	459	66	50
PP xh 2	135	330	697	12	18	17
IDF xh 1	254	18	1,280	99	15	13
IDF xh 1a	72	4	1	0	24	16
IDF xh 2	886	73	855	286	60	36
IDF xh 2a	1,172	125	56	562	205	143
IDF dk 1	3,694	51	1,953	2,792	138	76
IDF dk 1a	989	22	14	290	265	164
IDF dk 2	450	58	2,121	100	1	0
MS xk	82	0	17	122	3	3

#### 4.4.2 Land Status and Range Tenure

Only 21.2% (28,206 ha) of the grasslands in the Southern Thompson Upland are on provincial crown land (Figure 16). The Lundbolm and Hamilton Commonages east of Merritt contain 8,330 ha of grassland and account for 30% of the total crown grassland for the region. Besides these two commonages, only a few larger patches of crown grassland are left across the region. Examples of these remaining patches include the grasslands at Tunkwa Lake, August Lake, along the lower Nicola River, and along Trout Creek as it enters the Okanagan Valley near Summerland.



Approximately 93.3% of the region’s crown grasslands are under a grazing tenure, with grazing licenses making up the bulk of these (Figure 17). Grazing leases cover 2,405 ha of grassland and are generally situated adjacent to private lands. In the Mamit Valley and Stump Lake areas, grazing leases represent some of the last parcels of crown grassland. Leases in these and other areas may be subject to sell-off by the provincial government.

Figure 16: Southern Thompson Upland:  
Land Status of Grasslands

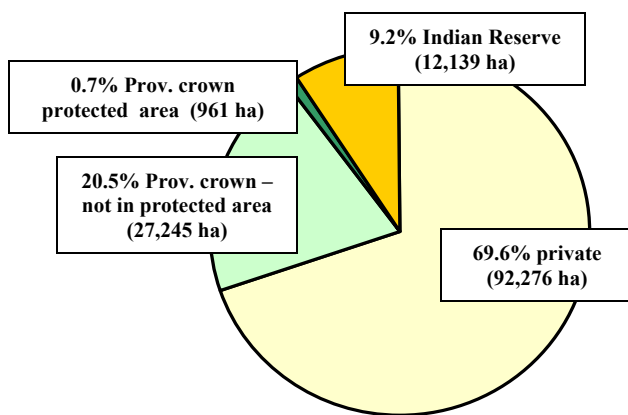
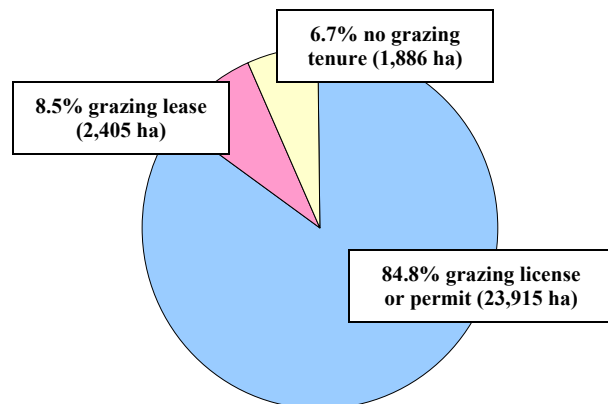


Figure 17: Southern Thompson Upland:  
Range Tenure on Provincial Crown Grasslands



There are roughly 1,890 ha of crown grassland in the Southern Thompson Upland without an active grazing tenure. These untenured grasslands are small, fragmented areas adjacent to private lands and Indian Reserves<sup>22</sup>. Unlike other regions in the southern interior, there are no ecological reserves or protected areas containing large patches of untenured grassland.

Only 961 ha (0.7%) of grassland in the Southern Thompson Upland are within provincial parks and protected areas. Tunkwa Provincial Park contains 815 ha of grassland and accounts for nearly 85% of the total. The remaining 15% is scattered across eight parks in the region, with five of these protecting less than 10 ha of grassland (Appendix 3). Unlike the Kamloops, Lillooet and Okanagan-Shuswap regions, the Merritt region has not undergone a formal Land and Resource Management Plan (LRMP), and a larger grassland protected area has not been designated here<sup>23</sup>. Of the 59,186 ha of IDFxh2a and IDFdk1a upper grassland in the Nicola Valley and Douglas Plateau, none are within crown parks or protected areas. However, the crown has little opportunity here with over 85% of the grasslands on private land or Indian Reserve.

Nearly 70% of the grasslands in the Southern Thompson Upland are on private land, the highest percentage out of all grassland regions in the province. Some areas, such as the Princeton Basin and Mamit Valley, are almost entirely private. North of Nicola Lake, privately owned grasslands are broken up by only a few, small grazing leases. East of Nicola Lake, Douglas Lake ranch is

<sup>22</sup> ownership data sources somewhat out of date; some of these untenured crown parcels may now be private lands.

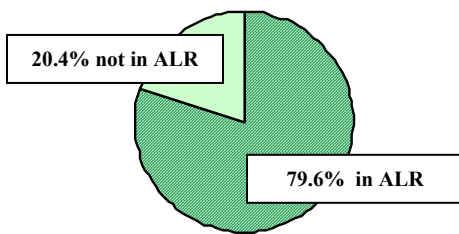
<sup>23</sup> Tunkwa Provincial Park was designated in 1996 as a result of the Kamloops LRMP.

the largest block of privately owned grassland in the province. In fact, with over 20,000 head of cattle running on over 200,000 ha of grassland, Douglas Lake ranch is the largest working cattle ranch in Canada.

The Southern Thompson Upland has 12,139 ha of grassland within Indian Reserves. The Upper Nicola Band holds over 67% of this area on the Nicola Lake, Douglas Lake, Chapperon Lake, Salmon Lake and Spahomin Creek Reserves. The Lower Nicola Band also holds a significant amount of grassland to the west on the Hamilton Creek and Nicola Mameet Reserves. Smaller grasslands on First Nations land are distributed throughout the region and are held by either the Cook’s Ferry, Shackan, Nooaitch, Coldwater or Upper Similkameen Bands.

Nearly 80% of the Southern Thompson Upland’s grasslands are in the Agricultural Land Reserve (ALR) (Figure 18). Grasslands outside the ALR are generally in areas of steep and rocky terrain or surrounding communities such as Merritt. Although most of the region’s grasslands are in the

Figure 18 – Southern Thompson Upland: Grasslands in Agricultural Land Reserve



ALR, grasslands continue to be taken out of the Reserve for subdivision and development. Stump Lake Ranch is one such example. Once a large, contiguous piece of grassland within the ALR, Stump Lake has now been subdivided and is undergoing the development of waterfront properties. This trend is likely to continue as land values increase, working ranches are sold off, and the urban population reaches retirement age.

#### 4.4.3 Historical Extent

The historical extent of grasslands on the Southern Thompson Upland is discussed in terms of areas lost to forest encroachment, agricultural conversion and urban development. All of these factors have decreased the extent of grassland over time<sup>24</sup>.

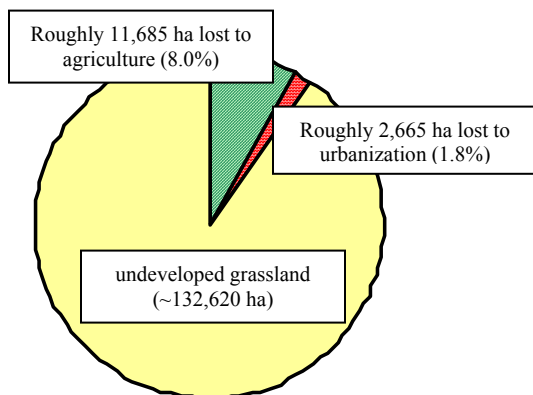
Approximately 11,685 ha of grassland on the Southern Thompson Upland have been converted to intensive agriculture. Converted lands include irrigated hayfields, pastures and range seedings located in valley bottoms and moisture receiving sites. These agricultural developments represent only an eight percent loss of grassland over the region (Figure 19), yet the loss of grassland biodiversity may be much higher as converted lands are concentrated in areas that once provided critical habitat for a significant number of grassland associated species (e.g. riparian areas and wetlands). With 80% of the region’s grasslands in the ALR, agricultural conversion continues to pose a significant threat.

Roughly 2,665 ha of grassland have been lost to urban and industrial development in the Southern Thompson Upland. Cities, towns and communities such as Merritt, Princeton, Logan Lake and Lower Nicola account for the largest portion of this, with gravel pits and mines in the

<sup>24</sup> *Changes in the Grassland-Forest Interface* has been developed to document and describe forest encroachment and ingrowth in the Thompson-Nicola region. Please refer to this report for a more in-depth review.

region making up the remainder. Roads and railways are also a significant factor in this region, however the loss to these developments has not been quantified. A considerable amount of grassland has been lost in the Merritt area, with 82.9% of the city’s historical grassland now under pavement. Within the Town of Princeton, 66.3% of the historical grasslands have been lost (Appendix 2). As residential and commercial development continues in these and other areas such as Nicola Lake and Stump Lake, grasslands will continue to be lost to subdivision.

**Figure 19 – Southern Thompson Upland:  
Grasslands Lost to Agriculture and Urbanization**



Nicola Valley in 1914

BC Archives (NA-03983)

**4.4.4 Species At Risk**

Grasslands environments in the Southern Thompson Upland support a great deal of animal and plant species, many of them threatened or endangered. Associated habitats such as Douglas-fir patches, aspen copses, riparian areas, wetlands and ponds are particularly rich in species and account for a significant portion of the biodiversity of a grassland area<sup>25</sup>.

An analysis determined which species have been mapped on grassland or immediately adjacent habitats in the Southern Thompson Upland (Table 16). Because the majority of the region’s grasslands are on private land or Indian Reserve, few species inventories have been conducted and many rare and endangered species may have not yet been found.

**Table 16. Southern Thompson Upland:  
Species at Risk Mapped on Grassland and Associated Habitats**

	Scientific Name	Common Name	COSEWIC Status	CDC Status
<b>AMPHIBIANS</b>				
	<i>SPEA INTERMONTANA</i>	GREAT BASIN SPADEFOOT	T (NOV 2001)	BLUE
	<i>AMBYSTOMA TIGRINUM</i>	TIGER SALAMANDER	E (Nov 2001)	RED
<b>BIRDS</b>				
	<i>SPHYRAPICUS THYROIDEUS THYROIDEUS</i>	WILLIAMSONS SAPSUCKER, THYROIDEUS SUBSPECIES		BLUE

<sup>25</sup> For more information on grassland associated species and their habitats in this region, refer to *The Grasslands of British Columbia*.

	<i>NUMENIUS AMERICANUS</i>	LONG-BILLED CURLEW	SC (1992)	BLUE
	<i>ATHENE CUNICULARIA</i>	BURROWING OWL	E (May 2000)	RED
	<i>OTUS FLAMMEOLUS</i>	FLAMMULATED OWL	SC (NOV 2001)	BLUE
	<i>MELANERPES LEWIS</i>	LEWIS'S WOODPECKER	SC (NOV 2001)	BLUE
	<i>GRUS CANADENSIS</i>	SANDHILL CRANE	NAR (1979) G. canadensis tabida assessed	BLUE
	<i>TYMPANUCHUS PHASIENELLUS</i>	SHARP-TAILED GROUSE, COLUMBIANUS SUBSPECIES		BLUE
	<i>COLUMBIANUS</i>			
	<i>AERONAUTES SAXATALIS</i>	WHITE-THROATED SWIFT		BLUE
	<i>ICTERIA VIRENS</i>	YELLOW-BREADED CHAT	E (Nov 2000)	RED
<b>BUTTERFLIES AND SKIPPERS</b>				
	<i>LYCAENA NIVALIS</i>	LILAC-BORDERED COPPER		BLUE
<b>FISH</b>				
	<i>ACROCHEILUS ALUTACEUS</i>	CHISELMOUTH	DD (1997)	BLUE
	<i>CATOSTOMUS</i>	MOUNTAIN SUCKER	NAR (1991)	BLUE
	<i>PLATYRHYNCHUS</i>			
	<i>COTTUS PUNCTULATUS</i>	ROCKY MOUNTAIN SCULPIN		BLUE
<b>MAMMALS</b>				
	<i>TAXIDEA TAXUS</i>	AMERICAN BADGER	E (MAY 2000)	RED
	<i>SPERMOPHILUS SATURATUS</i>	CASCADE MANTLED GROUND SQUIRREL	NAR (1992)	BLUE
	<i>URSUS ARCTOS HORRIBILIS</i>	GRIZZLY BEAR	SC (MAY 2002)	BLUE
	<i>EUDERMA MACULATUM</i>	SPOTTED BAT	SC (1988)	BLUE
	<i>MYOTIS CILIOLABRUM</i>	WESTERN SMALL-FOOTED MYOTIS		BLUE
<b>REPTILES</b>				
	<i>CROTALUS VIRIDIS</i>	WESTERN RATTLESNAKE		BLUE
<b>VASCULAR PLANTS</b>				
	<i>SALIX BOOTHII</i>	BOOTH'S WILLOW		BLUE
	<i>MYOSURUS APETALUS</i> VAR <i>BOREALIS</i>	BRISTLY MOUSETAIL		RED
	<i>ALOPECURUS CAROLINIANUS</i>	CAROLINA MEADOW-FOXTAIL		RED
	<i>POLYGONUM POLYGALOIDES</i>	CLOSE-FLOWERED KNOTWEED		RED
	<i>SSP CONFERTIFLORUM</i>			
	<i>CASTILLEJA CUSICKII</i>	CUSICK'S PAINTBRUSH		RED
	<i>CAREX XERANTICA</i>	DRY-LAND SEDGE		BLUE
	<i>GAYOPHYTUM HUMILE</i>	DWARF GROUNDSMOKE		BLUE
	<i>PSILOCARPHUS BREVISSIMUS</i> VAR <i>BREVISSIMUS</i>	DWARF WOOLLY-HEADS	E (NOV 2003)	RED
	<i>ASTRAGALUS LENTIGINOSUS</i>	FRECKLED MILK-VETCH		RED
	<i>GAYOPHYTUM RAMOSISSIMUM</i>	HAIRSTEM GROUNDSMOKE		RED
	<i>HUTCHINSIA PROCUMBENS</i>	HUTCHINSIA		RED
	<i>POLYGONUM POLYGALOIDES</i> <i>SSP KELLOGGII</i>	KELLOGG'S KNOTWEED		BLUE
	<i>DESCURAINIA SOPHIOIDES</i>	NORTHERN TANSY MUSTARD		BLUE
	<i>CRYPTANTHA AMBIGUA</i>	OBSCURE CRYPTANTHA		RED
	<i>TALINUM SEDIFORME</i>	OKANOGAN FAMEFLOWER	NAR (1990)	BLUE
	<i>MELICA BULBOSA</i> VAR <i>BULBOSA</i>	ONIONGRASS		RED
	<i>EPILOBIUM OREGONENSE</i>	OREGON WILLOWHERB		BLUE
	<i>CAREX HYSTRICINA</i>	PORCUPINE SEDGE		BLUE
	<i>IVA AXILLARIS</i> SSP <i>ROBUSTIOR</i>	POVERTY-WEED		RED
	<i>JUNCUS REGELII</i>	REGEL'S RUSH		BLUE
	<i>SCOLOCHLOA FESTUCACEA</i>	RIVERGRASS		RED
	<i>CAREX SAXIMONTANA</i>	ROCKY MOUNTAIN SEDGE		BLUE
	<i>ARABIS SPARSIFLORA</i>	SICKLE-POD ROCKCRESS		RED

ARTEMISIA CANA SSP CANA	SILVERY SAGEBRUSH		RED
COLLOMIA TENELLA	SLENDER COLLOMIA	E (NOV 2003)	RED
IPOMOPSIS MINUTIFLORA	SMALL-FLOWERED IPOMOPSIS		RED
ANTENNARIA FLAGELLARIS	STOLONIFEROUS PUSSYTOES	E (MAY 2004)	RED
LUPINUS BINGENENSIS VAR SUBSACCATUS	SUKSDORF'S LUPINE		RED
ASTRAGALUS FILIPES	THREADSTALK MILK-VETCH		BLUE
CAREX VALLICOLA VAR VALLICOLA	VALLEY SEDGE		RED
SENECIO INTEGERRIMUS VAR OCHROLEUCUS	WHITE WESTERN GROUNDSEL		RED
PYROLA ELLIPTICA	WHITE WINTERGREEN		BLUE

Committee on Status of Endangered Wildlife in Canada (COSEWIC) ranks:  
E (Endangered); T (Threatened); SC (Special Concern); NAR (Not at Risk); DD (Data Deficient)

**note** – list includes all species mapped within 2 km of a native grassland polygon.

#### 4.4.5 Non-Native Invasive Plants<sup>26</sup>

Compared to grasslands in the adjacent Okanagan and Thompson-Pavilion regions, grasslands in the Southern Thompson Upland are only marginally affected by non-native invasive plants. Many noxious weeds are present in the region, such as diffuse knapweed, spotted knapweed, hound's-tongue, Dalmatian toadflax and sulphur cinquefoil, yet populations tend to be locally abundant rather than widespread. Grasslands in the Princeton Basin, however, are an exception.

Diffuse and spotted knapweed are found in the Nicola Valley, north of Stump Lake to the Thompson Basin, and west of Merritt along the Nicola River to Spences Bridge. Spotted knapweed is also found on the Douglas Lake range, Hamilton Commonage and in the Princeton Basin, as is sulphur cinquefoil. Diffuse knapweed is particularly prevalent in the Princeton Basin, where it is found in grasslands along the upper Similkameen River and around Princeton. Hound's-tongue has been identified on grasslands in the Mamit Valley and Nicola Valley as well as the Aspen Grove area. On the Hamilton Commonage and at Tunkwa Lake, perennial sow-thistle and Canada thistle are present in some wetlands and mesic habitats. Other species such as Dalmatian toadflax, leafy spurge, blueweed, Russian thistle and Russian knapweed are locally abundant in the region, but are generally not widespread.

### 4.5 Cariboo-Chilcotin

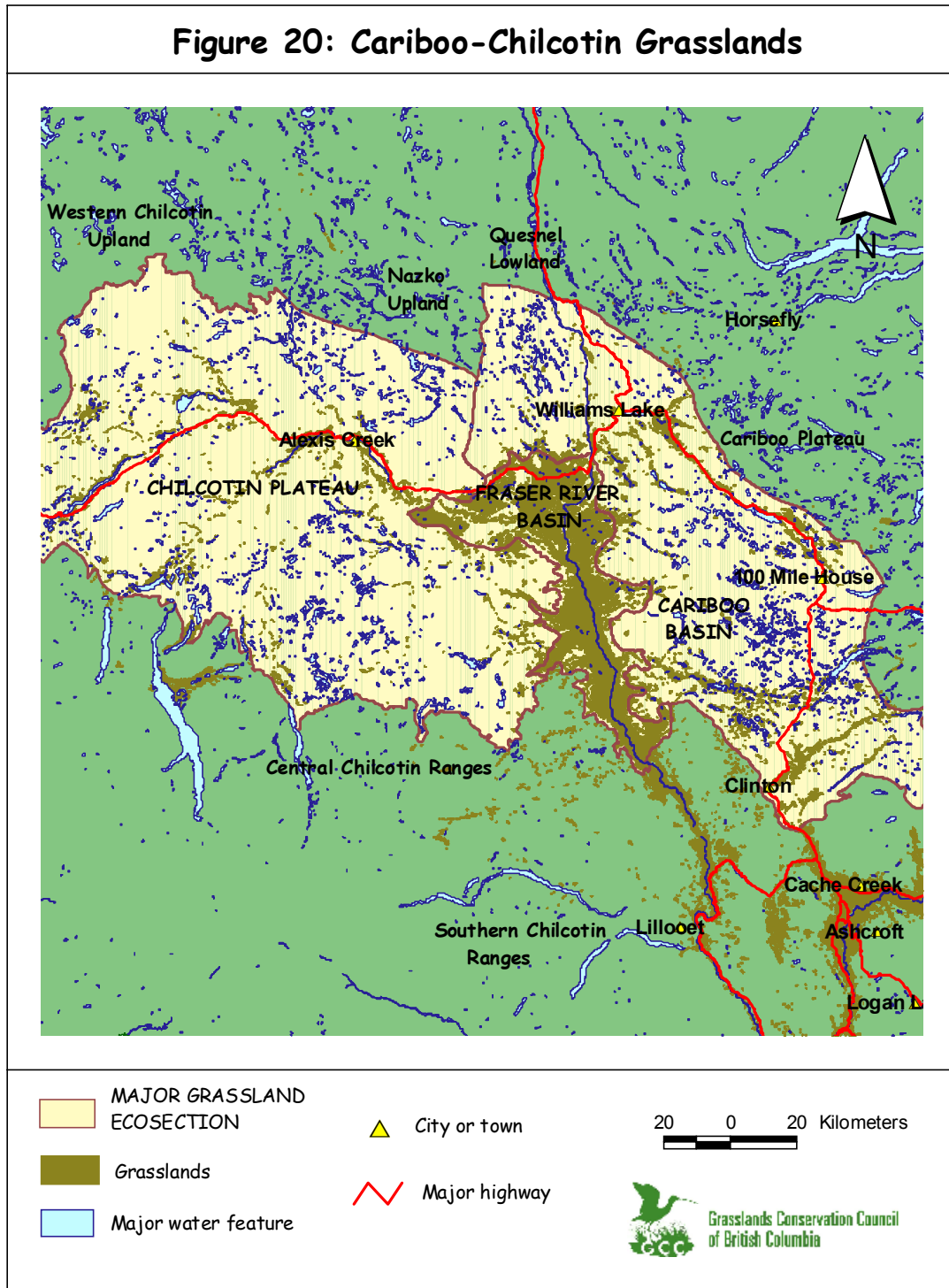
#### 4.5.1 The Grassland Landscape<sup>27</sup>

Roughly 215,000 ha of grassland are found within the Cariboo-Chilcotin, a broad region occupying the central portion of the Interior Plateau with the Coast Mountains to the west and the Cariboo Mountains to the east. The southern limits of the region abut the Thompson Plateau while the northern limits extend into the Nazko Upland (Figure 20). Ninety-seven percent of the region's grasslands are found within the Fraser River Basin, Cariboo Basin, Central Chilcotin

<sup>26</sup> with adaptations (with permission) from Wikeem, B. and S. Wikeem, 2004. Grasslands of British Columbia. Report prepared for the Grasslands Conservation Council of British Columbia. Kamloops, B.C.

<sup>27</sup> with adaptations (with permission) from Wikeem, B. and S. Wikeem, 2004. Grasslands of British Columbia. Report prepared for the Grasslands Conservation Council of British Columbia. Kamloops, B.C.

**Figure 20: Cariboo-Chilcotin Grasslands**





Ranges and Chilcotin Plateau Ecosections<sup>28</sup> (Table 17). The Fraser River Basin alone accounts for almost 60% of the region’s grasslands, with over 125,000 ha distributed along valley walls, river terraces and benches from Big Bar north to approximately Williams Lake.

Table 17. Cariboo-Chilcotin: Grassland Area by Ecosection and Biogeoclimatic Unit

Ecosection	Area of Grassland (ha)	% of total for region
Fraser River Basin	125,265	58.3%
Cariboo Basin	41,947	19.5%
Chilcotin Plateau	31,477	14.6%
Central Chilcotin Ranges	9,844	4.6%
Nazko Upland	1,936	0.9%
Southern Chilcotin Ranges	1,539	0.7%
Cariboo Plateau	1,461	0.7%
Western Chilcotin Upland	1,271	0.6%
Quesnel Lowland	151	0.1%
<b>TOTAL</b>	<b>214,892</b>	<b>100.0%</b>

Biogeoclimatic Unit	Area of Grassland (ha)	% of total for region
BG xh 2	1,922	0.9%
BG xh 3	18,334	8.5%
BG xw 2	41,698	19.4%
PP xh 2	444	0.2%
IDF xh 2	247	0.1%
IDF xh 2b	4	0.0%
IDF xw	5,122	2.4%
IDF xm	74,185	34.5%
IDF dk 1	139	0.1%
IDF dk 2	212	0.1%
IDF dk 2b	56	0.0%
IDF dk 3	29,035	13.5%
IDF dk 4	20,515	9.5%
IDF dw	3,501	1.6%
IDF unk	2	0.0%
MS xk	542	0.3%
MS xv	1,437	0.7%
MS dc	654	0.3%
MS dc 2	452	0.2%
MS dv	8	0.0%
SBPS dc	1,007	0.5%
SBPS xc	11,261	5.2%
SBPS mc	342	0.2%
SBPS mk	728	0.3%
SBS dw 1	634	0.3%
SBS dw 2	232	0.1%
SBS mc 2	172	0.1%
SBS mc 3	241	0.1%
ESSF xc	12	0.0%
ESSF xv 1	80	0.0%
ESSF xv 2	1,157	0.5%
ESSF dv	380	0.2%
ESSF mv 1	76	0.0%
AT	62	0.0%
<b>TOTAL</b>	<b>214,892</b>	<b>100.0%</b>



Junction of the Fraser and Chilcotin Rivers BC Parks



Chilcotin Plateau high elevation grassland D. Blumenauer

<sup>28</sup> for sections 4.5.2 and 4.5.3, statistics for the “Cariboo-Chilcotin region” are based on totals from the Fraser River Basin, Cariboo Basin, Central Chilcotin Ranges and Chilcotin Plateau Ecosections.

From the Fraser River Basin to the upland areas of the Cariboo Basin and Chilcotin Plateau, grasslands occur over an elevational gradient similar to that of the Thompson-Pavilion region. The lower grasslands of the Bunchgrass zone (BGxh3 unit) occur in the hottest and most arid portions of the region. Bluebunch wheatgrass and big sagebrush are the characteristic species forming lower grassland, shrub-steppe communities in the valley bottoms of the Fraser and Chilcotin Rivers, and on the valley slopes and terraces below 650 m. Lower grasslands in the Cariboo-Chilcotin extend north along the Fraser River to Sheep Creek Bridge on Highway 20, and continue west along the Chilcotin River to Farwell Canyon. At slightly higher elevations between 650 and 850 m, shrub-steppe communities give way to middle grasslands dominated by bluebunch wheatgrass and needle-and-thread grass. These grasslands of the BGxw2 Biogeoclimatic unit occupy mid to upper slopes along the Fraser River and the lower part of the Chilcotin River valley. Upper grasslands in the Interior Douglas-fir zone occur in a forested matrix on the plateau surfaces above the Fraser and Chilcotin rivers between 850 and 1200 m. Most of these upper grasslands occur within the IDFxM Biogeoclimatic unit, which accounts for 34.5% of the region’s total grassland. At climax, upper grasslands in the Cariboo-Chilcotin are dominated by porcupinegrass, bluebunch wheatgrass, spreading needle grass and Rocky Mountain fescue.

Higher on the plateau in the Sub-boreal Pine-Spruce zone west of the Fraser River, grasslands become more localized and are often associated with south facing slopes between lodgepole pine forests and wetlands. Grasslands at the lowest elevations of the Sub-boreal Pine-Spruce zone are dominated by bluebunch wheatgrass and resemble the upper grasslands of the Interior Douglas-fir zone. At higher elevations where the climate becomes cooler and moister, bluebunch wheatgrass is gradually replaced by oatgrass, spreading needlegrass and Rocky Mountain fescue.

In the Central Chilcotin Ranges, grasslands can be found in high elevation valley bottoms east of Taseko Lake where cold air drainage limits tree growth. These grasslands occur in the Montane Spruce and Engelmann Spruce-Subalpine Fir zones; Altai fescue and Rocky Mountain fescue are generally the dominant species. In the Chilko and Tatlayoko Lake valleys, small areas of isolated grassland and aspen parkland occur on some south facing slopes in the Interior Douglas-fir zone (IDFdw unit). The climate is warmer and moister than most other parts of the Interior Douglas-fir zone due to the influence of coastal air masses.

Grassland landscapes in the Cariboo-Chilcotin support a mix of habitats such as open prairies, wetlands, aspen copses, coniferous forest groves, and rocky, broken terrain (Table 18). The topographic diversity of the region lends itself to a variety of natural features and communities.

Table 18. Cariboo-Chilcotin: Selected Grassland Associated Habitats by Biogeoclimatic Unit

	aspen copses (ha)	cottonwood stands (ha)	cliffs, clay banks and rocky terrain (ha)	meadows, riparian brush and wetlands (ha)	ponds < 3 ha (number)	ponds < 1/2 ha (number)
BG xh 3	7	3	2,045	0	3	2
BG xw 2	163	0	3,329	95	102	71
IDF xm	1,957	121	5,936	2,065	444	251
IDF dk 3	5,823	5	1,428	5,561	712	420
IDF dk 4	3,552	31	2,444	5,776	134	83

#### 4.5.2 Land Status and Range Tenure

In the Fraser River Basin and Cariboo Basin Ecosections, 53.7% and 52.8% of the grasslands are on provincial crown land, respectively. To the west on the Chilcotin Plateau and Central Chilcotin Ranges, the crown land figures jump to 77.5% and 77.7%, respectively (Table 19). Most crown grasslands in the Cariboo-Chilcotin are under a range tenure, with grazing licenses and permits making up the majority. Grazing leases are a relatively minor component of overall range tenure in the region, except in the Fraser River Basin where nearly 9,000 ha of grassland are under lease (Table 20).

Table 19. Cariboo-Chilcotin: Land Status of Grasslands by Ecosection

	Fraser River Basin		Cariboo Basin		Chilcotin Plateau		Central Chilcotin Ranges	
	grassland (ha)	% of ecosec total	grassland (ha)	% of ecosec total	grassland (ha)	% of ecosec total	grassland (ha)	% of ecosec total
Provincial crown (not in protected area)	46,377	37.0%	20,996	50.1%	24,379	77.5%	7,651	77.7%
Provincial crown protected area	20,946	16.7%	1,135	2.7%	1,211	3.8%	1,406	14.3%
private	52,561	42.0%	16,663	39.7%	4,961	15.8%	166	1.7%
private acquired land	239	0.2%	0	0.0%	12	0.0%	12	0.1%
Indian Reserve (IR) (federal)	3,725	3.0%	1,190	2.8%	898	2.9%	609	6.2%
other federal lands ** (not IR)	1,416	1.1%	1,964	4.7%	15	0.0%	0	0.0%
TOTAL	125,264	100.0%	41,947	100.0%	31,477	100.0%	9,844	100.0%

Roughly 7,000 ha of grassland in the Cariboo-Chilcotin are without an active grazing tenure. The largest of these areas is a 3,286 ha patch of open aspen parkland on the northeast end of Chilko Lake along Nemaiah Creek, just outside Tsyl-os' Provincial Park. Junction Sheep Range is the second largest of these areas, with approximately 3,145 ha of untenured grassland. The remaining untenured areas are small and distributed throughout the region, mainly in parks and protected areas such as Nuntsi, Bull Canyon, Big Bar Lake and Big Creek Ecological Reserve.

Table 20. Cariboo-Chilcotin: Range Tenure on Provincial Crown Grasslands by Ecosection

	Fraser River Basin		Cariboo Basin		Chilcotin Plateau		Central Chilcotin Ranges	
	grassland (ha)	% of total crown	grassland (ha)	% of total crown	grassland (ha)	% of total crown	grassland (ha)	% of total crown
grazing license or permit	55,243	82.1%	20,994	94.9%	23,944	93.6%	5,820	64.3%
grazing lease	8,923	13.3%	1,060	4.8%	1,141	4.5%	31	0.3%
no grazing tenure	3,158	4.7%	77	0.3%	505	2.0%	3,207	35.4%
TOTAL	67,323	100.0%	22,131	100.0%	25,591	100.0%	9,057	100.0%

Approximately 24,700 ha of grassland in the Cariboo-Chilcotin fall within provincial parks or protected areas; 76.5% of this occurs in Churn Creek Protected Area. With roughly 18,885 ha of grassland within the protected area boundary, Churn Creek represents the largest area of protected grassland in the province (Appendix 3). Junction Sheep Range also protects a sizeable chunk, although it is  $\frac{1}{6}$  the area of grassland compared to Churn Creek. Seventeen parks account

for the remainder of the region's protected grassland, with 14 of these containing less than 100 ha of grassland.

Owing mainly to Churn Creek and Junction Sheep Range, the lower (BGxh3 unit) and middle (BGxw2 unit) grasslands of the Cariboo-Chilcotin are relatively well represented in the protected areas system. However, upper grasslands in the Interior Douglas-fir zone are less well represented, in particular the IDFd3 grasslands of the Cariboo Basin and 100 Mile House area (Appendix 5).

In the Fraser River Basin and Cariboo Basin Ecosections, 42.2% and 39.7% of the grasslands are on private land, respectively. To the west on the Chilcotin Plateau and Central Chilcotin Ranges, the private land figures drop to 15.8% and 1.7%, respectively. In the Fraser River Basin, large blocks of privately owned grassland are held at Big Bar Ranch, Gang Ranch, Alkali Lake Ranch, Riske Creek Ranch and Chilko Ranch. Along with Douglas Lake Ranch, these are some of the largest cattle operations on native grassland in the province. To the east in the Cariboo Basin, privately owned grasslands are concentrated on southern slopes of valleys from Lac La Hache to Williams Lake, along Chimney Creek, and in the Springhouse area. On the Chilcotin Plateau, private grasslands occur along the Chilcotin River from Hanceville to Puntzi Lake, and in smaller patches towards the Coast Mountains.

Just north of the confluence of French Bar Creek and the Fraser River, The Land Conservancy (TLC) has acquired roughly 240 ha of grassland as part of the larger Talking Mountain Ranch. TLC's acquisition and management of these properties and the associated range tenure area extends the corridor of protection on the west side of the Fraser River from Churn Creek Protected Area south to Watson Bar Creek. Talking Mountain Ranch properties and tenures straddle the Cariboo-Chilcotin and Thompson-Pavilion regions.

At the northern end of Tatlayoko Lake, Tatlayoko Lake Ranch, acquired by the Nature Conservancy of Canada (NCC), contains approximately 10 ha of native grassland. Ten km to the north in Skinner Meadows, an additional 14 ha of grassland have been secured by NCC<sup>29</sup>. Although the focus of these acquisitions was not directed specifically at grassland, considerable areas have been protected nonetheless.

Indian Reserves in the Cariboo-Chilcotin account for a relatively small percentage of total grassland ownership when compared to other regions in the southern interior of BC. Approximately 6,420 ha of grassland, only 3.1% of the region's total, fall within Indian Reserves. This contrasts sharply with figures for the Okanagan Basin (24.5%), Thompson Basin (14.6%), East Kootenay Trench (9.6%) and Southern Thompson Upland (9.2%). The Canoe Creek Band holds areas of grassland on the east side of the Fraser River at Canoe Creek and Dog Creek. Further north, grasslands are found on Esketemc Band territory at Wycotts Flat Indian Reserve and along Alkali Creek. The largest area of grassland held by First Nations in the Cariboo-Chilcotin occurs on Becher's Prairie where the Toosey Band has roughly 1,685 ha. Five km north across Highway 20, the Band also holds territory at Baptiste Meadow. Small areas of grassland are scattered on Indian Reserves throughout the remaining parts of the region, with the

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<sup>29</sup> the degree to which these "grasslands" resemble wet meadows has not yet been verified. Field checks are necessary to identify plant species and determine if these are indeed 'true' grasslands.

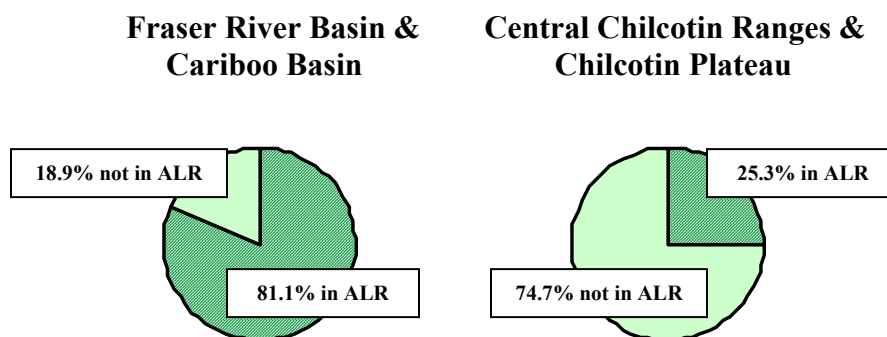
Canim, Williams Lake, Stone, Alexis Creek, Xeni Gwet'in and Tl'etinqox-t'in Bands having title over the balance of lands.

In addition to Indian Reserves, the federal government also holds authority over the Chilcotin Military Reserve, which lies just north of Becher's Prairie. This large reserve contains 3,380 ha of grassland in association with numerous small ponds and wetlands, aspen copses and coniferous forest patches.

Over 80% of the grasslands in the Fraser River Basin and Cariboo Basin Ecosections are in the Agricultural Land Reserve (ALR) (Figure 21). Except for steep and rocky ground, the majority of valley bottoms and upland benches have been set aside for possible future agricultural use. Although ALR designation provides one mechanism to limit building and development, it still leaves most grasslands in the Cariboo-Chilcotin at risk from agricultural conversion.

In the Central Chilcotin Ranges and Chilcotin Plateau, only 25.3% of grasslands are within the ALR. Beyond Alexis Creek, there are few native grasslands capable of supporting intensive agriculture due to the short growing season and steeper topography. Although grasslands outside the ALR may be at risk from human settlement, the rate of development on the Chilcotin Plateau is far less worrisome than the rate of development in the Okanagan, Thompson-Nicola and East Kootenay Trench regions.

Figure 21 – Cariboo-Chilcotin: Grasslands in Agricultural Land Reserve

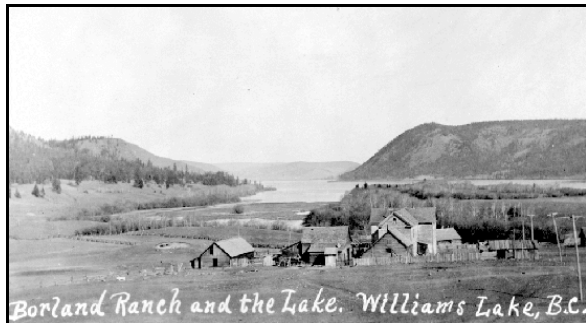


### 4.5.3 Historical Extent

The historical extent of grasslands in the Cariboo-Chilcotin region is discussed in terms of areas lost to forest encroachment, agricultural conversion and urban development. All of these factors have decreased the extent of grassland over time. Forest encroachment may be the biggest loss factor for grasslands in the Cariboo-Chilcotin. This is discussed in *Changes in the Grassland-Forest Interface*<sup>30</sup>.

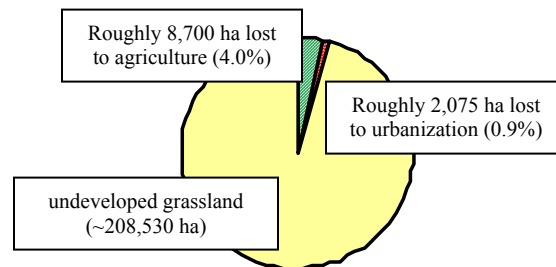
<sup>30</sup> *Changes in the Grassland-Forest Interface* has been developed to document and describe forest encroachment and ingrowth in the Cariboo-Chilcotin region. Please refer to this report for a more in-depth review.

Approximately 8,700 ha of grassland have been lost to agricultural conversion in the Cariboo-Chilcotin region (Figure 22). The majority of converted lands include irrigated hayfields, pastures and range seedings located in valley bottoms or on historical grassland benches.



Borland Ranch at Williams Lake, 1923 BC Archives (E-09962)

**Figure 22 – Cariboo-Chilcotin: Grasslands Lost to Agriculture and Urbanization**



Urban development in the Cariboo-Chilcotin has led to the disappearance of roughly 2,075 ha of grassland across the region. Grasslands along Highway 97 from 100 Mile House to Williams Lake have experienced the greatest loss, while smaller amounts have been lost in the Springhouse and Alexis Creek areas.

Urban and agricultural development pressure may be highest for the grasslands along Highway 97 from 100 Mile House to Williams Lake. Most of the intensive development in the Cariboo-Chilcotin has been concentrated along this route, and this trend is likely to continue. Private rangelands near 150 Mile House and Lac La Hache may be subject to subdivision and development. Grasslands in the Springhouse and Alexis Creek areas could face similar pressures. Development threats in the Fraser River Basin and upper Chilcotin Plateau are likely lower, however it is important to consider trends in these areas, particularly when it comes to the subdivision of large ranches.

#### 4.5.4 Species at Risk

Grassland environments in the Cariboo-Chilcotin are a haven for a number of threatened and endangered species, with some animals and plants reaching their northern distribution here. Lower, middle and upper grassland communities in association with rocky terrain, aspen copses, coniferous forest patches, riparian areas, wetlands and ponds provide a diverse mix of habitats for amphibians, reptiles, birds and mammals<sup>31</sup>.

An analysis determined which species have been mapped on grassland or immediately adjacent habitats in the Cariboo-Chilcotin (Table 21). Adjacent habitats such as riparian areas, aspen copses and cliff or talus terrain are important as many grassland associated species rely on these for survival.

<sup>31</sup> For more information on grassland associated species and their habitats in this region, refer to *The Grasslands of British Columbia*.



Table 21. Cariboo-Chilcotin: Species at Risk Mapped on Grassland and Associated Habitats

	Scientific Name	Common Name	COSEWIC Status	CDC Status
<b>BIRDS</b>				
	<i>RECURVIROSTRA AMERICANA</i>	AMERICAN AVOCET		RED
	<i>BOTAURUS LENTIGINOSUS</i>	AMERICAN BITTERN		BLUE
	<i>PELECANUS ERYTHORHYNCHOS</i>	AMERICAN WHITE PELICAN	NAR (1987)	RED
	<i>DOLICHONYX ORYZIVORUS</i>	BOBOLINK		BLUE
	<i>SPIZELLA BREWERI BREWERI</i>	BREWERS SPARROW, BREWERI SUBSPECIES		RED
	<i>OTUS FLAMMEOLUS</i>	FLAMMULATED OWL	SC (NOV 2001)	BLUE
	<i>ARDEA HERODIAS HERODIAS</i>	GREAT BLUE HERON, HERODIAS SUBSPECIES		BLUE
	<i>MELANERPES LEWIS</i>	LEWIS'S WOODPECKER	SC (NOV 2001)	BLUE
	<i>NUMENIUS AMERICANUS</i>	LONG-BILLED CURLEW	SC (1992)	BLUE
	<i>FALCO MEXICANUS</i>	PRAIRIE FALCON	NAR (1996)	RED
	<i>GRUS CANADENSIS</i>	SANDHILL CRANE	NAR (1979) G. canadensis tabida assessed	BLUE
	<i>TYMPANUCHUS PHASIANELLUS COLUMBIANUS</i>	SHARP-TAILED GROUSE, COLUMBIANUS SUBSPECIES		BLUE
	<i>ASIO FLAMMEUS</i>	SHORT-EARED OWL	SC (1994)	BLUE
	<i>STRIX OCCIDENTALIS</i>	SPOTTED OWL	E	RED
	<i>BUTEO SWAINSONI</i>	SWAINSON'S HAWK		RED
	<i>BARTRAMIA LONGICAUDA</i>	UPLAND SANDPIPER		RED
	<i>AERONAUTES SAXATALIS</i>	WHITE-THROATED SWIFT		BLUE
	<i>ICTERIA VIRENS</i>	YELLOW-BREASTED CHAT	E (NOV 2000)	RED
<b>FISH</b>				
	<i>ACROCHEILUS ALUTACEUS</i>	CHISELMOUTH	DD (1997)	BLUE
	<i>ACIPENSER TRANSMONTANUS POP 4</i>	WHITE STURGEON (LOWER FRASER RIVER POPULATION)		RED
<b>MAMMALS</b>				
	<i>TAXIDEA TAXUS</i>	AMERICAN BADGER	E (MAY 2000)	RED
	<i>MYOTIS THYSANODES</i>	FRINGED MYOTIS	SC (1988)	BLUE
	<i>URSUS ARCTOS HORRIBILIS</i>	GRIZZLY BEAR	SC (MAY 2002)	BLUE
	<i>EUDERMA MACULATUM</i>	SPOTTED BAT	SC (1988)	BLUE
	<i>CORYNORHINUS TOWNSENDII</i>	TOWNSEND'S BIG-EARED BAT		BLUE
	<i>MYOTIS CILIOLABRUM</i>	WESTERN SMALL-FOOTED MYOTIS		BLUE
	<i>GULO GULO LUSCUS</i>	WOLVERINE	SC (2003)	BLUE
<b>REPTILES</b>				
	<i>CHRYSEMYS PICTA</i>	PAINTED TURTLE		BLUE
<b>VASCULAR PLANTS</b>				
	<i>CHAMAERHODOS ERECTA SSP NUTTALLII</i>	AMERICAN CHAMAERHODOS		BLUE
	<i>SALIX SERISSIMA</i>	AUTUMN WILLOW		RED
	<i>RANUNCULUS PEDATIFIDUS SSP AFFINIS</i>	BIRDFOOT BUTTERCUP		RED
	<i>BOUTELOUA GRACILIS</i>	BLUE GRAMA		BLUE
	<i>SALIX BOOTHII</i>	BOOTH'S WILLOW		BLUE
	<i>DRABA REPTANS</i>	CAROLINA DRABA		BLUE
	<i>MONTIA CHAMISSOI</i>	CHAMISSO'S MONTIA		BLUE
	<i>CHENOPODIUM ATROVIRENS</i>	DARK LAMB'S-QUARTERS		BLUE
	<i>SILENE DRUMMONDII VAR</i>	DRUMMOND'S CAMPION		BLUE

<i>DRUMMONDII</i>			
<i>CAREX XERANTICA</i>	DRY-LAND SEDGE	RED	
<i>TRICHOPHORUM PUMILUM</i>	DWARF CLUBRUSH	BLUE	
<i>POTENTILLA NIVEA VAR PENTAPHYLLA</i>	FIVE-LEAVED CINQUEFOIL	BLUE	
<i>PELLAEA GASTONYI</i>	GASTONY'S CLIFF-BRAKE	BLUE	
<i>ALLIUM GEYERI VAR TENERUM</i>	GEYER'S ONION	BLUE	
<i>CAREX SYCHNOCEPHALA</i>	MANY-HEADED SEDGE	BLUE	
<i>MUHLENBERGIA GLOMERATA</i>	MARSH MUHLY	BLUE	
<i>ARNICA CHAMISSONIS SSP INCANA</i>	MEADOW ARNICA	BLUE	
<i>CAREX HYSTRICINA</i>	PORCUPINE SEDGE	RED	
<i>MELICA SPECTABILIS</i>	PURPLE ONIONGRASS	RED	
<i>EPILOBIUM CILIATUM SSP WATSONII</i>	PURPLE-LEAVED WILLOWHERB	RED	
<i>SCOLOCHLOA FESTUCACEA</i>	RIVERGRASS	RED	
<i>CAREX SAXIMONTANA</i>	ROCKY MOUNTAIN SEDGE	BLUE	
<i>POTENTILLA OVINA VAR OVINA</i>	SHEEP CINQUEFOIL	BLUE	
<i>CAREX SIMULATA</i>	SHORT-BEAKED FEN SEDGE	BLUE	
<i>CAMISSONIA BREVIFLORA</i>	SHORT-FLOWERED EVENING-PRIMROSE	RED	
<i>ARABIS SPARSIFLORA</i>	SICKLE-POD ROCKCRESS	BLUE	
<i>ATRIPLEX ARGENTEA SSP ARGENTEA</i>	SILVERY ORACHE	RED	
<i>CREPIS ATRIBARBA SSP ATRIBARBA</i>	SLENDER HAWKSBEARD	RED	
<i>DRABA GLABELLA VAR GLABELLA</i>	SMOOTH DRABA	BLUE	
<i>CHAMAESYCE SERPYLLIFOLIA SSP SERPYLLIFOLIA</i>	THYME-LEAVED SPURGE	BLUE	
<i>APOCYNUM X FLORIBUNDUM</i>	WESTERN DOGBANE	BLUE	
<i>JUNCUS ALBESCENS</i>	WHITISH RUSH	BLUE	
<b>COMMUNITIES</b>			
	<i>ARTEMISIA TRIDENTATA / PSEUDOROEGNERIA SPICATA</i>	BIG SAGE / BLUEBUNCH WHEATGRASS	RED
	<i>PSEUDOROEGNERIA SPICATA - KOELERIA MACRANTHA</i>	BLUEBUNCH WHEATGRASS - JUNEGRASS	RED

Committee on Status of Endangered Wildlife in Canada (COSEWIC) ranks:  
E (Endangered); T (Threatened); SC (Special Concern); NAR (Not at Risk); DD (Data Deficient)

**note** – list includes all species mapped within 2 km of a native grassland polygon.

#### 4.5.5 Non-native Invasive Plants<sup>32</sup>

Non-native invasive plants are not as widespread in the Cariboo-Chilcotin as in grassland regions further south in BC. Some noxious weeds of concern include diffuse knapweed, spotted knapweed, leafy spurge, hound's tongue and blueweed. Diffuse and spotted knapweed are concentrated mostly in the southern part of the region south of 100 Mile House, although many patches have been found north to Williams Lake and west to the Chilcotin Plateau. Pockets of leafy spurge also occur in Cariboo-Chilcotin, especially along Canoe Creek and the Fraser River near Gang Ranch, and north to the Nechako Basin.

<sup>32</sup> with adaptations (with permission) from Wikeem, B. and S. Wikeem, 2004. Grasslands of British Columbia. Report prepared for the Grasslands Conservation Council of British Columbia. Kamloops, B.C.

## 4.6 Peace

### 4.6.1 The Grassland Landscape<sup>33</sup>

Lying east of the Rocky Mountains at approximately 56°N latitude, Peace grasslands are considerably different than those of the southern interior. Grasslands in this region are the northwestern extent of the Great Plains which stretch east across Alberta, Saskatchewan and Manitoba. Despite the term “Great Plains”, which often evokes images of vast prairie, open grasslands in fact comprise a very small area of the Peace; aspen parklands are more abundant.

The Peace region contains roughly 28,800 ha of grassland distributed mainly on steep, south facing slopes along the Peace River and its tributaries in the Peace Lowland and Halfway Plateau Ecosections<sup>34</sup> (Figure 23, Table 22). More than 95% of the region’s grasslands occur within the BWBSmw1 Biogeoclimatic unit along the breaks of the Peace, Halfway, Cameron, Moberley, Murray, Pine, Beatton, Kiskatinaw and Alces Rivers. Sizeable grassland areas are also found along Cache Creek, on the north shore of Moberly Lake and at Lone Prairie.

Table 22. Peace: Grassland Area by Ecosection and Biogeoclimatic Unit

Ecosection	Area of grassland (ha)	Area of grassland associated clay banks (ha) *	% of total for region **	Biogeoclimatic Unit	Area of grassland (ha)	Area of grassland associated clay banks (ha)	% of total for region
Peace Lowland	8,088	10,868	65.7%	BWBS mw 1	14,935	12,815	96.2%
Halfway Plateau	6,283	425	23.3%	BWBS wk 1	319	11	1.1%
Kiskatinaw Plateau	1,140	498	5.7%	BWBS wk 2	597	0	2.1%
Clear Hills	13	968	3.4%	SBS wk 2	110	0	0.4%
Hart Foothills	483	67	1.9%	ESSF mv 2	46	0	0.2%
TOTAL	16,007	12,826	100.0%	TOTAL	16,007	12,826	100.0%

\* see footnote 24

\*\* % of total includes both grassland and grassland associated clay banks

The species composition of Peace grasslands varies greatly in response to changes in local soils and microclimate, or as a result of historical grazing or fire. Most of the grasslands in this region



grasslands in Peace River Corridor Provincial Park BC Parks

have been classified as subtypes of the Wheatgrass-Needlegrass-Sedge association. The largest expanses of grassland and parkland in the region are contained in the Wheatgrass-Needlegrass communities that occupy the gentle rolling terrain of the Great Plains and steep, south facing slopes along the river valleys. Needlegrass communities also occupy steep, south facing slopes and knolls along the main

<sup>33</sup> with adaptations (with permission) from Wikeem, B. and S. Wikeem, 2004. Grasslands of British Columbia. Report prepared for the Grasslands Conservation Council of British Columbia. Kamloops, B.C.

<sup>34</sup> approximately 12,800 ha of this have been mapped as “grassland associated clay banks”, with “clay bank” being the term used to describe these non-forested areas in the source Forest Cover data. Many of these clay banks are in fact grassland communities, whereas others are very sparsely vegetated and may not be considered ‘true’ grasslands. Detailed work and field checks are necessary to verify this mapping in the Peace. Figures are likely overestimated.

**Figure 23: Peace Grasslands**



river valleys, and are most common in areas with well drained, coarse textured soils. Prairie sagewort- Western wheatgrass communities are found on steep, south facing slopes along the Peace River, but unlike Needlegrass communities, are situated on finer textured, glaciolacustrine materials. Finally, grassland-shrub communities are found on steep, south facing slopes above the Peace, Beatton and Halfway rivers. A mix of saskatoon, rose, snowberry and trembling aspen provide an overstory for a number of grass species including western bluegrass, junegrass and needle-and-thread grass.

Grasslands in the Peace region are closely associated with the surrounding aspen parkland as well as the wetland and riparian systems that often occur at the base of slopes or in depressions (Table 23). This complex mix of habitats provides for rich communities of flora and fauna in grassland environments.

Table 23. Peace: Selected Grassland Associated Habitats by Biogeoclimatic Unit

	aspen parkland (ha)	cottonwood stands (ha)	cliffs and rocky terrain (ha)	meadows, riparian brush and wetlands (ha)
BWBS mw 1	72,524	2,389	58	8,479
BWBS wk 2	1,232	30	0	2,992

#### 4.6.2 Land Status and Range Tenure

Approximately 62.5% (18,556 ha) of the grasslands in the Peace region are on provincial crown land (Figure 24). Of these, just over 50% are under a range tenure, with grazing licenses and permits making up the majority (Figure 25). Grazing leases cover roughly 690 ha of grassland and are distributed mainly along the Peace River.

There are over 9,000 ha of untenured crown grassland in the Peace. This is likely attributed to the fact that extreme slopes are generally not conducive to cattle grazing. A few parks and protected areas, such as Pine River Breaks, Peace River Corridor and Clayhurst Ecological Reserve, also contain untenured grasslands.

Figure 24 – Peace: Land Status of Grasslands

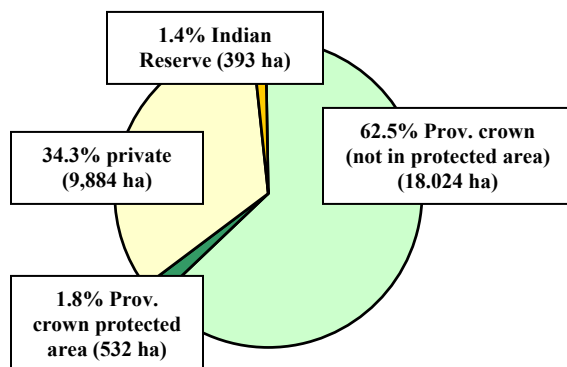
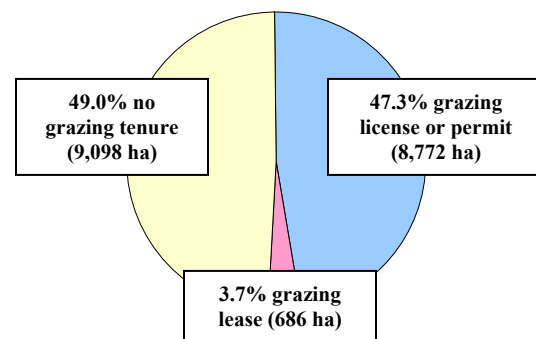


Figure 25 – Peace: Range Tenure on Provincial Crown Grasslands

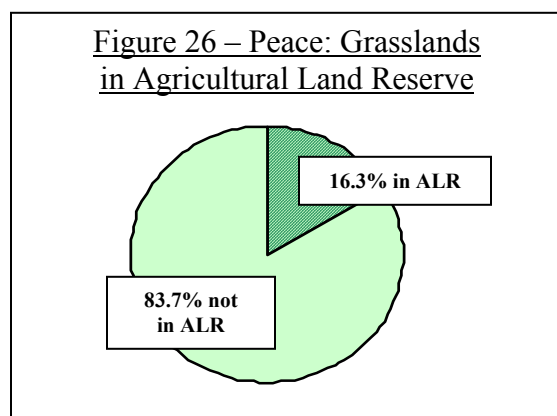


A small percentage (1.8%) of grasslands in the Peace are within provincial parks or protected areas. Peace River Corridor, Pine River Breaks, Gwillim Lake and Clayhurst Ecological Reserve contain the largest areas at 136 ha, 114 ha, 100 ha and 96 ha of grassland, respectively (Appendix 3). Grasslands in the BWBSmw1 Biogeoclimatic unit are underrepresented in the protected areas system with less than 2% in provincial parks or protected areas (Appendix 5).

Roughly 34.3% of the Peace region's grasslands are on private land, with the majority of these distributed along the south facing breaks of the Peace and Beaton Rivers. Sizeable areas of private grassland are also found along the Halfway, Pine and Alces Rivers, as well as at Lone Prairie and north of Pouce Coupe. The majority of the Peace lowlands are on private land, yet alienated parcels tend to cover the flatter agricultural areas rather than the open grasslands on steep slopes. This is why only  $\frac{1}{3}$  of the region's grasslands are privately held.

Approximately 393 ha of grassland are distributed among four Indian Reserves in the region. The Halfway River Band holds title over the largest area of grassland on the Halfway River Indian Reserve, while the remaining grasslands are found at the East Moberly Lake (Saulteau Band), Blueberry River (Blueberry River Band) and Beaton River Reserves (Blueberry River and Doig River Bands).

The lowlands of the Peace region represent the largest area of Agricultural Land Reserve (ALR) in the province. ALR overlaps with productive agricultural land on relatively level ground above



the Peace River and its main tributaries from Hudson's Hope east to the Alberta border. Nearly 84% of the grasslands in the region, however, are outside the ALR (Figure 26), owing mainly to their position on steep, dry slopes. Agricultural potential on these slopes is limited, and this has spared many of the region's grasslands from conversion to grain fields, hayfields, pastures and other non-native feed crops or range seedings.

#### 4.6.3 Historical Extent

The historical extent of grasslands in the Peace region is discussed in terms of areas lost to forest encroachment and agricultural conversion. Both of these factors have decreased the extent of grassland over time<sup>35</sup>.

On level ground above the Peace River and its main tributaries from Hudson's Hope east to the Alberta border, large areas have been converted for agricultural purposes. Canola and cereal crops such as wheat, oats and barley cover sizeable tracts of land, as do hayfields and pastures.

<sup>35</sup> *Changes in the Grassland-Forest Interface* has been developed to document and describe forest encroachment and ingrowth in the Peace region. Please refer to this report for a more in-depth review.



Most of these flat agricultural lands, however, likely supported more aspen parkland historically than open grassland. Yet, with the confounding effects of historical bison grazing and aboriginal burning, it is difficult to discern to what degree these historical aspen parklands were ‘naturally’ open. Historical grasslands mapping has not yet been conducted for the Peace region.



Wheat fields near Pouce Coupe in 1950

BC Archives (I-22149)

In addition to agricultural conversion, the Peace lowlands have many roads, railways and oil and gas sites. The area of grassland and aspen parkland lost to these developments has not been quantified.

#### 4.6.4 Species at Risk

In the Peace region, a number of threatened and endangered species are found within the complex communities of open grassland in association with deciduous forest, riparian areas, wetlands, cliffs and clay banks. The merging of vegetation types from the Great Plains, Arctic tundra and the cordilleran forest make this region unique with respect to its flora and fauna<sup>36</sup>.

An analysis determined which species have been mapped on grassland or immediately adjacent habitats in the Peace region (Table 24). The aspen parkland that often surrounds open grasslands in this region is an important habitat type for grassland associated species.

Table 24. Peace: Species at Risk Mapped on Grassland and Associated Habitats

	Scientific Name	Common Name	COSEWIC Status	CDC Status
<b>BIRDS</b>				
	<i>DENDROICA VIRENS</i>	BLACK-THROATED GREEN WARBLER		BLUE
	<i>WILSONIA CANADENSIS</i>	CANADA WARBLER		BLUE
	<i>OPORORNIS AGILIS</i>	CONNECTICUT WARBLER		RED
	<i>VIREO PHILADELPHICUS</i>	PHILADELPHIA VIREO		BLUE
<b>BUTTERFLIES AND SKIPPERS</b>				
	<i>PAPILIO BAIRDII PIKEI</i>	BAIRD'S SWALLOWTAIL, PIKEI SUBSPECIES		BLUE
<b>VASCULAR PLANTS</b>				
	<i>ALOPECURUS ALPINUS</i>	ALPINE MEADOW-FOXTAIL		RED
	<i>ROSA ARKANSANA VAR ARKANSANA</i>	ARKANSAS ROSE		RED
	<i>SALIX SERISSIMA</i>	AUTUMN WILLOW		BLUE
	<i>ANEMONE CANADENSIS</i>	CANADA ANEMONE		RED
	<i>OXYTROPIS JORDALII SSP DAVISII</i>	DAVIS' LOCOWEED		RED

<sup>36</sup> For more information on grassland associated species and their habitats in this region, refer to *The Grasslands of British Columbia*.

<i>CAREX XERANTICA</i>	DRY-LAND SEDGE	RED
<i>LOMATIUM FOENICULACEUM</i> <i>VAR FOENICULACEUM</i>	FENNEL-LEAVED DESERT-PARSLEY	RED
<i>ARTEMISIA LONGIFOLIA</i>	LONG-LEAVED MUGWORT	BLUE
<i>ATRIPLEX NUTTALLII</i>	NUTTALL'S ORACHE	RED
<i>HELIANTHUS NUTTALLII</i> <i>VAR</i> <i>NUTTALLII</i>	NUTTALL'S SUNFLOWER	BLUE
<i>CALAMAGROSTIS</i> <i>MONTANENSIS</i>	PLAINS REEDGRASS	RED
<i>RANUNCULUS RHOMBOIDEUS</i>	PRAIRIE BUTTERCUP	BLUE
<i>POLYGALA SENEGA</i>	SENECA-SNAKEROOT	BLUE
<i>ARABIS SPARSIFLORA</i>	SICKLE-POD ROCKCRESS	RED
<i>GLYCERIA PULCHELLA</i>	SLENDER MANNAGRASS	BLUE
<i>PENSTEMON GRACILIS</i>	SLENDER PENSTEMON	BLUE
<i>HELICTOTRICHON HOOKERI</i>	SPIKE-OAT	BLUE
<i>POLEMONIUM OCCIDENTALE</i> <i>SSP OCCIDENTALE</i>	WESTERN JACOB'S-LADDER	BLUE

**note** – list includes all species mapped within 2 km of a native grassland polygon.

#### 4.6.5 Non-native Invasive Plants<sup>37</sup>

Non-native invasive plants have been present in the Peace from at least the 1930s. Some species were introduced as garden escapes, whereas others arrived by rail with agricultural products. Common toadflax, cleavers, oxeye daisy, scentless chamomile, perennial sow-thistle, Canada thistle and spotted knapweed are all present on grassland or associated habitats in the region.

Canada thistle is likely the most prevalent of non-native invasive plants on grasslands in the Peace, with numerous populations occurring along the south slopes of the Peace, Beatton, Halfway and Cameron Rivers, and along Cache Creek. Perennial sow-thistle is also quite common on grasslands in similar areas. Scentless chamomile has been found along the Peace, Alces, Beatton and Halfway Rivers, and above Cache Creek. Spotted knapweed is not as widespread on grasslands in the Peace as it is in the south, but local populations have been found near Dawson Creek, Chetwynd and Hudson's Hope.

#### 4.7 Other Regions

Based on available data, preliminary mapping has been conducted for lesser known grassland areas in the Muskwa Foothills-Liard Highland, Bulkley Basin and East Vancouver Island-Gulf Islands regions of British Columbia. Adequate inventory data were not available to map grasslands in the northwest portion of the province in the Northern Boreal Mountains-Plateaus Ecoprovince.

Grasslands in these other regions are not as widely recognized as those in the southern interior of the province or in the Peace country. As such, there is a general lack of suitable inventory data, information and classification to guide grasslands mapping. For those regions where preliminary mapping has been conducted, grassland vegetation cover was compiled and overlaid with Ecoregion and Biogeoclimatic Zone data. Data overlays for land status, range tenure, historical

<sup>37</sup> with adaptations (with permission) from Wikeem, B. and S. Wikeem, 2004. Grasslands of British Columbia. Report prepared for the Grasslands Conservation Council of British Columbia. Kamloops, B.C.

extent, species locations and non-native invasive plants will not be performed until these base grassland vegetation layers have been quality assured<sup>38</sup>. For a complete description of grassland ecosystems in these other regions, refer to *Grasslands of British Columbia*.

#### 4.7.1 Muskwa Foothills-Liard Highland

The Muskwa Foothills-Liard Highland region occurs in the northeast portion of BC, covering the area from Williston Lake to the Liard River in the foothills east of the Rocky Mountains (Figure 27). The Muskwa Foothills Broad Ecosystem Unit (BEU) inventory at 1:250 000 scale was used to map grasslands in the Peace Foothills, Muskwa Foothills, Misinchinka Ranges and Eastern Muskwa Ranges Ecosections. Selected Open Range polygons from 1:20 000 Forest Cover data were used to map grasslands north of the BEU inventory in the Liard Highland area. BEU and Open Range polygons were then merged to estimate the total area of grassland for this region at 61,720 ha<sup>39</sup>. The majority of these grasslands occur within the Muskwa Foothills Ecosection (Table 25).

The BEU inventory contains descriptions for the three types of grassland in this region: montane shrub/grassland, subalpine grassland and subalpine shrub/grassland. Montane shrub/grassland communities contain a varied mixture of shrubs, thickets and herbaceous openings and are found on steep, warm aspects along main river valleys within the BWBS Biogeoclimatic Zone. Subalpine grasslands are found at high elevations on steep, warm aspect slopes or subalpine ridges and are dominated by perennial grasses and forbs on droughty sites.

Subalpine shrub/grasslands are the most extensive of grassland habitats in this region and occur



Subalpine shrub/grasslands in the Muskwa Foothills

Craig Delong

in high elevation valleys subject to cold air drainage in the SWB and BWBS Biogeoclimatic Zones. These areas are characterized by intermixed dense shrubs and bunchgrasses, and are typically dominated by scrub birch, willows and Altai fescue. Grasslands dominated by Altai fescue also occur on the north side of the Liard River on gentle, rolling terrain in the Hyland Highlands Ecosection.

<sup>38</sup> exception for Muskwa Foothills-Liard Highland region where regional district and protected area data were overlaid to populate tables in Appendices 1, 3 and 5.

<sup>39</sup> 40,000 ha of grassland were mapped using the BEU inventory; an area was mapped if grassland was a dominant habitat with >60% of the polygon area, or a sub-dominant habitat with >40% - <60% of the polygon area, and occurring in association with an aspen/balsam poplar community as the dominant habitat.

**Figure 27: Muskwa Foothills-Liard Highland Grasslands**

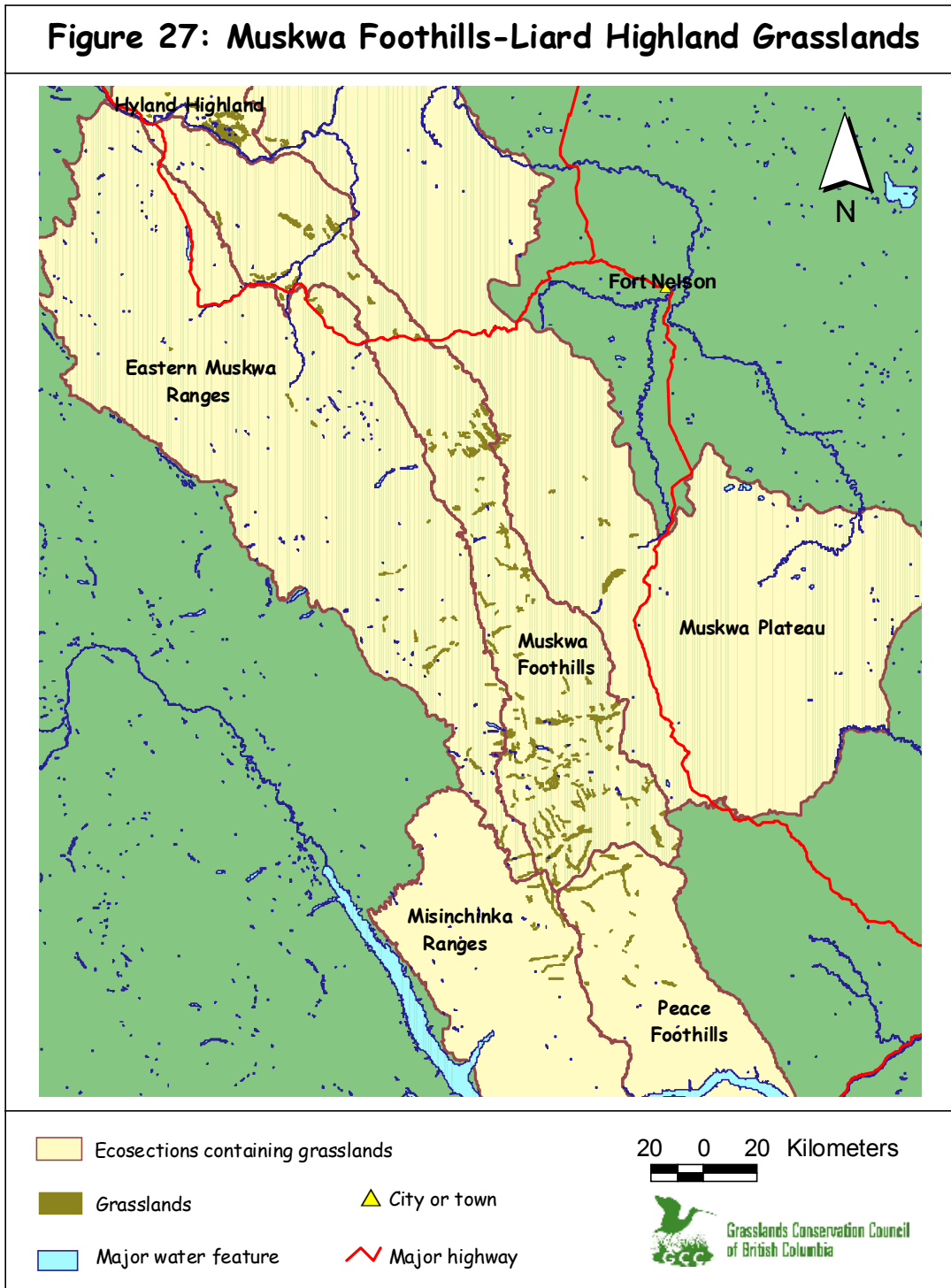


Table 25. Muskwa Foothills-Liard Highland:  
Grassland Area by Ecosection and Biogeoclimatic Unit

Ecosection	Area of grassland (ha)	% of total for region	Biogeoclimatic Unit	Area of grassland (ha)	% of total for region
Muskwa Foothills	36,907	59.8%	BWBS dk 2	6,744	10.9%
Hyland Highland	6,723	10.9%	BWBS mk	224	0.4%
Eastern Muskwa Ranges	5,766	9.3%	BWBS mw 2	7,032	11.4%
Peace Foothills	5,307	8.6%	BWBS wk 2	3,059	5.0%
Misinchinka Ranges	3,657	5.9%	BWBS wk 3	92	0.1%
Muskwa Plateau	3,363	5.4%	ESSF mv 4	8,041	13.0%
TOTAL	61,722	100.0%	ESSF wk 2	372	0.6%
			SWB mk	35,805	58.0%
			AT	353	0.6%
			TOTAL	61,722	100.0%

#### 4.7.2 Bulkley Basin

The Bulkley Basin Ecosection occurs in central BC and extends from Vanderhoof in the east to Telkwa in the west (Figure 28). Ootsa Lake forms the southern boundary of the ecosection while the northern boundary lies just north of Smithers along the Bulkley River. Open Range polygons were used to roughly map and estimate the area of grassland in the Bulkley Basin and its surrounding ecosections. These polygons were derived from 1:20 000 scale Forest Cover data covering the Bulkley, Morice and Lakes Forest Districts.

This region contains 18,384 ha of Open Range (OR), with the majority falling within the Bulkley Basin Ecosection (Table 26). Although OR has been used to roughly define and estimate the area of grassland, orthophoto verification and expert knowledge are required to increase the accuracy of maps and resulting statistics. Preliminary analyses of OR in the Bulkley Basin have revealed that some of these areas are agricultural clearings, others resemble wet meadows rather than grasslands, while still others are in fact forested. Furthermore, there are 'true' grasslands in this area that do not occur within Open Range polygons<sup>40</sup>.

<sup>40</sup> Based on field work to identify Saskatoon – Slender wheatgrass scrub steppe (SW) and Bluegrass – Slender wheatgrass grasslands (BW) in:

Haeussler, S. 1998. Rare and endangered plant communities of the Southeastern Skeena region. Prepared for BC Environment and Habitat Conservation Trust Fund. Smithers, BC. 98 p.

**Figure 28: Bulkley Basin Open Range**

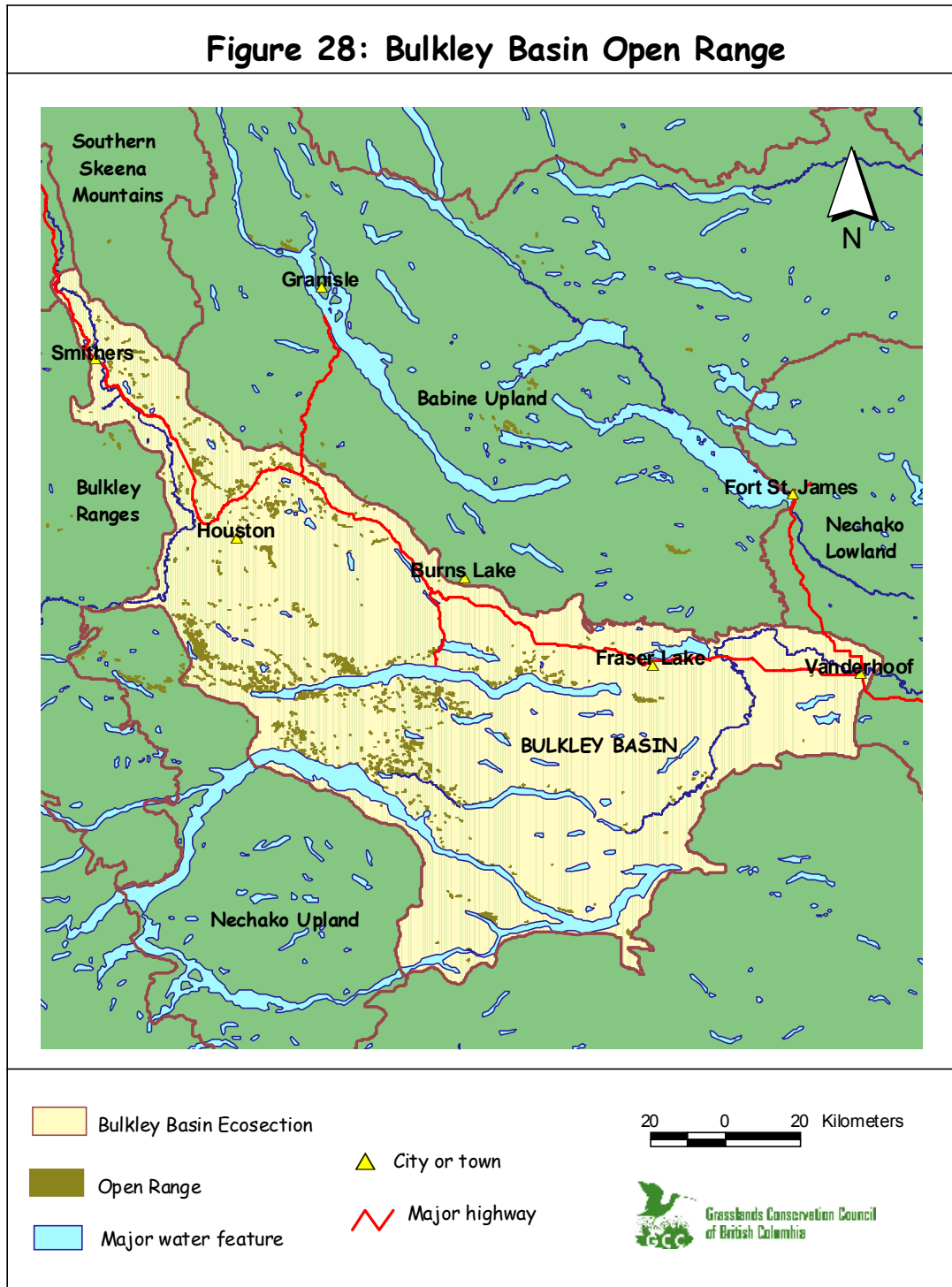




Table 26. Bulkley Basin: Open Range Area by Ecosection and Biogeoclimatic Unit

Ecosection	Area of open range (ha)	% of total for region **
Bulkley Basin	15,581	84.8%
Babine Upland	1,357	7.4%
Nechako Upland	783	4.3%
Bulkley Ranges	380	2.1%
Cranberry Upland	197	1.1%
Southern Skeena Mountains	67	0.4%
Nechako Lowland	20	0.1%
TOTAL	18,384	100.0%

Biogeoclimatic Unit	Area of open range (ha)	% of total for region
SBS dk	12,692	69.0%
SBS mc 2	4,752	25.8%
SBS dw 3	95	0.5%
SBS wk 3	143	0.8%
ICH mc 2	59	0.3%
CWH ws 2	43	0.2%
ESSF mc	477	2.6%
ESSF mv 1	5	0.0%
ESSF mv 3	19	0.1%
ESSF ww	88	0.5%
AT	11	0.1%
TOTAL	18,384	100.0%



Grasslands on the north shore of Francois Lake Brian Wikeem

Grasslands in the Bulkley Basin are limited to the lowest elevations and occur most often on moderate to steep south facing slopes in the SBSdk Biogeoclimatic unit. Saskatoon – Slender wheatgrass communities are found on the north shores of major lakes in the region including Francois, Ootsa, Cheslatta and Uncha Lake. These communities are also

found on warm, dry sites along the Nechako and Bulkley Rivers as well as along other drainages. Interior bluegrass - Slender wheatgrass communities are far less common in the Bulkley Basin but occupy similar sites.

#### 4.7.3 East Vancouver Island-Gulf Islands

The East Vancouver Island-Gulf Islands region is located in the southwest corner of the province and is generally defined by the Nanaimo Lowland and Southern Gulf Islands Ecosections (Figure 29). Terrestrial Herbaceous (HT) and Garry Oak Woodland (WD) polygons at a 1:20 000 scale were acquired from the East Vancouver Island-Gulf Islands Sensitive Ecosystems Inventory (SEI) and used to approximate grassland extent for this region<sup>41</sup>. Terrestrial herbaceous communities have also been identified on the Sunshine Coast, yet SEI mapping data has not yet been released for this mainland project area. The degree to which terrestrial herbaceous communities and Garry Oak woodlands resemble ‘true’ grasslands has not yet been determined.

Garry Oak woodlands are generally confined to the southeast coast of Vancouver Island and the adjacent Gulf Islands and exist under a warm, dry rainshadow climate in the CDFmm Biogeoclimatic unit (Table 27). Of the 1,275 ha of woodland mapped within the region, the majority occurs on the southern portion of the Saanich Peninsula around Victoria. Sizeable areas

<sup>41</sup> Polygons selected from the SEI if the dominant ecosystem was HT or WD, with a WD polygon only selected if it contained Garry Oak (QG) as a dominant tree species.

Figure 29: East Vancouver Island-Gulf Islands  
Garry Oak Woodland and Terrestrial Herbaceous



of woodland have also been identified on Saltspring, Prevost and Galiano Islands. Garry Oak woodlands have been described as encompassing a number of inter-related communities including open oak stands and meadows, as well as more densely forested stands where oak occurs in association with coastal Douglas-fir, grand fir and arbutus. Shrub, grass and forb species typically dominate the understory. Most Garry Oak woodlands occur on rocky knolls, south facing slopes, and ridges where soils are shallow and dry<sup>42</sup>.

Terrestrial Herbaceous communities are more widespread than Garry Oak woodlands in this region, occurring from the southern tip of Vancouver Island in the CDFmm Biogeoclimatic unit to Campbell River in the CWHxm2 Biogeoclimatic unit. The SEI mapped 4,245 ha of this community, with concentrations on Vancouver Island around Goldstream, upper Saanich Inlet, Duncan, Wellington and Campbell River. Sites have also been identified on most of the Gulf Islands. Terrestrial Herbaceous communities are described as open wildflower meadows and grassy hilltops dominated by herbs, grasses, forbs, mosses and lichens. Herbaceous vegetation is continuous except for rock outcrops and there are scattered trees and shrubs as a result of the shallow, dry soils. Summer heat also creates drying conditions that limits tree and shrub growth. Terrestrial Herbaceous communities are found outside the salt spray zone near shorelines, and can continue up to the summits of local hills<sup>42</sup>.



Terrestrial herbaceous community in Victoria

Wayne Erickson

**Table 27 – East Vancouver Island-Gulf Islands: Garry Oak Woodland and Terrestrial Herbaceous Area by Ecosession and Biogeoclimatic Unit**

Ecosession	Area of Garry Oak woodland (ha)	Area of Terrestrial Herbaceous (ha)	% of total for region *
Namaimo Lowland	1,027	3,441	80.9%
Southern Gulf Islands	231	480	12.9%
Strait of Georgia	17	202	4.0%
Leeward Island Mountains	0	122	2.2%
<b>TOTAL</b>	<b>1,275</b>	<b>4,245</b>	<b>100.0 %</b>

Biogeoclimatic Unit	Area of Garry Oak woodland (ha)	Area of Terrestrial Herbaceous (ha)	% of total for region *
CDF mm	1,201	1,411	47.3%
CWH xm 1	34	2,478	45.5%
CWH xm 2	0	238	4.3%
CWH mm 2	0	70	1.3%
no beclabel **	39	49	1.6%
<b>TOTAL</b>	<b>1,275</b>	<b>4,245</b>	<b>100.0 %</b>

\* % of total combines area of Garry Oak and Terrestrial Herbaceous.

\*\* no beclabel for small number of polygons in Georgia Strait that do not overlap with Biogeoclimatic Ecosystem Classification.

<sup>42</sup> McPhee, M., P. Ward, J. Kirkby, L. Wolfe, N. Page, K. Dunster, N.K. Dawe and I. Nykwist. 2000. Sensitive Ecosystems Inventory: East Vancouver Island and Gulf Islands, 1993-1997. Volume 2: Conservation Manual. Technical Report Series No. 345, Canadian Wildlife Service, Pacific and Yukon Region, British Columbia.

#### 4.7.4 Northern Boreal Mountains-Plateaus

The Northern Boreal Mountains-Plateaus region covers the northwest portion of the province between the Rocky Mountains and the Coast Mountains (Figure 1). Extending from Williston Lake to Atlin, this broad, sparsely populated region includes the Kechika and Northern Omineca Mountains, the Cassiar and Tuya Ranges, and the Southern Boreal, Stikine and Teslin Plateaus. Extensive alpine and sub-alpine grasslands have been identified in this region (B. Drinkwater,



grasslands in Spatsizi Plateau Wilderness Provincial Park BC Parks

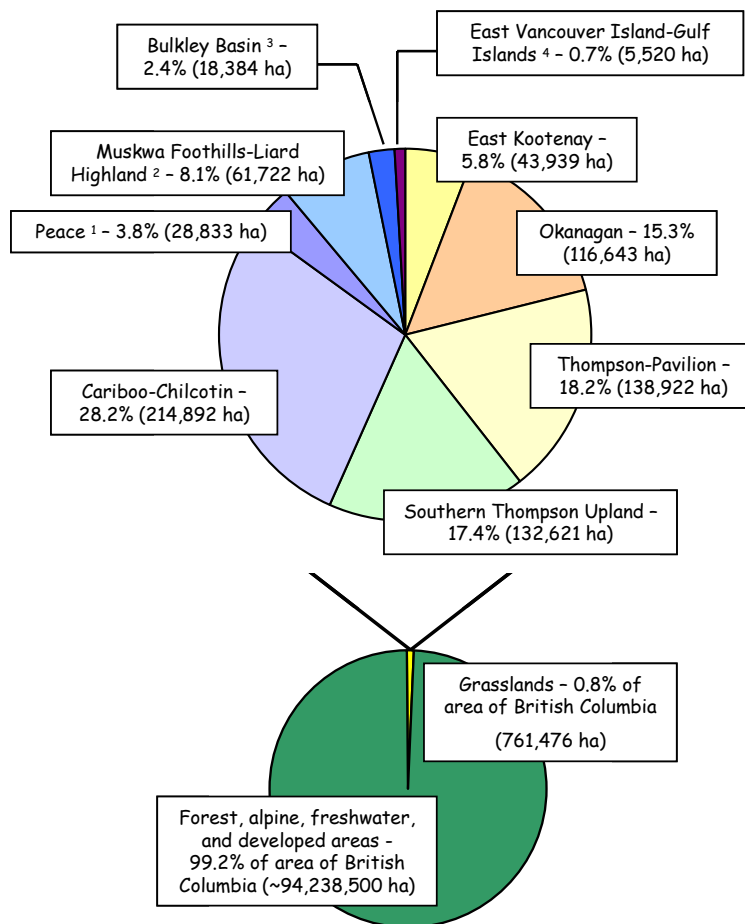
pers. comm. 2003), yet adequate inventory source data is not available to consistently map these types. The Broad Ecosystem Inventory (BEI) at 1:250 000 scale maps areas of “alpine grassland” in this region, however ecologists that assisted with the inventory consider the product only somewhat useful for identifying grasslands. Alpine grasslands were identified based on a visual reference to coarse-filter Landsat imagery in hard copy form. Experts believe that in addition to some grassland areas being missed, others were grouped into

larger vegetation assemblages at this broad mapping scale. Mapping in this region is also marred by the lack of a grasslands classification system.

## 5. PROVINCIAL STATISTICS

Statistics from each grassland region have been assembled to produce a provincial perspective on the area of grassland, land status, range tenure, Agricultural Land Reserve and loss to development. The purpose of this section is to provide a provincial overview in a graphical format.

Figure 30 – Area of BC’s Grasslands with Percentage by Region



1 - mapping in the Peace covers numerous clay banks and sparsely vegetated areas along major river breaks, some of which may not be considered ‘true’ grassland communities. This region requires additional field verification; figure for area of grassland is likely somewhat overestimated.

2 – mapping based on 1:250 000 scale data for Muskwa Foothills combined with 1:20 000 data for Liard Highland.

3 – mapping based on area of Open Range in the Bulkley Basin. Not all Open Range in this region is grassland; figure is likely somewhat overestimated.

4 – mapping based on area of Terrestrial Herbaceous and Garry Oak Woodland communities in the East Vancouver Island – Gulf Islands Sensitive Ecosystems Inventory. Degree to which these communities resemble ‘true’ grasslands has not yet been determined.

**additional notes** – no mapping in the Northern Boreal Mountains-Plateaus region.

Figure 31 – Land Status of BC’s Grasslands <sup>1</sup>

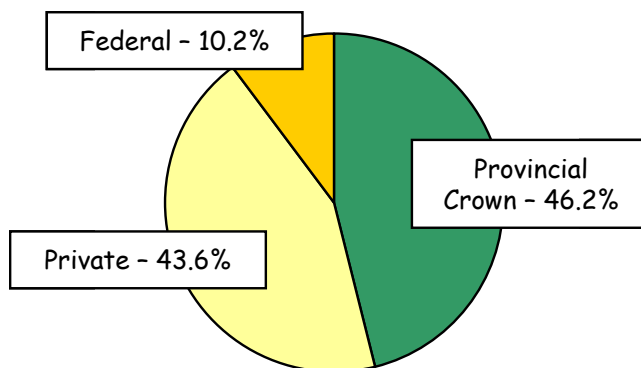


Figure 32 – Land Status of BC’s Grasslands (expanded) <sup>1</sup>

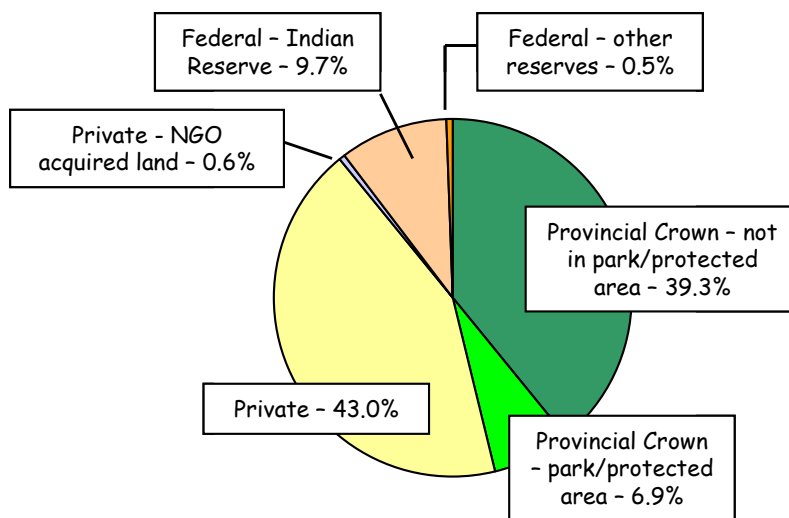


Figure 33 – Range Tenure on BC’s Provincial Crown Grasslands <sup>1</sup>

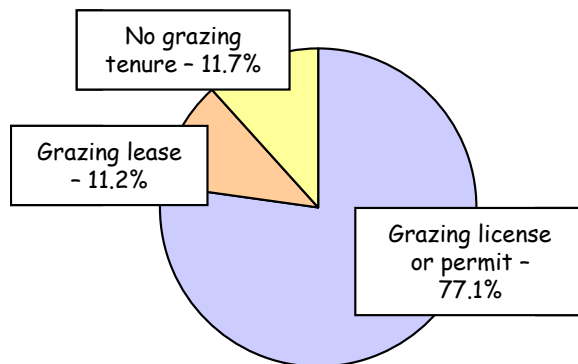




Figure 34 – BC’s Grasslands in Agricultural Land Reserve (ALR) <sup>1</sup>

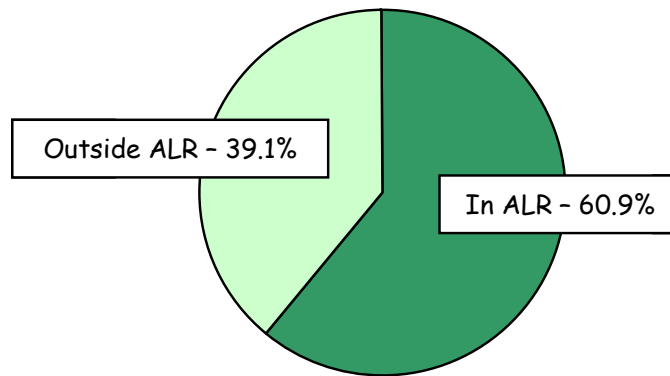
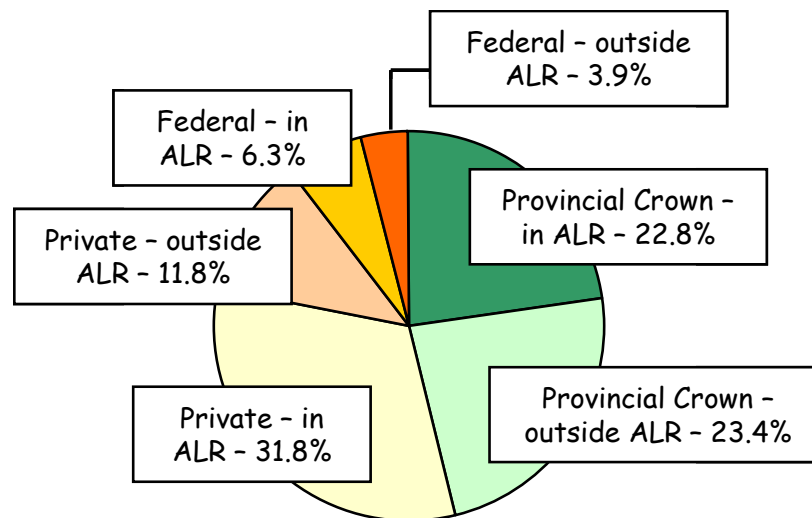
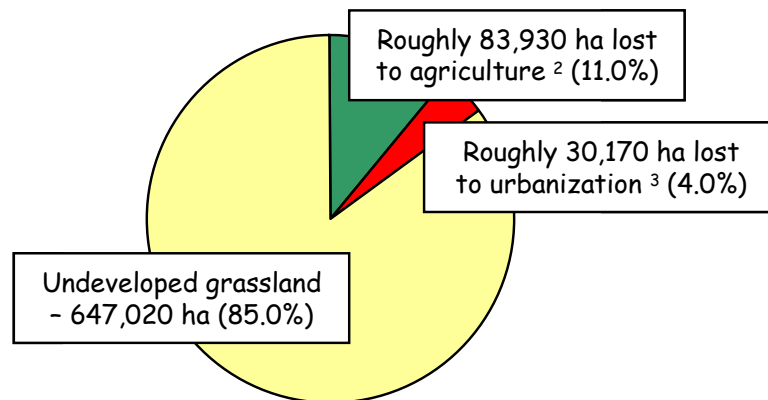


Figure 35 – BC’s Grasslands in Agricultural Land Reserve (ALR) (expanded) <sup>1</sup>



1 – land status, range tenure and ALR statistics based on mapping in the East Kootenay, Okanagan, Thompson-Pavilion, Southern Thompson Upland, Cariboo-Chilcotin and Peace regions. Does not include statistics for the Muskwa Foothills-Liard Highland, Bulkley Basin, East Vancouver Island-Gulf Islands or Northern Boreal Mountains-Plateaus regions.

Figure 36 – Southern Interior Grasslands Lost to Agriculture and Urbanization <sup>1</sup>



1 – based on historical mapping in the East Kootenay, Okanagan, Thompson-Pavilion, Southern Thompson Upland and Cariboo-Chilcotin regions.

2 – refers to intensive types of agriculture such as vineyards, orchards and plantation crops as well as less intensive types such as irrigated hayfields and pastures. Does not refer to the agricultural practice of ranching or livestock grazing on native grasslands.

3 – refers to built-up areas and urban development within towns, cities and communities; also refers to industrial sites.

## 6. DATA LIMITATIONS AND CONSIDERATIONS

Data, maps, statistics and analyses resulting from the *BC Grasslands Mapping Project* are subject to a number of limitations and considerations. The purpose of the following section is to outline these in some detail. Understanding these limitations is important to ensure the product is applied appropriately.

### 6.1 Grassland Ecosystems Mapping

Grassland ecosystems have been mapped at the 1:20 000 scale for the Invermere, Cranbrook, Arrow, Boundary, Penticton, Vernon, Salmon Arm, Merritt, Lillooet, Kamloops, Clearwater, 100 Mile House, Williams Lake, Chilcotin, Quesnel, Robson Valley, Vanderhoof, Prince George, Fort St. James, Dawson Creek, Fort St. John and Fort Nelson Forest Districts. These were the Ministry of Forests districts in place when the mapping was initiated in April 2000. Forest Cover data acquired for grassland ecosystems mapping had been ‘cut’ to these administrative boundaries. In turn, these boundaries served as the geographic extent for all subsequent data overlays on the base grasslands ecosystems layer.

Forest Cover data were used as the source linework for grassland ecosystems mapping. With the primary purpose of the Forest Cover inventory to map and classify productive, commercial forest land, non-forested lands such as grasslands were considered secondary. Unlike forested areas where tree species, composition and volume were identified, native grasslands were generally defined as ‘Open Range’ and given no differentiation of species type, composition or seral stage.

Other non-commercial forest areas such as alpine, riparian brush and wetlands were also treated as secondary cover types in the Forest Cover inventory. In alpine areas, there was no differentiation between rock and ice, wet meadows and dry alpine grasslands, among other communities. Thus, most alpine grasslands across the province have not been mapped. The Forest Cover inventory failed to differentiate among grassland communities at various elevations and did not pick up many of the smaller habitats and ecosystems that occur within grassland environments. Various wetland complexes, rose thickets and antelope-brush stands are among the many important communities not mapped by Forest Cover data. With respect to mapping scale and resolution, distinct vegetation communities less than 1 ha were generally not identified. However, exceptions have been noted for small ponds that have been ‘TRIM- tied’<sup>43</sup> as well as small tree patches, such as aspen copses, that occur within open grasslands.

Forest Cover data are somewhat out of date; currency depends on the forest district from which the data originates. From the time of the original inventory in each district to the present day, a number of changes have occurred on grasslands, with some changes not reflected in the data. Even though Forest Cover inventory updates were conducted regularly, there are still incidences where grasslands are mapped in an area where they no longer exist. Typically this includes grasslands that have been converted to private agricultural plots or urban areas as a result of development, or more densely forested areas as a result of encroachment or ingrowth. Although this circumstance is not widespread, it is safe to assume that the area of grassland has been slightly overestimated while the area of converted or forested land within the grassland matrix has been slightly underestimated<sup>44</sup>. It is important to consider that the purpose of the *BC Grasslands Mapping Project* was to develop a benchmark map of BC’s grasslands. Updates and maintenance of the grasslands GIS will be required, and are covered in section 8.

Approximately 1½ years were spent developing and verifying the base grassland ecosystems layer for the province. Detailed checks were made with aerial photography, orthophoto mosaics, Landsat imagery and detailed ecosystem inventories (e.g. Terrestrial Ecosystems Mapping, Predictive Ecosystems Mapping, Sensitive Ecosystems Inventory) to increase the accuracy and consistency of the resulting products. During this intensive process, numerous polygons were added, deleted or altered to better map grassland ecosystems given the limitations of the source Forest Cover data. Technical Review Committees comprised of grassland experts were also established in each major region (Appendix 7). Information and on-the-ground knowledge gathered from these committees was a critical component of mapping verification.

Additional data considerations for grassland ecosystems mapping include:

- Mapped grasslands include open range and open dry forest ≤ 10% crown closure.
- Communities adjacent to grasslands were mapped to capture the larger grassland environment:
  - aspen copses
  - cottonwood stands

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<sup>43</sup> Process of integrating water features into the Forest Cover inventory using existing digital Terrain Resource Information Mapping (TRIM).

<sup>44</sup> For the most part, forested land that has reverted to grassland as a result of fire was captured during Forest Cover inventory updates. As such, there are no reported instances of forested land that should be classified as grassland.

- rivers, lakes and wetlands
- wet meadows
- riparian brush
- coniferous forest patches
- cliffs, clay banks, gravel bars and rocky terrain
- Biogeoclimatic Ecosystem Classification (BEC) and Ecosections current to 1995 were used for data overlays and resulting statistics.

For more information on grassland ecosystems data and specific details related to mapping in each forest district, refer to the metadata files and procedural documentation in the GIS.

## 6.2 Land Status and Range Tenure

The land status and range tenure of BC's grasslands was determined through a number of GIS data overlays including:

- Agricultural Land Reserve; 1:20 000 scale; current to January 2000; acquired from Land Reserve Commission - May 2002.
- Ownership (private, crown, federal land); 1:20 000 scale; various degrees of currency depending on forest district; acquired from Ministry of Sustainable Resource Management and Ministry of Forests - various dates 2001-2002.
- Provincial parks and protected areas; 1:20 000 scale; current to August 2001; acquired from Ministry of Sustainable Resource Management - May 2002.
- Non-government organization acquired lands; ~1:20 000 scale; various degrees of currency depending on forest district; acquired from Ministry of Sustainable Resource Management - May 2002 (South Okanagan); Columbia Basin Fish and Wildlife Compensation Program - May 2002 (East Kootenay); The Land Conservancy – May 2002 (Annis Covenant and Talking Mountain Ranch); Nature Conservancy of Canada – May 2002 (Tatlayoko Ranch and Skinner Meadows).
- Regional districts; 1:50 000 scale; current to Oct 1999; acquired from Ministry of Sustainable Resource Management - May 2002.
- Municipal boundaries; 1:250 000 scale; current to July 1997; acquired from Ministry of Sustainable Resource Management - May 2002.
- Range Act tenures (grazing licenses and permits); ~1:20 000 scale; various degrees of currency depending on forest district; acquired from Ministry of Sustainable Resource Management and Ministry of Forests - various dates 2001-2002.
- Land Act tenures (grazing leases); 1:20 000 scale; various degrees of currency depending on forest district; acquired from Ministry of Forests, Ministry of Sustainable Resource Management, Land Reserve Commission, and Land & Water BC - various dates 2001-2002.

Throughout all four years of the *BC Grasslands Mapping Project*, efforts were made to update and edit the land status and range tenure layers to keep the GIS database current. Cadastral and land parcel data from regional districts, Land & Water BC, and the Integrated Cadastral Initiative (ICI) were used during this process. Range tenure data were updated and edited based primarily on discussions with Range Officers in each forest district. With the status and tenure of grasslands constantly changing, the update of this portion of the database was very labour intensive and time consuming.

There is one specific instance where one should question the land status of a particular grassland area based on the relative ‘out-of-dateness’ of the Ministry of Forests’ Ownership data. This circumstance is where a small, crown land parcel is surrounded by private land. Unless this parcel is a provincial park, protected area, crown reserve or grazing lease, it is likely now private land, especially if it occurs in a valley bottom. If the parcel also has no range tenure, the likelihood of it being private is even higher. For any project using this data and conducting field work, it is recommended that the area be staked prior to commencement of the work, particularly for crown lands. Land status and range tenure data in the grasslands GIS are meant for strategic-level purposes only.

For more information on land status and range tenure data and specific details related to mapping in each forest district, refer to the metadata files and procedural documentation in the GIS.

### 6.3 Historical Extent

Historical grassland extent was mapped for the valley bottoms of the southern interior, considering only those areas that have been converted from native grassland to urban and agricultural developments<sup>45</sup>. Mapping was based on 1:20 000 scale Forest Cover data and focussed on urban (U), gravel pit (GR), clearing/cultivated (C) and hayfield (P) polygons identified under the non-productive forest descriptor field of the Forest Cover. Geographic extent was defined by the Cranbrook, Invermere, Boundary, Penticton, Vernon, Salmon Arm, Merritt, Lillooet, Kamloops, 100 Mile House, Williams Lake and Chilcotin Forest Districts. Historical extent was estimated by determining what percentage of an existing converted area once supported native grassland. For example, a vineyard situated on an upland bench and completely surrounded by grassland was likely 100% grassland historically. If this vineyard is 100 ha, then there were 100 ha of grassland that existed there historically. On the other hand, a valley bottom hayfield associated with a mix of riparian brush, cottonwood and grassland may have only been 20% grassland historically. If this hayfield is 100 ha, then it is assumed that 20 ha of grassland existed there historically. Historical grassland extent was mapped based on the following data and information inputs:

- Earliest aerial photography available for each region (e.g. 1938 in Okanagan, 1952 in East Kootenays).
- Historical photos from BC Archives (oblique landscape photographs).
- Soil maps delineating grassland soils (e.g. chernozems).
- Range survey linen maps from the 1950s.
- Historical Terrestrial Ecosystem Mapping for the South Okanagan.
- TRIM contours and water, existing grassland extent, and orthophotography for detailed site interpretation.
- Site specific information gathered from experts.

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<sup>45</sup> grasslands lost to forest encroachment were not considered in this analysis. Refer to *Changes in the Grassland-Forest Interface* for details on forest encroachment in each region.

Conversion to urban and agricultural development refers to those areas of historical native grassland that are now either cities, towns, built-up areas, linear developments, mines, gravel pits, industrial sites, golf courses, vineyards, orchards, market crop plantations, irrigated hayfields and pastures, or range seedings.

For more information on historical grasslands data and specific details related to mapping in each forest district, refer to the metadata files and procedural documentation in the GIS.

#### 6.4 Species at Risk

Field observations of threatened and endangered species were collected and integrated into the grasslands GIS. Point data were collected from the Conservation Data Centre (CDC) and from biologists and wildlife experts in each administrative region of the Ministry of Water, Land and Air Protection (WLAP). Only the locations of grassland associated species were collected from WLAP<sup>46</sup>. Species data are subject to the following limitations and considerations:

- Points do not reflect a true inventory of all threatened and endangered species locations across the province; sightings are generally concentrated along roads and on crown land; the number of points in an area is more a reflection of inventory effort than actual abundance/distribution of species locations.
- Species points from WLAP biologists have not yet been assessed by the CDC. Some points may not be accepted into element occurrences, others may be grouped into a single element occurrence; these points to be used only for ‘presence-absence’ of specific species.
- Accuracy of some species points is questionable due to a lack of GPS point precision or errors in data capture (especially for WLAP points).

For more information on species data, refer to the metadata files and procedural documentation in the GIS.

#### 6.5 Non-native Invasive Plants

Non-native invasive plant distribution was mapped for forest districts where data were readily available. Point data were collected for the Invermere, Cranbrook, Lillooet, Vanderhoof, Dawson Creek and Fort St. John Districts. Polygon data at approximately 1:30 000 scale were collected for the Merritt, Kamloops and Clearwater Districts. Non-native invasive plant data are subject to the following limitations and considerations:

- Points and polygons do not reflect a true inventory of non-native invasive plant distribution and abundance in each district; mapping is generally confined to ‘weed treatment’ sites on crown land where the Ministry of Forests has, or will be, instituting biological and/or chemical weed control.

For more information on non-native invasive plant data and specific details related to mapping in each forest district, refer to the metadata files and procedural documentation in the GIS.

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<sup>46</sup> Grassland associated species defined as “a species that depends on a grassland habitat or a grassland-adjacent habitat for a good part of its life cycle. This includes species in adjacent dry conifer forests, valley bottom deciduous stands, pocket wetlands and riparian areas that exist as part of the larger grassland and open valley bottom landscape.”

Refer to *Grasslands of British Columbia* for list of grassland associated species.



## 7. PROJECT CONCLUSIONS AND RECOMMENDATIONS

### 7.1 Identifying Priority Areas for Conservation and Stewardship

Now that the *BC Grasslands Mapping Project* is complete, it is critical for the GCC and its partners to employ the GIS in the identification of priority areas for grasslands conservation and stewardship. To identify these high value/high threat sites, the GCC recommends using the grasslands database in conjunction with the expertise of local and regional agrologists, ecologists, ranchers, First Nations and other grassland experts across the province. Value criteria will include attributes such as grassland habitat diversity, condition, contiguity and connectivity. Threat criteria will include attributes such as ownership status, size of land parcel and risk of development. This collaborative expert process will yield key recommendations, supported by maps and other information, which will be extended to the appropriate agencies, organizations and individuals having jurisdiction over priority areas (i.e. provincial government, federal government, First Nations and private landowners). The GCC proposes to extend the results of the prioritization exercise to increase awareness and inform specific groups of the need for conservation and stewardship of identified sites, whether it be through the designation of protected areas or special management zones on provincial crown and federal lands, the acquisition of properties or establishment of covenants on private lands, or the stewardship of working ranches on both First Nations and private lands. This provincial exercise will allow the GCC to work proactively with stakeholders to ensure that high value, priority grassland ecosystems are managed for their long-term existence and health.

The identification of priority sites, or ‘core’ conservation and stewardship areas, is one step in the GCC’s overall strategy to complete regional grassland conservation plans. Regional plans will ultimately integrate core areas in a landscape mosaic comprised of a buffer zones, special management areas and landscape linkages that will together ensure an appropriate level of grasslands conservation and stewardship across the province.

Refer to Appendices 8 - 10 for a detailed description of the grasslands prioritization process.

### 7.2 Grassland Site Series - Seral Community Classification and Mapping

Although the majority of the province’s grasslands have been mapped during this project, GIS data were not available to classify these into discrete communities at the 1:20 000 scale. The 1:250 000 scale Biogeoclimatic Ecosystem Classification (BEC) provides a coarse level of distinction with the identification of lower (BGxh), middle (BGxw) and upper (IDF) grasslands, however this does not adequately capture the diversity and variability of bunchgrass and shrub-steppe communities. This coarse scale classification is also limited to southern interior grasslands. Despite some finer scale, BEC site series classification initiatives undertaken in the southern interior valleys, gaps still remain in sizeable grassland areas. Furthermore, these site-specific classifications have focussed primarily on late-successional grasslands; most seral or disturbed grasslands have not been classified. Without a classification system for all of BC’s grasslands, it is difficult to manage for grasslands diversity and conservation. There must be differentiation among the various climax and seral grassland communities across the province for effective planning and decision making.

The GCC recommends the initiation of a site series and accompanying seral community classification for BC's grasslands. The GCC will work closely with the Ministry of Forests and Ministry of Sustainable Resource Management to ensure that site series classification conforms to the standardized BEC system. Existing classifications from Terrestrial Ecosystem Mapping (TEM), Predictive Ecosystem Mapping (PEM) and Sensitive Ecosystem Inventories (SEI) will be compiled and integrated. Seral stage classification focussing on seral plant communities will be incorporated into the site series system. Seral plant communities will be categorized as early, mid, late seral, or climax, with climax being the most advanced stage of succession.

Once complete, the site series and accompanying seral community classification will provide a foundation for mapping. Grassland ecosystems and seral associations will be mapped across the province, focussing first on priority areas (see section 7.1). Spectral signature classification using Landsat imagery may be the most efficient process for completing this work.

### **7.3 Additional Mapping, Verification and Data Compilation**

The GCC recommends the following as additions to the grasslands GIS:

- Non-native invasive plant mapping for the Arrow-Boundary, Okanagan-Shuswap, 100 Mile House, Central Cariboo and Chilcotin Forest Districts. This mapping will be available on the Land and Resource Data Warehouse (LRDW) once the Southern Interior Region of the Ministry of Forests standardizes all data.
- Verify grasslands mapping in the Peace, particularly for those areas identified as "grassland-associated clay banks".
- Historical mapping in the Peace to determine how much grassland has been lost to agriculture.
- Finer scale mapping of grasslands in the Muskwa Foothills-Liard Highland region.
- Verify grasslands mapping in the Bulkley Basin by determining which Open Range polygons overlap with 'true' grasslands versus those that overlap with agricultural fields, wet meadows or forested areas.
- Develop a process to map alpine grasslands, particularly in the Northern Boreal Mountains-Plateaus region. Landsat imagery will likely prove to be the best data source for this.
- Land status, range tenure, historical extent, rare species locations and non-native invasive plant overlays for the Muskwa Foothills-Liard Highland, Bulkley Basin and Northern Boreal Mountains-Plateaus regions.
- Continued compilation of mapping data for Garry Oak Woodland and Terrestrial Herbaceous communities in the East Vancouver Island-Gulf Islands region.

## **8. DATA WAREHOUSING AND MAINTENANCE**

As part of the terms of this project, the GCC has delivered an all-inclusive grasslands GIS with multiple coverages to the Ministry of Sustainable Resource Management (MSRM) for data warehousing. All GIS products have detailed metadata and procedural documentation. MRSRM will store this data in a manner consistent with their warehousing standards and provide access to key clients such as the Ministry of Forests; Ministry of Water, Land & Air Protection; Ministry of Agriculture, Food & Fisheries; non-government organizations; First Nations; ranching and

other industries; and the federal government. The GCC is actively working with MSRM to ensure that the grasslands data are available through an internet map service.

The maintenance of the grasslands GIS, including updates to grassland ecosystems mapping, will be handled by the Grasslands Conservation Council as the need arises. The GCC will perform updates as required by the custodian of grasslands data, whom the GCC is seeking in the Ministry of Water, Land and Air Protection. An update of the grassland ecosystems layer will be required before 2008 as more areas are lost to development and forest encroachment. This ecosystem update should integrate all existing Vegetation Resources Inventories (VRI), Terrestrial Ecosystem Mapping (TEM) and Sensitive Ecosystem Inventories (SEI). Updated maps will be delivered to MSRM in order for the Ministry to store and provide access to the most current grasslands data.

## 9. COMMUNICATION, EXTENSION AND DATA DISTRIBUTION

The GCC is developing a comprehensive communication and extension plan that addresses needs in the planning, decision making and policy processes of the federal government, provincial government, regional and municipal level governments, the ranching and general agricultural industry, environmental non-government organizations and First Nations. The GCC will ensure the effective delivery of grasslands data and information to ensure that all relevant groups have the information they need to develop sustainable grassland management plans.

Information-sharing agreements have been developed with agencies, organizations and individuals that would like to use the draft maps, statistics and information produced prior to the data being formally released. The need and demand for information produced through the GIS has become very apparent. Agreements include:

- Ministry of Forests – data products used to assist with forest ingrowth mapping in the Cariboo region; weed data converted from tabular format to mapped locations and distributed to Peace Forest District; maps and information distributed to Victoria to assist with State of the Forest reporting.
- Ministry of Water, Land and Air Protection – data products and information to support numerous operations of the Environmental Stewardship Division.
- Ministry of Sustainable Resource Management – grassland ecosystems mapping for Boundary, Arrow, Cranbrook and Invermere Forest Districts (primarily for base mapping and preliminary analyses by Nelson service centre); grassland ecosystems mapping to assist with verification of Broad Ecosystems Inventory in Okanagan Range Ecoregion.
- Canadian Intermountain Joint Venture (CIJV) – base grassland ecosystems mapping and statistical analyses covering the CIJV study area (Environment Canada initiative).
- Canadian Wildlife Service – maps and information to support CIJV work.
- Regional District of North Okanagan – information to support land value assessments.
- Regional District of Central Okanagan – grassland ecosystems mapping, historical extent and wetland datasets provided for base information.
- University of British Columbia – maps and information to assist with student projects in the Natural Resources Conservation Program of the Faculty of Forestry.
- University College of the Cariboo – reference maps for Range Ecology classes in the Department of Natural Resource Sciences.

- BC Cattlemen’s Association – map of rangelands in BC.
- Kootenay Livestock Association – map of East Kootenay grasslands with identification of land status.
- Columbia Basin Fish and Wildlife Compensation Program – grassland ecosystems mapping for Invermere and Cranbrook Forest Districts (for launch of Columbia Basin Biodiversity Atlas).
- Forest Research Extension Partnership – map of range reference areas in the Nelson Forest Region for presentations.
- Community Mapping Network – base grassland ecosystems mapping for the province for public viewing under ‘Sensitive Habitat and Inventory Mapping’ website component.
- Aboriginal Mapping Network – grassland ecosystems mapping methodology.
- Ktunaxa-Kinbasket Tribal Council – data products to help identify archaeological sites within grassland environments.
- Nature Conservancy of Canada – hard copy map products to support the Canadian Rocky Mountains Ecoregional Assessment; numerous data products, information and expertise to support the Okanagan Ecoregional Assessment.
- Canadian Park and Wilderness Society – statistics to support analyses of grasslands within protected areas.
- The Land Conservancy (TLC) – maps of Reynolds Ranch and East Kootenay grasslands for TLC properties.
- Land Trust Alliance – grassland data products to assist with analyses of conservation priorities on private land.
- East Kootenay Conservation Program – maps and analyses of privately held grasslands in the East Kootenays.
- Columbia River Greenways – data products for the Invermere Forest District (part of data compilation exercise for important habitats in the East Kootenay portion of the Columbia Basin).
- Allan Brooks Nature Centre – grassland maps and information for conservation and communication work in the central and north Okanagan.
- Iverson and Mackenzie Biological Consulting – maps, statistics and information for grassland reporting and for development of national park candidate areas.
- Ecoscape Biological Consulting – maps and information to assist with Sharp-tailed Grouse recovery program.

The GCC will continue to ensure the accessibility and dissemination of all GIS data and associated products resulting from the *BC Grasslands Mapping Project*. Grassland coverages will be available through the Ministry of Sustainable Resource Management office in Kamloops. Grasslands coverages will also be available through the Grasslands Conservation Council, as will all products related to the project. The GCC website ([www.bcgrasslands.org](http://www.bcgrasslands.org)) will be a key source of information. The GCC will continue to extend the products of the *BC Grasslands Mapping Project* to government agencies, non-government organizations, First Nations, ranchers and other groups involved in grassland education, communications, research, monitoring, conservation and stewardship. Target audiences include:

- Federal Government - Environment Canada, Department of Indian and Northern Affairs.

- Provincial Government - Ministry of Forests; Ministry of Water, Land and Air Protection; Ministry of Sustainable Resource Management; Ministry of Agriculture, Food and Fisheries; Ministry of Energy and Mines.
- Crown Corporations - Land and Water BC, BC Hydro, BC Assessment.
- Regional Districts - Cariboo, East Kootenay, Thompson-Nicola, Okanagan-Similkameen, etc.
- Municipal Governments - Vernon, Penticton, Kamloops, Kelowna, Cranbrook, etc.
- First Nations Government - Shuswap Nation Tribal Council, Ktunaxa-Kinbasket Tribal Council, individual bands, etc.
- Ranching associations - BC Cattlemen's Association, livestock associations.
- Non-government organizations - Wildlife Habitat Canada, Nature Conservancy of Canada, Canadian Parks & Wilderness Society, Federation of BC Naturalists, Ducks Unlimited Canada, The Nature Trust of BC, The Land Conservancy, South Okanagan Similkameen Conservation Program, East Kootenay Conservation Program, etc.

## **10. FINANCIAL REPORT**

See attached financial report.

## APPENDIX 1

### Area of Grassland in Regional Districts

REGIONAL DISTRICT <sup>1</sup>	Grassland Area (ha)
Thompson-Nicola	300,807
Cariboo	153,598
Okanagan-Similkameen	82,614
Peace River <sup>2</sup>	69,424
East Kootenay	43,920
Fort Nelson-Liard <sup>2</sup>	21,416
Kootenay-Boundary	18,449
North Okanagan	18,408
Squamish-Lillooet	16,632
Central Okanagan	10,642
Columbia-Shuswap	2,477
Fraser-Fort George	92

1 - does not include preliminary mapping for the Bulkley Basin and East Vancouver Island-Gulf Islands regions. Grasslands in the northwest portion of the province not mapped.

2 - mapping in the Peace River Regional District covers numerous clay banks and sparsely vegetated areas along major river breaks, some of which may not be considered 'true' grassland communities. This region requires additional field verification; figure is likely somewhat overestimated.

Grasslands in the Muskwa Foothills-Liard Highland portion of the Peace River and Fort Nelson-Liard Regional Districts mapped as draft.



## APPENDIX 2

### Loss of Grassland to Development within Municipalities

MUNICIPALITY	Historical Grassland Area (ha)	Present Grassland Area (ha)	Loss to Development <sup>1</sup> (ha)	% loss
Kamloops	19,300	12,656	6,644	34.4%
Kelowna	9,452	1,760	7,692	81.4%
Spallumcheen	6,301	1,367	4,934	78.3%
Coldstream	5,389	2,652	2,737	50.8%
Summerland	3,913	2,499	1,414	36.1%
Penticton	2,488	668	1,820	73.1%
Vernon	1,797	553	1,244	69.2%
Peachland	1,003	354	649	64.7%
Grand Forks	839	157	682	81.3%
Merritt	776	133	643	82.9%
Osoyoos	717	389	328	45.7%
Ashcroft	717	378	339	47.3%
Cache Creek	677	399	278	41.1%
Midway	682	266	416	61.0%
Williams Lake	635	105	530	83.5%
Logan Lake	429	286	143	33.3%
Princeton	381	128	253	66.3%
Oliver	367	12	355	96.8%
Kimberley	222	151	71	32.0%
Invermere	213	25	188	88.2%
100 Mile House	211	100	111	52.5%
Lillooet	171	13	158	92.6%
Lumby	131	81	50	38.3%
Sparwood-District B	107	76	31	29.1%
Chase	92	0	92	100.0%
Keremeos	87	0	87	100.0%
Armstrong	57	0	57	100.0%
Cranbrook	39	0	39	100.0%
Greenwood	37	13	24	65.2%
Clinton	31	0	31	100.0%
Lytton	10	0	10	100.0%
Hudsons Hope	no data	578	no data	n/a
Taylor	no data	230	no data	n/a
Chetwynd	no data	20	no data	n/a
Fort St. John	no data	9	no data	n/a

1 - refers to residential, commercial and industrial development of municipalities as well as rural homesteading, farming and associated development occurring within municipal boundaries.

**additional notes** - orange figures represent 50 – 80% loss; red figures represent 80 – 100% loss.

### APPENDIX 3

#### Area of Grassland in Provincial Parks and Protected Areas

Region <sup>1</sup>	Park/Protected Area <sup>2</sup>	Grassland area (ha) <sup>3</sup>
East Kootenay	Kikomun Creek	316
East Kootenay	Windermere Lake	83
East Kootenay	Columbia Lake	45
East Kootenay	Norbury Lake	25
East Kootenay	Thunder Hill	19
East Kootenay	Wasa Lake	15
East Kootenay	Elko	10
East Kootenay	Dry Gulch	9
East Kootenay	Elk Valley	8
Okanagan	South Okanagan Grasslands - PA	5,038
Okanagan	White Lake Grasslands - PA	1,230
Okanagan	Snowy - PA	738
Okanagan	Kalamalka Lake	533
Okanagan	Anarchist - PA	185
Okanagan	Vaseux - PA	173
Okanagan	Enderby Cliffs - PA	128
Okanagan	Okanagan Mountain	102
Okanagan	Cathedral - PA	101
Okanagan	Bear Creek	59
Okanagan	Fintry - PA	56
Okanagan	Haynes Lease - ER	55
Okanagan	Trout Creek - ER	51
Okanagan	Okanagan Lake	36
Okanagan	Campbell-Brown (Kalamalka Lake)	31
Okanagan	Kekuli Bay	28
Okanagan	Johnstone Creek	13
Okanagan	Kickininee	9
Okanagan	Inkaneep	7
Okanagan	Vaseux Lake	5
Okanagan	Myra Bellevue - PA	5
Okanagan	Keremeos Columns	4
Okanagan	Echo Lake	2
Okanagan	Enderby Cliffs	1
Okanagan	Fields Lease - ER	1
Thompson-Pavilion	Lac Du Bois Grasslands - PA	7,076

Thompson-Pavilion	Edge Hills	1,706
Thompson-Pavilion	Elephant Hill	925
Thompson-Pavilion	Skwaha Lake - ER	252
Thompson-Pavilion	Juniper Beach	237
Thompson-Pavilion	Cornwall Hills	209
Thompson-Pavilion	Marble Range	185
Thompson-Pavilion	Arrowstone - PA	149
Thompson-Pavilion	Soap Lake - ER	130
Thompson-Pavilion	Harry Lake Aspen	102
Thompson-Pavilion	Painted Bluffs	81
Thompson-Pavilion	Epsom Park	68
Thompson-Pavilion	Steelhead	44
Thompson-Pavilion	Tranquille - ER	31
Thompson-Pavilion	Buse Lake - PA	27
Thompson-Pavilion	Walhachin Oxbows	26
Thompson-Pavilion	Skihyst - ER	18
Thompson-Pavilion	McQueen Creek - ER	17
Thompson-Pavilion	Niskonlith Lake	10
Thompson-Pavilion	Paul Lake	11
Thompson-Pavilion	Pritchard Park	6
Thompson-Pavilion	Blue Earth Lake	6
Thompson-Pavilion	Marble Canyon	5
Thompson-Pavilion	Goldpan	4
Thompson-Pavilion	Downing	2
Thompson-Pavilion	Bedard Aspen	1
Thompson-Pavilion	Roderick Haig-Brown	1
Southern Thompson Upland	Tunkwa	815
Southern Thompson Upland	Kentucky-Alleyne	37
Southern Thompson Upland	Trepanier - PA	21
Southern Thompson Upland	Monck	19
Southern Thompson Upland	Brent Mountain	7
Southern Thompson Upland	Greenstone Mountain	7
Southern Thompson Upland	Darke Lake	6
Southern Thompson Upland	Whipsaw Creek - ER	5
Southern Thompson Upland	Roche Lake	3
Cariboo-Chilcotin	Churn Creek - PA	18,885
Cariboo-Chilcotin	Junction Sheep Range	3,142
Cariboo-Chilcotin	Tsyl-os'	1,187
Cariboo-Chilcotin	Chasm	1,009

Cariboo-Chilcotin	Spruce Lake - PA	812
Cariboo-Chilcotin	Big Creek	99
Cariboo-Chilcotin	Itcha Ilgachuz Park	97
Cariboo-Chilcotin	Nuntsi	66
Cariboo-Chilcotin	Bull Canyon	52
Cariboo-Chilcotin	Cariboo Nature	26
Cariboo-Chilcotin	Big Bar Lake	23
Cariboo-Chilcotin	Moose Valley	21
Cariboo-Chilcotin	Big Creek - ER	13
Cariboo-Chilcotin	Green Lake - Boyd Bay	5
Cariboo-Chilcotin	Westwick Lake - ER	4
Cariboo-Chilcotin	Nazko Lake	4
Cariboo-Chilcotin	Lac La Hache	2
Cariboo-Chilcotin	Green Lake - Sunset View	2
Cariboo-Chilcotin	Green Lake - Little Arrow	1
Peace <sup>4</sup>	Peace River Corridor - Peace River	130
Peace	Pine River Breaks	114
Peace	Gwillim Lake	100
Peace	Clayhurst - ER	96
Peace	Kiskatinaw River - PA	27
Peace	Peace River Corridor - Wakanaahtaah	27
Peace	Rolla Canton - ER	16
Peace	Beatton River	12
Peace	Peace River Corridor - Alces River	6
Peace	Dunlevy Recreation Area	6
Peace	Butler Ridge	2
Central Interior <sup>5</sup>	Rubyrock Lake	420
Central Interior	Sutherland River - PA	207
Central Interior	Kluskoil Lake	65
Central Interior	Entiako	12
Central Interior	Nechako Canyon - PA	12
Central Interior	Stuart River - Lower	2
Muskwa Foothills-Liard <sup>6</sup>	Northern Rocky Mountains	10,349
Muskwa Foothills-Liard	Graham Laurier	4,378
Muskwa Foothills-Liard	Liard River Corridor	3,782
Muskwa Foothills-Liard	Redfern - Keily	3,047
Muskwa Foothills-Liard	Liard River West Corridor	366
Muskwa Foothills-Liard	Liard River Corridor - PA	147

Muskwa Foothills-Liard	Liard River Hotsprings	32
Upper Fraser Trench <sup>7</sup>	Jackman Flats	79

1 - does not include preliminary mapping for the Bulkley Basin and East Vancouver Island-Gulf Islands regions. Grasslands in the northwest portion of the province not mapped.

2 - refers to provincial parks, protected areas (PA) and ecological reserves (ER).

3 - area includes small parcels of private grassland that occur within protected area boundaries such as those at Lac du Bois Grasslands, White Lake Grasslands and South Okanagan Grasslands.

4 - mapping in the Peace River Regional District covers numerous clay banks and sparsely vegetated areas along major river breaks, some of which may not be considered ‘true’ grassland communities. This region requires additional field verification; figures are likely somewhat overestimated.

5 – does not include the Bulkley Basin portion of the Central Interior.

6 – grasslands in the Muskwa Foothills-Liard Highland region mapped as draft.

7 – may not be considered a ‘true’ grassland community.

## APPENDIX 4

### Area of Grassland and Associated Habitats in Acquired Lands

	REGION	grassland (ha)	grass asso. aspen copses (ha)	grass asso. cottonwood stands (ha)	grass asso. clay banks and rocky terrain (ha)	grass asso. meadows, riparian brush and wetlands (ha) – no ponds
Annis Covenant-TLC	East Kootenay	15	.	.	.	.
Brisco-CWS	East Kootenay	.	.	.	.	60
Bull River-TNT	East Kootenay	1	.	.	4	.
Bull River-BC Gov	East Kootenay	21	1	.	.	.
Bummers Flats-BC Gov	East Kootenay	144	25	8	1	496
Cherry Creek-TNT	East Kootenay	30	50	.	5	.
Mt Broadwood-NCC	East Kootenay	4	.	.	1	.
Musil/Big Ranch-TNT	East Kootenay	10	12	21	.	.
Newgate-BC Gov	East Kootenay	85	.	.	.	3
RCMP Flats-TNT	East Kootenay	3	.	.	1	.
Sheep Mtn-TNT	East Kootenay	322	.	.	29	.
Sheep Mtn-BC Gov	East Kootenay	72	.	.	11	.
Three Sons-BC Gov	East Kootenay	66	.	.	8	30
Wasa Slough-TNT	East Kootenay	4	8	.	.	47
West Columbia Lk-TNT	East Kootenay	612	34	.	20	17
Wilmer-CWS	East Kootenay	57	.	9	12	257
Wolf Creek-BC Gov	East Kootenay	7	.	.	.	29
Wycliffe-TLC/BC Gov	East Kootenay	307	43	14	34	7
Kilpoola Lake-TNT	Okanagan	42	2	.	.	.
Harper Property-TLC	Okanagan	6	.	.	35	.
Ok Falls/Vaseux Lake-TNT	Okanagan	670	9	.	110	.
Shorts Creek-TNT	Okanagan	.	.	.	36	.
Skaha Lake-TNT	Okanagan	16	.	.	10	.
Trust Creek-TNT	Okanagan	27	.	.	.	.
Vaseux Lake-CWS	Okanagan	341	.	.	150	.
White Lake-TNT	Okanagan	834	2	.	32	5
Reynolds Ranch-TLC	Thompson-Pavilion	277	10	.	.	.
Skinner Meadows-NCC	Cariboo-Chilcotin	12	.	.	.	15
Tatlayoko Ranch-NCC	Cariboo-Chilcotin	9	65	.	.	.

Analysis based on acquired lands data available as of 2003. Many areas not yet digitally mapped (especially for TNT).

Acquired lands - lands acquired or managed for conservation purposes by the provincial government, federal government and/or non-government conservation organizations. TNT (The Nature Trust of BC); TLC (The Land Conservancy of BC); NCC (The Nature Conservancy of Canada); CWS (Canadian Wildlife Service); BC Gov – not in official park/protected area



## APPENDIX 5

### Protected Area/Biogeoclimatic Unit Gap Analysis for BC's Grasslands

Biogeoclimatic Unit	area of grassland <sup>1</sup> (ha)	area of grassland in protected area <sup>2</sup> (ha)	% of grassland in protected area by unit
BG xh 1	22,543	3,250	14.4%
BG xh 2	48,589	2,500	5.1%
BG xh 3	21,812	6,208	28.5%
BG xw 1	57,244	4,838	8.5%
BG xw 2	41,698	8,506	20.4%
BWBSdk 2	6,744	4,079	60.5%
BWBS mk	224	0	0.0%
BWBSmw 1 <sup>3</sup>	28,011	532	1.9%
BWBSmw 2 <sup>4</sup>	7,032	2,678	38.1%
BWBSwk 1	344	8	2.4%
BWBSwk 2 <sup>4</sup>	969	1	0.1%
BWBSwk 3	92	0	0.0%
ESSFdc 1	21	0	0.0%
ESSFdc 2	221	0	0.0%
ESSFdk	427	0	0.0%
ESSFdv	380	0	0.0%
ESSFmv 1	80	1	0.6%
ESSFmv 2	50	0	0.0%
ESSF mv 4 <sup>4</sup>	8,041	3658	45.5%
ESSFwc 4	27	0	0.0%
ESSFwk 2 <sup>4</sup>	372	372	100.0%
ESSFwm	14	0	0.0%
ESSFxc	1,308	401	30.7%
ESSFxcp	53	49	92.3%
ESSF xv 1	115	71	62.1%
ESSF xv 2	1,157	78	6.7%
ICH dw	222	0	0.0%
ICH mk 1	1,344	8	0.6%
ICH mk 2	51	0	0.0%
ICH mw 2	97	0	0.0%
IDF dk 1	25,821	1,708	6.6%
IDF dk 1a	30,588	60	0.2%
IDF dk 1b	433	0	0.0%
IDF dk 2	2,633	41	1.6%
IDF dk 2b	56	0	0.0%
IDF dk 3	30,159	292	1.0%
IDF dk 4	20,515	1,098	5.4%
IDF dm 1	6,508	3	0.0%
IDF dm 2	23,111	1,285	5.6%

IDF dw	3,501	1,099	31.4%
IDF mw 1	2,845	139	4.9%
IDF mw 2	645	7	1.1%
IDF mw 2a	15	0	0.0%
IDF unk	14	0	0.0%
IDF un	2,249	190	8.4%
IDF unv	152	0	0.0%
IDF xh 1	32,069	1,871	5.8%
IDF xh 1a	21,103	528	2.5%
IDF xh 1b	385	0	0.0%
IDF xh 2	20,565	637	3.1%
IDF xh 2a	43,336	31	0.1%
IDF xh 2b	141	0	0.0%
IDF xm	75,509	7,651	10.1%
IDF xw	7,548	1,360	18.0%
MS dc	654	0	0.0%
MS dc 2	452	98	21.8%
MS dk	2,047	304	14.8%
MS dm 1	953	0	0.0%
MS dm 2	792	9	1.2%
MS dv	8	0	0.0%
MS xk	4,824	773	16.0%
MS xv	1,568	52	3.3%
PP dh 1	5,154	13	0.2%
PP dh 2	15,881	528	3.3%
PP xh 1	25,364	2,673	10.5%
PP xh 1a	3,249	946	29.1%
PP xh 2	24,279	876	3.6%
PP xh 2a	685	0	0.0%
SBPSdc	1,007	80	8.0%
SBPSmc	342	11	3.3%
SBPSmk	733	0	0.0%
SBPSxc	11,261	107	0.9%
SBS dh	83	79	94.8%
SBS dk	998	227	22.8%
SBS dw 1	634	0	0.0%
SBS dw 2	232	0	0.0%
SBS dw 3	95	41	43.5%
SBS mc 2	632	296	46.8%
SBS mc 3	241	12	5.0%
SBS wk 2	117	0	0.0%
SBS wk 3	143	76	52.8%
SWB mk <sup>4</sup>	35,805	11,192	31.3%

<b>NDT4 (BG, PP, IDF Zones)</b>	616,398	48,337	7.8%
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1 - does not include preliminary mapping for the Bulkley Basin and East Vancouver Island-Gulf Islands regions. Grasslands in the northwest portion of the province not mapped.

2 - refers to provincial parks, protected areas, ecological reserves and NGO acquired lands.

3 - mapping in the Peace covers numerous clay banks and sparsely vegetated areas along major river breaks, some of which may not be considered ‘true’ grassland communities. This region requires additional field verification; figure for area of grassland in BWBSmw1 zone is likely somewhat overestimated.

4 - grasslands in the Muskwa Foothills-Liard Highland region mapped as draft (relates primarily to SWBmk, BWBSmw2, BWBSwk2, ESSFmv4 and ESSFwk2 zones)

## APPENDIX 6

### Potential for Major Weed Infestations on Grasslands in Different Biogeoclimatic Units

CARIBOO REGION	BGxh	BGxw	IDFxh	IDFxw	IDFxm	IDFdk	MS	SBPS	ESSF	AT
Sulphur Cinquefoil	l	l	h	h	h	h	m	m	l	l
Spotted Knapweed	l	m	h	h	h	h	m	m	m	l
Diffuse Knapweed	h	h	m	m	m	m	l	l	l	l
Leafy Spurge	h	h	h	h	h	h	m	m	l	l
Dalmatian Toadflax	m	h	h	h	h	m	m	m	l	l
Hound's-tongue	l	l	h	h	h	m	m	m	m	l

KAMLOOPS REGION	BGxh	BGxw	PPxh	IDFxh	IDFxw	IDFxm	IDFdk	IDFmw	ICH	MS	ESSF	AT
Sulphur Cinquefoil	l	l	h	h	h	h	h	h	m	m	l	l
Spotted Knapweed	l	m	h	h	h	h	h	h	h	m	m	l
Diffuse Knapweed	h	h	h	m	m	m	m	m	l	l	l	l
Leafy Spurge	h	h	h	h	h	h	h	h	m	m	l	l
Dalmatian Toadflax	m	h	h	h	h	h	h	h	m	m	l	l
Hound's-tongue	l	l	h	h	h	h	h	h	h	h	m	l

NELSON REGION	PPdh	IDFxh	IDFunn	IDFdm	ICH (dry)	ICH (wet)	MS	ESSF	AT
Sulphur Cinquefoil	h	h	h	h	h	m	m	l	l
Spotted Knapweed	h	h	h	h	h	m	m	m	l
Diffuse Knapweed	h	h	h	h	l	l	l	l	l
Leafy Spurge	h	h	h	h	h	m	m	l	l
Dalmatian Toadflax	h	h	h	h	h	m	m	l	l
Hound's-tongue	m	h	h	h	h	h	h	m	l

potential for major weed infestation			
<table border="1" style="margin: auto;"> <tr> <td style="background-color: yellow;">low</td> </tr> <tr> <td style="background-color: orange;">medium</td> </tr> <tr> <td style="background-color: red;">high</td> </tr> </table>	low	medium	high
low			
medium			
high			

**note** - All grasslands in every Biogeoclimatic Zone are susceptible to weed invasion. However, the potential for a major weed infestation is relative depending on the weed and on the environmental conditions. For example, spotted knapweed can easily establish itself in the lower grasslands (BGxh), but it is more likely to develop into a major infestation in the upper grasslands (IDF).

Cariboo Region - Quesnel, Chilcotin, Williams Lake and 100 Mile House Forest Districts.

Kamloops Region – Penticton, Vernon, Salmon Arm, Kamloops, Clearwater, Lillooet and Merritt Forest Districts.

Nelson Region - Boundary, Invermere and Cranbrook Forest Districts.

## APPENDIX 7

### List of Regional Technical Review Committees for the *BC Grasslands Mapping Project* (as of June 2003)

#### PROVINCIAL TECHNICAL REVIEW COMMITTEE

Ken Balaski—Manager of Range Section; Ministry of Forests; Victoria  
Phil Belliveau—Senior Ecosystem Biologist; Ministry of Water, Land & Air Protection;  
Kamloops  
Glenna Boughton—GIS Coordinator; Ministry of Sustainable Resource Management; Kamloops  
Larry Casper—Natural Resources Coordinator; Lillooet Tribal Council; Lillooet  
Bruno Delesalle—Executive Director; Grasslands Conservation Council of BC; Kamloops  
Orville Dyer—Wildlife Biologist; Ministry of Water, Land & Air Protection; Penticton  
Darrell Eustache—Instructor; Nicola Valley Institute of Technology; Merritt  
Don Gayton—Ecosystem Management Specialist; Forest Research & Extension Program;  
Nelson  
Katherine Gizikoff—KG Consulting; Merritt  
Cindy Haddow—Range Specialist; Ministry of Water, Land & Air Protection; Victoria  
Kristi Iverson—Iverson and MacKenzie Biological Consulting; Lac La Hache  
Dennis Lloyd—Regional Ecologist; Ministry of Forests; Kamloops  
Ted Lea—Vegetation Ecologist; Ministry of Water, Land & Air Protection; Victoria  
Larry Price—Unit Head of Information Systems; Ministry of Sustainable Resource Management;  
Nelson  
Bob Scheer—Ecosystem Officer; Ministry of Water, Land & Air Protection; Kamloops  
Darrell Smith—Program Manager; East Kootenay Conservation Program; Invermere  
Ordell Steen—Regional Ecologist; Ministry of Forests; Williams Lake  
Judy Steves—Aboriginal Liaison and District Planner; Ministry of Forests; Kamloops  
Rick Tucker—Range Reference Area Agrologist; Ministry of Forests; Kamloops  
Phil Youwe—Range Officer; Ministry of Forests; Kamloops

\* members of the Provincial Committee from Kamloops served on the Kamloops Regional Technical Review Committee.

#### CARIBOO REGIONAL TECHNICAL REVIEW COMMITTEE

Chris Armes—District Agrologist; Ministry of Forests; Williams Lake  
Sonya Campbell—District Agrologist; Ministry of Forests; Alexis Creek  
Ray Coupé—Research Associate / Ecologist; Ministry of Forests; Williams Lake  
Chris Easthope—Range Management Agrologist; Ministry of Forests; Williams Lake  
Ross Fredell—Range Officer; Ministry of Forests; Williams Lake  
Wendy Hayes—Range Officer; Ministry of Forests; 100 Mile House  
Kristi Iverson— Iverson and MacKenzie Biological Consulting; Lac La Hache  
Lyle Resh—Resource Inventory; Ministry of Sustainable Resource Management; Williams Lake  
Ordell Steen—Research Ecologist; Ministry of Forests; Williams Lake

#### EAST KOOTENAY REGIONAL TECHNICAL REVIEW COMMITTEE

Phil Burk—Range Technician; Ministry of Forests; Invermere  
Sue Crowley—Ecosystem Specialist; Ministry of Water, Land & Air Protection; Invermere

Peter Davidson—Ecosystem Specialist; Ministry of Water, Land & Air Protection; Cranbrook  
Don Gayton—Ecosystem Management Specialist; Forest Research & Extension Program;  
Nelson

Michael Keefer—Ethnobotanist; Ktunaxa-Kinbasket Treaty Council; Cranbrook

Jodie Kekula—Range Officer; Ministry of Forests; Cranbrook

Val Miller—Regional Range Agrologist; Ministry of Forests; Nelson

Larry Price—Unit Head of Information Systems; Ministry of Sustainable Resource Management;  
Nelson

Anne Skinner—Range Agrologist; Ministry of Forests; Cranbrook

Darrel Smith—Program Manager; East Kootenay Conservation Program; Invermere

Gary Tipper—Ecosystem Specialist; Ministry of Water, Land & Air Protection; Cranbrook

### **PRINCE GEORGE REGIONAL TECHNICAL REVIEW COMMITTEE**

Bill Arthur—Ecosystem Specialist; Ministry of Water, Land, and Air Protection; Prince George

Neil Block—Range Officer; Ministry of Forests; Fort Nelson

Keith Carroll—District Agrologist; Ministry of Forests; Fort St. John

Craig Delong—Regional Ecologist; Ministry of Forests; Prince George

Ross Green—Range Officer; Ministry of Forests; Fort St. John

Perry Grilz—Range Specialist; Ministry of Forests; Prince George

Mike McConnell—District Agrologist; Ministry of Forests; Dawson Creek

Birthe Miller—Mapping and Design Supervisor; Ministry of Forests; Prince George

Frank Spears—Regional GIS Analyst; Ministry of Sustainable Resource Management; Prince  
George

Karen Tabe—Range Officer; Ministry of Forests; Vanderhoof

Bryan Webster—Ecosystem Officer; Ministry of Water, Land, and Air Protection; Fort St. John



## APPENDIX 8

### Identifying Priority Grassland Areas for Conservation Emphasis: Goals and Proposed Approach (Draft, January 2004)

#### **1. Definition of a Grasslands Conservation Area**

A grassland area that is managed for the long-term health and integrity of its constituent native plant communities and animal species. Grasslands conservation is a broad goal that can be achieved through a number of avenues including, but not limited to, the designation of protected areas, the establishment of special management zones, the acquisition of properties by conservation organizations, and the stewardship of working ranches.

#### **2. Goals of Grasslands Conservation**

The following are goals toward which grasslands conservation in general is directed:

- a) Representativeness: Ensure all principal native grassland ecosystems and seral stages are represented in core conservation areas, with emphasis given to rare ecosystems and late seral plant communities.
- b) Species Persistence: Ensure the long-term persistence of all constituent grassland-associated plant and animal species, particularly species at risk. Provide for the mix of seral plant communities and disturbances needed to maintain a variety of grassland-associated species.
- c) Contiguity: Situate conservation areas occur across contiguous grassland landscapes as large and intact as reasonable. Minimize fragmentation by the appropriate selection of conservation areas as well as the consideration of adjacent land management.
- d) Connectivity: Minimize barriers to species movement through the establishment of sustainable corridors and linkages among ecosystems, both within and between conservation areas.
- e) Prioritization: Give priority to high value grassland conservation areas under high threat over lower value conservation areas under lower threat.
- f) Management Zones: Apply the Biosphere Reserve Model (with core conservation areas, buffer zones, transition zones and landscape linkages) and supply a range of management recommendations for each zone.
- g) Sustainable Development: Eliminate or minimize future urban growth and agricultural development on grassland or direct development to areas that respect the above goals and allow them to be adequately achieved.
- h) Integrated Resource Management: Achieve grassland conservation goals with consideration of the least conflict, cost and impact to other resources.
- i) Stakeholder Involvement: Engage key interest groups and stakeholders in the process, including government agencies, ranching and other industries, land owners, and urban developers.

### **3. Approach to Identifying Priority Grassland Conservation Areas**

In order to most effectively and efficiently achieve grassland conservation goals, the identification of conservation areas must be based on a systematic approach. This approach involves the identification of an initial set of conservation areas (first cut) followed by the development of priority sites (second cut) in need of immediate conservation and stewardship action. An outline of this approach is described below:

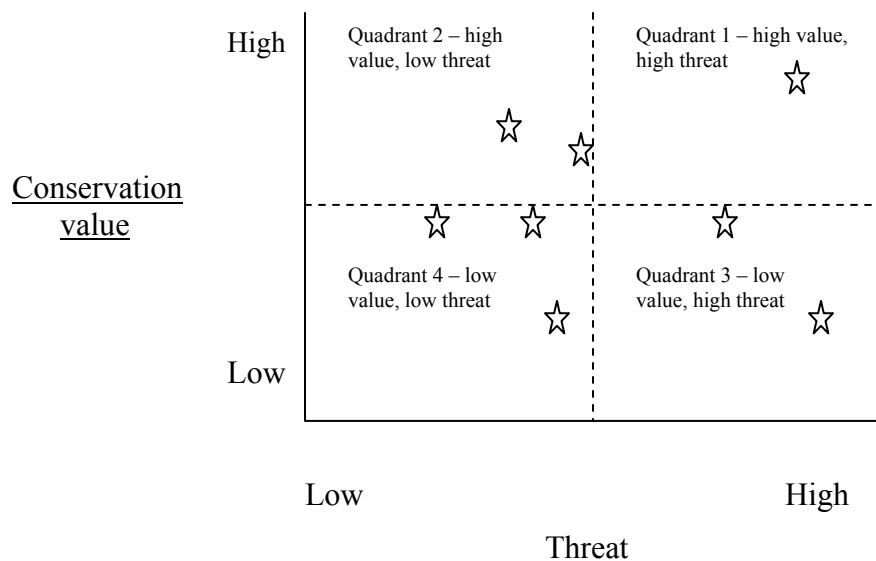
- A. Using local expertise and GIS data, **identify a set of initial conservation areas** that achieve the goals from 2a) to 2d) above as well as the criteria set out for ‘high value’ (see Appendix 9). These areas are coarse filter and include grassland landscapes or ecosystems<sup>47</sup>.

During this process, list the values associated with each conservation area and express how the selection of the area achieves the goals from 2a) to 2d) above.

- B. **Physically create and name initial conservation areas in the GIS.** Use roads, water, range fences and other features to define the boundaries of each conservation area. Develop spatial and attribute data for these delineated conservation areas.
- C. **Determine the land status of each conservation area** and separate these into groups (crown, crown protected area, crown grazing lease, crown grazing license, private, Indian Reserve, etc).
- D. **Assess and rank each conservation area within each group** based on its value (see Appendix 9) and the threats to its values (severity and urgency of threat). The following will be used in the threats analysis:
- Ownership and size of land parcel
  - In or out of the Agricultural Land Reserve
  - In or out of municipal boundary
  - Degree of fragmentation as a result of built-up areas and linear developments
  - Proximity to cities, towns and existing developments
  - Population growth rates and estimates
  - Type of crown range tenure (grazing lease versus grazing license versus untenured)
  - Proximity to water
  - Degree of overlap with mineral claims
  - Degree of non-native invasive plant infestation
  - Rate of forest encroachment and ingrowth
  - Other

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<sup>47</sup> It is assumed that proper management of a grassland ecosystem will ensure the health of its constituent native plant and animal species. That is, proper management of the landscape (coarse filter) will ensure the health of individual species (fine filter) within that landscape.

**Use matrix to plot out results**

E. **Prioritize conservation areas** based on above assessment. Quadrant 1 sites are priority.

**Additional considerations:**

1. The identification of core conservation areas in the approach above is a critical component of an overall grassland ecosystem management plan for a region. To complete the plan and realize its benefits, the process must go on to define buffer and transition zones, landscape linkages and special management areas. Management recommendations must then be supplied for all zones. Defining core conservation areas is only one piece of the overall landscape puzzle.

2. There is a lack of plant community or ecosystem classification for many of the smaller types of ecosystems in grasslands environments. This classification needs to be developed to ensure that smaller, distinct elements are represented in an overall grassland ecosystem management plan.

3. The Grasslands Conservation Council should provide ecosystem-based guidelines in areas most suitable for urban development. These recommendations would be provided to guide where development could occur and where it should not due to the impacts on high ecological values (for example, no development in grassland associated riparian areas).

4. Note that this work is consistent with the current GCC Strategic Plan, section 6.3.3 – 4<sup>th</sup> bullet

*“Complete provincial analysis and modeling of grasslands across BC to identify grasslands most threatened or at risk, including: the identification of representative grasslands, key areas for conservation and restoration, and forecasting potential loss of grasslands”*

## APPENDIX 9

### Identifying Priority Grassland Areas for Conservation Emphasis: Initial Mapping Procedures (Draft, January 2004)

#### **1. Creation of assessment maps**

**Overview:** Develop base maps and mylar overlays that will assist the experts in identifying grassland areas of high value.

- a) Choose broad grassland assessment area (East Kootenay Trench, Okanagan, Thompson-Pavilion, Southern Thompson Upland, Cariboo-Chilcotin, Peace, etc).
- b) Create several base grassland ecosystem maps at 1:75,000 scale to cover all grasslands within the assessment area. Also create one, smaller scale overview map. Map the following features:
  - Grasslands – yellow/beige (primary habitat) – derived from grasslands GIS
  - Deciduous forest – green (grassland associated habitat) – derived from grasslands GIS
  - Coniferous forest – dark green (grassland associated habitat) – derived from grasslands GIS
  - Old growth forest adjacent to grassland – hatched (grassland associated habitat) – forest age greater than 200 years + presence of veterans - derived from Forest Cover; only map old growth forests within 2 km of a grassland.
  - Open dry forest on broken terrain – brown (grassland associated habitat) – derived from grasslands GIS
  - Rock, clay bank or gravel bar – grey (grassland associated habitat) – derived from grasslands GIS
  - Brush, meadow or wetland – light green (grassland associated habitat) – derived from grasslands GIS
  - Lake – blue (grassland associated habitat) – derived from grasslands GIS
  - Streams and rivers – blue (grassland associated habitat) – derived from TRIM
  - Contours – black (with elevation annotation) – derived from TRIM
  - Biogeoclimatic Ecosystem Classification (BEC) – black (with BEC labels) - derived from 1995 BEC coverage

- Annotation – black – derived from TRIM
- c) Create ‘species sightings’ mylar overlay – derived from grasslands GIS
- Use coverage <SAR\_BC> to plot red and blue listed species occurrences (animals, plants and plant communities). Plot occurrences with a ‘medium’ or ‘high’ accuracy only. See <species\_markers.xls> for point marker standards. Ensure list of species is handy for experts (<species\_map\_ids.xls>).
- d) Create ‘roads and developed areas’ mylar overlay – derived from grasslands GIS
- Plot roads and trails, linear developments and railways using coverages <DIST\_%district-name%>.
  - Plot urban and industrial areas, clearings and cultivated land using coverages <TGRSDEV\_%district-name%>.
- e) Create ‘land status’ mylar overlay – derived from grasslands GIS
- Plot crown, crown protected area or ecological reserve, federal reserve, private, and private NGO land using coverages <TGRS\_%district-name%>. Status habitats listed in step 1b (except for TRIM streams and rivers and adjacent old growth forests not included in base grassland ecosystems mapping)
  - Plot range units, pastures and tenures using range layers in grasslands GIS or in regional MSRM Arc Libraries.
- f) Create ‘non-native invasive plants’ mylar overlay – derived from grasslands GIS
- Plot distribution of non-native invasive plants using weed coverages in grasslands GIS or in regional MSRM Arc Libraries.
- g) Plot 100, 1 000 and 10 000 hectare squares on map for area reference.

## **2. Expert selection of grasslands of high value**

**Overview:** With pen in hand, experts identify high value grassland areas on maps developed in step 1. Grassland value is defined by the degree to which a selected area works towards the 4 goals listed below:

**Representativeness:** Ensure all principal native grassland ecosystems and seral stages are represented in core conservation areas, with emphasis given to rare ecosystems and late seral plant communities.

**Species Persistence:** Ensure the long-term persistence of all constituent grassland-associated plant and animal species, particularly species at risk. Provide for the mix of seral communities and disturbances needed to maintain a variety of grassland-associated species.

Contiguity: Situate conservation areas occur across contiguous grassland landscapes as large and intact as reasonable. Minimize fragmentation by the appropriate selection of conservation areas as well as the consideration of adjacent land management.

Connectivity: Minimize barriers to species movement through the establishment of sustainable corridors and linkages among ecosystems, both within and between conservation areas.

### **List of criteria for identifying grassland areas of high value**

a) High habitat diversity – area supports a diversity of bunchgrass, sagebrush, aspen copses, coniferous forest patches, adjacent old growth forest, rocky or slope terrain, riparian areas and wetlands.

- Goals reached – species persistence, representativeness.
- Contributing map layers and information – base grassland ecosystems, site specific knowledge of experts.

b) Unfragmented – relatively large, intact area with minimal fragmentation from development.

- Goals reached – contiguity, connectivity.
- Contributing map layers and information – base grassland ecosystems, roads and developed areas, land status, site specific knowledge of experts.

c) In good condition – area supports late seral, climax or good condition grassland and associated communities with minimal weed infestation (~5 ha minimum area).

- Goals reached – representativeness, species persistence.
- Contributing map layers and information – base grassland ecosystems, roads and developed areas, land status, non-native invasive plants, site specific knowledge of experts.

d) With concentration of threatened and endangered species, plant communities and important fauna – area with red and blue listed animal and plant occurrences and plant communities. Area with critical habitat for grassland associated fauna (~5 ha minimum area).

- Goals reached – representativeness, species persistence.
- Contributing map layers and information – base grassland ecosystems, species sightings, site specific knowledge of experts, species and habitat lists (<species\_map\_ids> and <priority\_wldhab>).

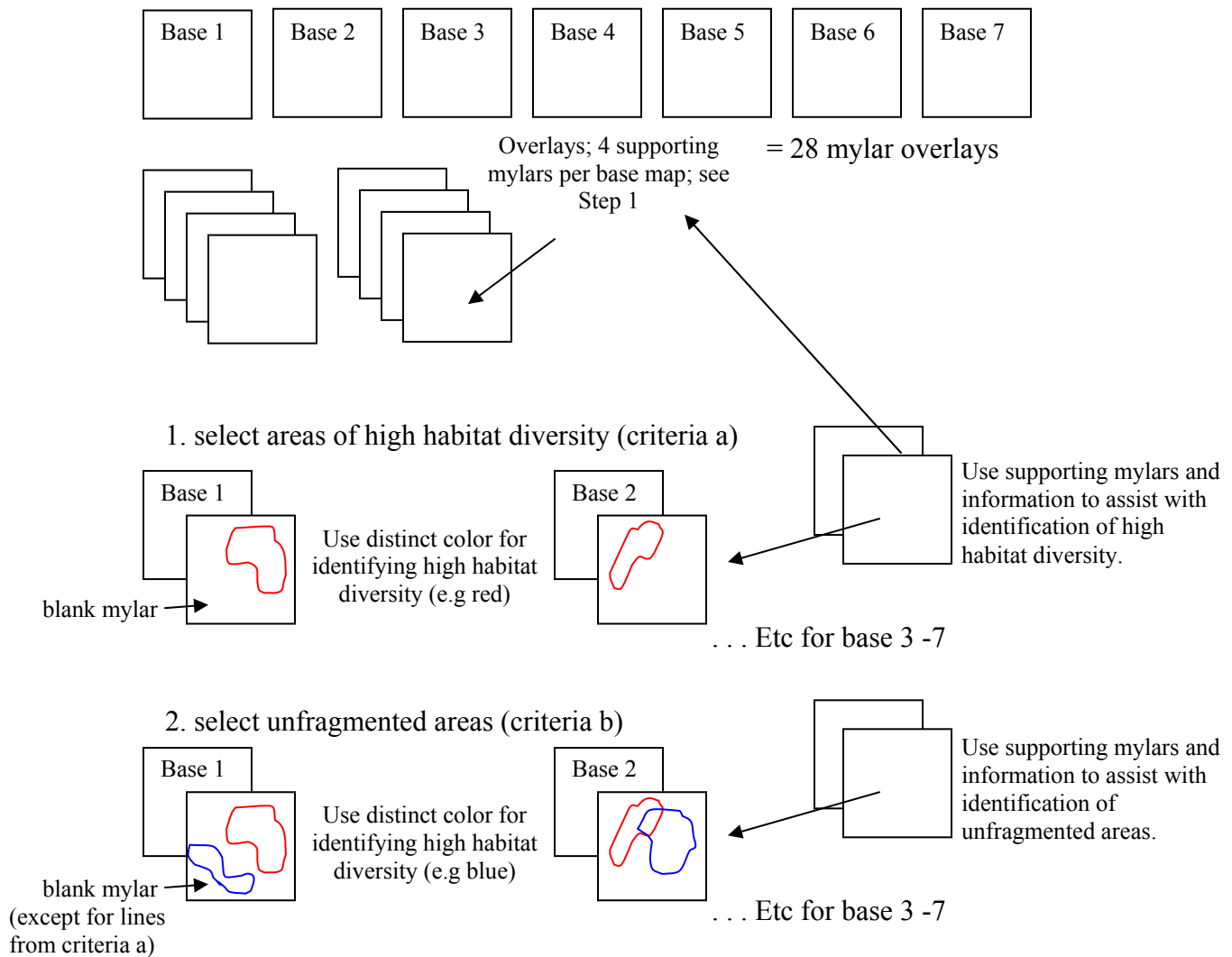
e) Adjacent to natural landscape linkages – area adjacent to corridors that are managed appropriately for species movement and ecosystem cycling (e.g. adjacent to valley bottom riparian area under special management, adjacent to protected area).

- Goals reached – contiguity, connectivity
- Contributing map layers and information – base grassland ecosystems, roads and developed areas, land status, site specific knowledge of experts.



1. Maps and mylar overlays are taken to regional agrologists, ecologists, ranchers, First Nations and other grassland experts for the identification of grassland areas of high value. In a systematic process, experts select areas for each of the five criteria listed above. Blank mylars are supplied for each of the base maps. See the following schematic:

**EXAMPLE: Thompson-Nicola: 7 base grassland ecosystem maps with 4 mylar overlays per map**



**Continue with process for criteria c, d and e**

2. Expert identified areas are digitized and GIS datasets are created. Roads, water, range units and other features are used to define the boundaries of each expert identified area.

3. Identified areas are combined to examine overlap.

**Additional considerations:**

1. Priority grasslands for restoration: some experts would first focus on the late seral or good condition grasslands, then focus on the *potentially* good condition, high value areas in need of restoration. It is recommended that both good condition and potentially good condition grasslands of high value be identified. Expert knowledge regarding areas of late seral communities and high forage value will be captured on maps. Weed distribution, land status, range tenure and site specific knowledge of experts will help to identify high value areas in need of restoration.

2. Grassland values on private land and First Nations land: it is important to consider that grassland “value” to a rancher or First Nations person may differ considerably from grassland “value” from another’s point of view. Economic and cultural values must be taken into consideration during the identification of priority areas for conservation and stewardship, especially on private land and Indian Reserves.

## APPENDIX 10

### Identifying Priority Grassland Areas for Conservation Emphasis: High Value Habitats for Grassland Associated Fauna (Draft, January 2004)

The following is a subset of high value habitats that occur within grassland environments in the Thompson-Pavilion and Okanagan regions. A few wildlife species associated with these habitats have been listed, with emphasis on birds. This list does not include all high value grassland associated habitats, nor does it include all species associated with the habitats listed. The purpose of this list is to begin to identify the many high value areas and their associated species in each region to assist with priority grasslands mapping.

- Big Sage and Antelope-Brush stands – important for Brewer’s Sparrow, Sage Thrasher, Clay-coloured Sparrow and other bird species. Also important for snakes, rodents and rare invertebrates. Antelope-brush valuable forage for ungulates.
- Open grasslands on deep and loamy or aeolian soil – Pocket Gopher burrowing sites → Pocket Gopher important food source for snakes, Badgers, Coyotes and raptors such as Red-tailed Hawk, Northern Harrier and to a lesser degree, Swainson's Hawk. Aeolian soil also important for Badger burrows and Burrowing Owls.
- Coniferous forest patches with grasslands – nesting or roosting sites for Swainson’s Hawk, Great Horned Owl, Long-eared Owl and other bird species; Coyote and deer shelter; shelter for Long-toed Salamanders that breed in adjacent grassland ponds. Ponderosa Pine stands important for White-headed Woodpecker.
- Douglas-fir and Ponderosa Pine snags – nesting sites for Lewis’ Woodpecker, kestrels, Mountain Bluebird and other bird species. Big Brown Bat use tree cavities for rearing young and roosting.
- Aspen copses - important for cavity nesters such as Red-naped Sapsucker, Mountain Bluebird and Tree Swallow; Sharp-tailed Grouse winter cover and forage; Swainson's Hawk and Red-tailed Hawk nesting sites; White-tailed and Mule Deer browse; provide summer shade for snakes; provide habitat for Long-toed Salamanders when not at breeding ponds. Presence of a pond in the aspen stand increases the value of the grove immensely for a range of species.
- Birch stands – Sharp-tailed Grouse foraging sites; birch seeds important for a variety of passerines; larger stands key nest sites for crows and magpies whose nests in turn are used by Long-eared Owls.
- Riparian areas (willow/cottonwood/birch) within grasslands – trees provide nesting sites for Lewis’ Woodpecker, Yellow-breasted Chat and other bird species; shelter for White-tailed Deer; forage areas for bats; shelter and forage for snakes and many other species.

- Rose thickets – important for Clay-coloured Sparrow; food/shelter for Sharp-tailed Grouse; nesting sites for Yellow-breasted Chat.
- Ponds or wetlands – critical for many species {birds (esp. waterfowl), reptiles, amphibians, mammals}; Great Basin Spadefoot, Tiger Salamander, Long-toed Salamander and Painted Turtle breeding areas; alkaline ponds/wetlands critical for Avocets; important for Black-necked Stilts; home to a variety of rare invertebrates found in no other habitats; sedge meadows in upper grasslands can be important Great Gray Owl foraging sites; insects flying over wetlands are food source for bats.
- Rocky terrain and cliffs – roosting and hibernacula for Townsend's Big-eared Bat, Pallid Bat, Spotted Bat and other bat species; hibernacula for snake species; foraging and nesting sites for Rock Wren, Canyon Wren, White-throated Swift, Prairie Falcon, Peregrine Falcon, Golden Eagle and Red-tailed Hawk; Bighorn Sheep escape terrain and lambing areas.
- Saskatoon stands in gullies - important for Black Bear, Lark Sparrow and a variety of birds that forage on the berries. Gullies also serve as movement corridors for Bighorn Sheep.
- Larger conifer forest adjacent to grassland - nesting and sheltering habitats for species that spend some time foraging in grasslands; Great Gray Owl, Flammulated Owl, Mule Deer, Elk, etc; provide summer shade for snakes.
- Special vegetation stands - for butterflies/insects {mostly in the south Okanagan (e.g. milkweed for Monarchs), but need to do more research in other areas}.