ECOSYSTEMS IN BRITISH COLUMBIA AT RISK

Grasslands of the Southern Interior

Grasslands cover less than one percent of British Columbia's land area.

BRITISH COLUMBIA
Ministry of Sustainable Resource Management
Ministry of Water, Land and Air Protection

Why are grasslands of the southern interior at risk?

In the hot, dry regions of the southern interior of British Columbia lie grasslands dominated by bunchgrasses, wildflowers, and dryland shrubs. Grasslands were naturally limited in extent when European settlement began in the mid-1800s, and significant areas of grasslands have been lost since that time. Today, grasslands cover less than one percent of British Columbia's land area and are one of Canada's most endangered ecosystems. Scattered grasslands also occur in coastal, central, and northern British Columbia; these grasslands are also threatened but have different ecological characteristics from those in the southern interior.

The warm climate and dramatic setting of grassland ecosystems has long attracted human habitation, and today the loss of grasslands is evidenced by extensive vineyards, orchards, hay fields, human settlements, and commercial and industrial developments in southern interior valleys. About one-third of the grasslands area in the Okanagan Basin and Boundary District has been lost to development; the North Okanagan has lost nearly half of its native grasslands. Ongoing population growth will add increasing pressures to remaining grasslands. Most of the losses and adverse effects are to valley-bottom ecosystems, which are the most valuable to biodiversity, the most fragile to disturbances, and the slowest to recover.

Many remaining grasslands have been invaded by introduced plants such as knapweed, sulphur cinquefoil, and cheatgrass. Since grassland species are subtly different and often poorly known, changes from native to foreign plants can go unnoticed, and reversing such changes can be difficult. People often recreate in grasslands, without realizing that the fragile, easily disturbed crust of lichens, mosses, and algae (known as a microbiotic crust), soils, and plants are easily damaged by both motorized vehicles and mountain bikes. A single track can become an erosion site, become weed infested, and invite further traffic. Expansion of urban and suburban populations also brings more pets and recreation, which can in turn negatively affect grasslands and the creatures reliant on them.

Southern Interior grasslands have a long history of intensive livestock grazing, which reduced many low-elevation and gently sloping grasslands to little more than bare soil in the early 1900s. Many grasslands have partially or wholly recovered through carefully managed livestock grazing. However, unmanaged livestock grazing has degraded or prevented the recovery of other grasslands by exposing mineral soil, damaging bunchgrasses, and promoting the invasion of introduced plant species.

Grasslands are the most valuable to biodiversity, the most fragile to disturbances.

Historically, natural fires maintained grasslands on moister sites and at higher elevations by preventing trees from establishing. For about a century, fire has been largely excluded from grasslands through fire suppression, cessation of burning by aboriginal peoples, and removal of fine fuels through domestic grazing. Subsequent forest invasion has reduced some Cariboo-Chilcotin grasslands by more than 30 percent since 1962. Although not well documented, significant areas of many other grasslands have also been lost. Ironically, as has happened in the United States, the introduction of cheatgrass may result in too frequent, too intense fires in some valley-bottom grasslands.

What are they?

Grasslands of the southern interior are semi-arid ecosystems dominated by bunchgrasses, shrubs, and non-grass plants known as forbs. Grasslands occur in the hottest, driest valleys, including the Okanagan, Thompson, Nicola, Fraser, Chilcotin, Kettle, and Kootenay, and represent the northern extent of grasslands that once dominated what are now agricultural fields of the Great Basin in the United States.

These valleys lie in the rainshadow of the Coast, Cascade, or Columbia mountains, where winters are cool or cold with relatively little snow. Valley heating and a flow of warm air from the Great Basin result in hot, dry summers. In this semi-arid environment, long summer droughts can prevent tree seedlings from establishing. Most grasses, however, are well-adapted to capturing limited moisture. The shape of bunchgrasses funnels moisture to a vast network of fine roots that are particularly effective at capturing moisture near the soil surface. Bunchgrasses survive drought by actively growing only during spring and late autumn.

Although bunchgrasses characterize grasslands, some shrubs and a great diversity of forbs also occur. In spring, moist soils bring the first flush of blooms of easily overlooked sagebrush buttercup and yellow bells, which are soon followed by the bright pink and yellow splashes of bitterroot and arrow-leaved balsamroot. The sequence of flowering continues until the hot, dry months of summer, when the flashy colours of flowers are replaced by the subtle beauty of tawny tones and textures of dormant grasses and plants. Fall brings the wind-pollinated flowers of big sagebrush and rabbit-brush shrubs. This diversity of

plant species is paralleled by a diversity of mammals, birds, amphibians, reptiles, and insects that are adapted to and depend on grassland ecosystems for food, shelter, and breeding sites.

Underneath the more obvious plants of undisturbed grasslands lies a fragile, easily disturbed crust of lichens, mosses, and algae known as a microbiotic crust. A careful hands-and-knees look reveals a tiny world of lichens and miniature mosses, many of which reveal their brightest colours only after a rainfall. This crust binds the soil together in an irregular surface that enables soils to better capture moisture, prevents wind and water erosion, and provides some nitrogen to grassland plants.

A careful look reveals a tiny world of lichens and miniature mosses.

Southern interior grasslands include ecosystems dominated by bunchgrasses, and ecosystems dominated by dryland shrubs such as sagebrush or antelope-brush with grasses and forbs. These shrub-dominated ecosystems are sometimes referred to as shrub-steppe. Both livestock grazing and fire exclusion have likely resulted in the conversion of some bunchgrass-dominated areas to shrub-steppe.

Grasslands exhibit distinct ecological trends associated with moisture and temperature gradients, which are in turn related to elevation changes and site conditions, including aspect and slope. In general, moisture, forb diversity, productivity, and plant and litter cover increase with elevation, while microbiotic crust cover and diversity decrease.

Valley-bottoms are the hottest and driest areas, and are commonly dominated by dryland shrubs with widely spaced bunchgrasses such as bluebunch wheatgrass and needle-and-thread grass, scattered forbs such as prickly pear cactus, and a diverse microbiotic crust. These grasslands are the most sensitive to disturbance, and have been the most affected to date by livestock, invasive plants, and development. Middle slopes of valleys are usually dominated by bunchgrasses with a wider diversity of forbs; scattered areas of shrub-steppe also occur.

At the upper edges of valleys and on adjacent plateaus, slightly cooler and moister climates result in conditions favourable for both forests and grasslands. Here, frequent low-intensity fires likely played a key role in maintaining grasslands in a mosaic with open forests. With fire exclusion, many of these grassland areas have been invaded by trees and are shrinking rapidly. When undisturbed, these grasslands are dominated by rough or Idaho fescue in southern valleys, and by porcupine grass in the Cariboo-Chilcotin. They have a wide diversity of forbs, although their microbiotic crusts are often less diverse and less continuous because thicker litter layers limit their development.

What is their history?

In British Columbia, southern interior grasslands are ancient communities that probably became established from the south about 10 000 years ago as the Pleistocene glaciers were melting. During a warm climatic period from about 9000 to 4700 years ago, species from the arid Great Basin west of the Rockies

moved northward into the hot, dry valley bottoms of southern British Columbia. Grasslands covered a much greater area during this warm climatic period, but shrunk to their current extent about 4000 years ago when the climate became moister and cooler.

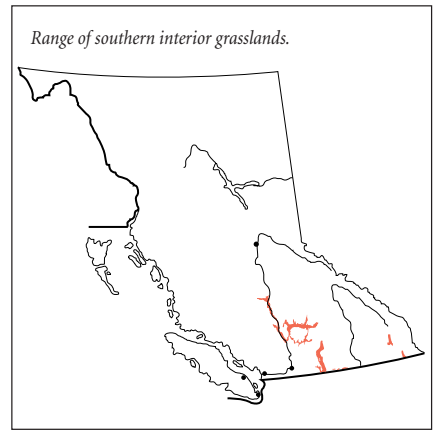
Fire was historically a strong shaping influence in grasslands. Fires, started both by lightning and traditional burning by aboriginal peoples, are estimated to have occurred every 10 to 20 years. Most grassland plants have structures that are able to survive fires moving through the fine grass fuels and thrive on the flush of nutrients released by burning. Tree seedlings were able to establish only where there was more moisture or in an unusually moist year, and most did not acquire thick, fire-resistant bark in time to survive the next fire. During the past 140 years, fire exclusion has allowed trees to invade and shrink grasslands, especially at higher elevations and on cooler, moister sites.

Fire was historically a strong shaping influence in grasslands.

Grasslands have been grazed by cattle, horses, and sheep for the last 140 years. Human populations in grassland-dominated valleys have increased steadily since the mid 1800s. Both of these factors have played a role in the present condition and distribution of British Columbia's southern interior grasslands.

What is their conservation status?

Grasslands in the southern interior occupy less than one percent (662 872 ha) of British Columbia's land area. Because grasslands are geographically restricted to hot southern interior valleys and occupy a very small portion of British Columbia's land area, these ecosystems are considered highly endangered. More than 40 percent



Range of southern interior grasslands.

of grasslands are privately owned, 10 percent are within Indian Reserves, and less than half are on Crown land. Of publicly owned grasslands, about 90 percent are under grazing tenures. Just over three-quarters of private land grasslands lie within the Agricultural Land Reserve.

Only a small percentage of our grasslands are protected – Eight percent lie within Crown protected areas, and non-government conservation organizations have purchased less than one percent of privately held grasslands for protection. Larger grassland protected areas include Lac du Bois Grasslands Protected Area near Kamloops, South Okanagan Grasslands Protected Area west of Oliver and Osoyoos, and Churn Creek Protected Area west of the Fraser River from Clinton.

Nearly all grassland and shrub-steppe natural plant communities are considered at risk. Presently, 15 of these plant communities have been blue-listed (special concern) or red-listed (endangered); evaluations for other grassland plant communities are pending. Many other plant communities associated with grassland landscapes, such as wetlands, aspen copses, and woodlands, are also endangered.

Why are they important?

Grasslands have a wide range of important values, one of which is their intrinsic value – they are an essential part of British Columbia's and North America's unique biodiversity and natural heritage. Grasslands are naturally rare and have been substantially reduced by human activities. All of us are reliant on the ecosystem services that grasslands provide, including the safe capture, storage, filtration, and release of water and clean air. Grasslands provide places for recreation, education, eco-tourism, ranching, and hunting. Healthy grasslands with dense grass are more resistant to invasion of non-native plants and provide more forage and wildlife habitat than degraded grasslands. Grasslands are important to aboriginal peoples, for harvest of bitterroot, balsamroot, and other plants found in grasslands. Grasslands provide a scenic backdrop for many communities and are places to enjoy nature and observe wildlife. The warm climate and aesthetic values of grasslands have contributed to increased real estate values in many valleys – ironically this has increased the threats to the beauty and biodiversity that has attracted people to live there.

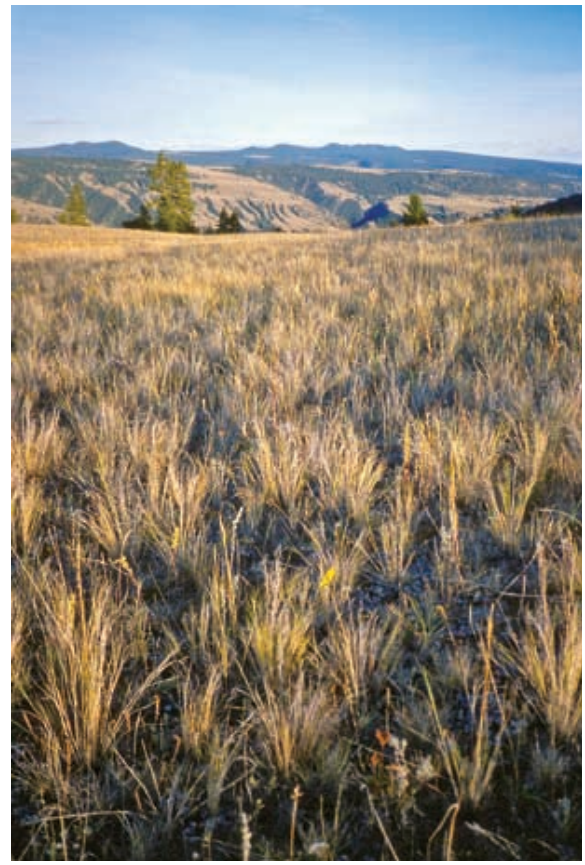
Many of the values of grassland landscapes lie in the diversity of ecosystems that occur there, including woodlands, old forests, wetlands, riparian areas, aspen copses, cliffs, rock and talus. Most of these ecosystems are also considered threatened or endangered, and together this diverse mosaic of ecosystems within the grassland environment provides habitat for a wide diversity of plants, mammals, birds, reptiles, amphibians, and invertebrates.

Although grasslands cover a very small portion of British Columbia's land area, they provide habitat for more than one-third of the province's

rare and endangered vertebrates; many rare plants and invertebrates also occur in grasslands. Rare grassland mammals include the now endangered Badger which burrows extensively in grasslands, hunting for ground squirrels, small mammals, and larger insects. Burrowing Owls are one of the many animals reliant on abandoned Badger burrows. These owls have been extirpated from British Columbia's grasslands, and re-introduction programs are in place. Sharp-tailed Grouse have greatly declined and no longer occur in many grasslands. Spring dawn can bring the rare sight of a cluster of male Sharp-tailed Grouse stomping and clucking on a low rise in the grasslands in efforts to attract females. Stranger still is the Great Basin Spadefoot, a threatened amphibian that breeds in water in spring, develops quickly, and survives the harsh grassland summers by using spurs on its feet to dig itself underground.

Grasslands are also home to many smaller and less showy endangered creatures including a huge diversity of insects such as the immaculate green hairstreak butterfly. Many endangered plants occur in grasslands, including the showy and rare Lyall's mariposa lily and silvery sagebrush.

With climate change, healthy grasslands may provide corridors for movement and sources of plant and animal species moving north or to higher elevations. Many grassland species are at the edges of their range; such populations are often more adaptable to change and have the best chance of surviving climate change. Loss, fragmentation, and degradation of grasslands may limit the survival and spread of many species in the future.



MANY GRASSLANDS OF THE CARIBOO-CHILCOTIN ARE DOMINATED BY BLUEBUNCH WHEATGRASS AND HAVE MANY NORTHERN SPECIES NOT PRESENT IN MORE SOUTHERN GRASSLANDS. *Kristi Iverson photo*

How can we protect grasslands?

We all need to take part in saving grassland ecosystems. Their subtle and fragile beauty has often been overlooked in the past. Today these ecosystems are at risk. What can we do? Begin by learning more about grasslands by spending time in them. Watch for changes through the seasons, learn the flowers and plants, and watch some of the many fascinating creatures that inhabit them. Join and support natural history and conservation organizations such as the Grasslands Conservation Council of British Columbia and raise awareness through local activities. Support grassland purchases, raise awareness, and assist in developing plans and bylaws to protect these and other sensitive ecosystems.

Grasslands provide habitat for more than one-third of the province's rare and endangered vertebrates.

Learn how to identify introduced invasive plants that threaten native grasslands. Learn how to avoid spreading them further and to control them. If you enjoy recreating in grasslands, learn how to do so with a sensitivity that will not damage them. Always stay on existing trails and roads and avoid areas already infested with invasive plants to avoid spreading their seeds. If you own land, you can contact a conservation organization to find out how you can protect your grasslands in perpetuity through conservation covenants, land donations, and other options.

The Grasslands Conservation Council of British Columbia, which became a society in 1999, was the outcome of discussion in 1996 of a group of people concerned about grasslands. The Council is a strategic alliance of diverse organizations and individuals that is committed to raising awareness, stewardship, and conservation of British Columbia's grasslands.

By working together and raising awareness, we may be able to conserve British Columbia's endangered southern interior grasslands.

BICYCLE AND VEHICLE DISTURBANCE OF GRASSLAND SOILS CAN CAUSE EROSION AND SPREAD INVASIVE PLANTS. *Kristi Iverson photo*

WITH FIRE EXCLUSION, MANY AREAS OF GRASSLANDS HAVE BEEN INVADED BY ENCROACHING TREES. *Kristi Iverson photo*

THE TOBACCO PLAINS GRASSLANDS OF SOUTH EASTERN BRITISH COLUMBIA ARE LITTLE KNOWN AND HAVE YET TO BE DESCRIBED. *Carmen Cadrin photo*

THIS RARE PLANT, SPALDING'S CAMPION, IS KNOWN ONLY FROM THE TOBACCO PLAINS GRASSLANDS IN SOUTH EASTERN BRITISH COLUMBIA. *Mike Miller photo*

SPOTTED KNAPWEED IS AN INVASIVE PLANT THAT SPREADS RAPIDLY AND HAS DISPLACED NATIVE VEGETATION IN MANY GRASSLANDS. *University of Idaho Archives, University of Idaho, www.invasive.org*

FOR MORE INFORMATION ON RARE SPECIES AND HABITATS, CONTACT:

B.C. Conservation Data Centre, Ministry of Sustainable Resource Management
PO Box 9358, Stn. Prov. Govt., Victoria, British Columbia V8W 9M2
http://srmwww.gov.bc.ca/cdc

For more information on grasslands:
Forest and Range Practices Act www.for.gov.bc.ca/code
Grasslands Conservation Council of British Columbia www.bcgrasslands.org
Nature Conservancy of Canada www.natureconservancy.ca
South Okanagan-Similkameen Conservation Program www.soscp.org
The Land Conservancy of British Columbia www.conservancy.bc.ca
The Nature Trust of British Columbia www.naturetrust.bc.ca

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