



# Grassland Issues in British Columbia





The Grasslands Conservation Council of British Columbia's mission is to:

- Foster understanding and appreciation for the ecological, social, economic, and cultural importance of BC grasslands.
- Promote stewardship and sustainable management practices to ensure the long-term health of BC grasslands.
- Promote the conservation of representative grassland ecosystems, species at risk, and their habitats.

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**Commonsense solutions for BC grasslands.**

**[bcgrasslands.org](http://bcgrasslands.org)**

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Osoyoos, BC in September 2008. Credit: McKay Savage\*

## Grassland Issues

British Columbia's grasslands cover less than one percent of a province that is dominated by trees, and there are few large, unaltered grassland landscapes left.

Grasslands in the Okanagan and Thompson valleys and the Rocky Mountain Trench have been lost to urban development, highways and railway lines, orchards, vineyards and other uses. All of our grasslands have been used for livestock grazing for over 150 years and for recreation activities for over 50 years. Non-native species have spread throughout the grasslands where disturbances have removed native species.

As a result of all these changes, grassland ecosystems are more endangered than coastal old growth forests.

Most of BC's species at risk are found in the grasslands of the province. In many cases, their rarity is largely due to loss or fragmentation of habitat by the many disturbances that humans have caused.

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## Natural Disturbances

Natural disturbances change grasslands in many ways, adding to the diversity of these ecosystems. Some types of disturbance can be predicted, such as annual flooding of riparian areas along rivers and streams, while others happen unexpectedly, such as a fire after a lightning storm. Landslides, wind storms and flash floods also take their toll, but usually only affect a small area.

## Human Disturbances

British Columbia's grasslands developed about 8,000 years ago, after the last glacial period. They contain a wonderful variety of native plants, shrubs, and trees that have adapted to grow in sometimes harsh conditions. Many creatures rely on grasslands for habitat year round while others migrate into grasslands to breed and raise young.

Many different types of human disturbances have both reduced the area of grasslands and changed grassland ecosystems. There are now few large, unaltered grassland areas in the province.

Until about the 1840s, the only human-induced change to grasslands was created by small numbers of First Nations people. Their activities included harvesting plants, berries, and fruits; using trees for canoes, shelter, baskets, and warmth; and hunting animals for food, clothing, and shelter.

It is known that as many as 120 plants were used by the Thompson people of the Spuzzum-Spences Bridge area for food, flavouring, or drinks. Some of their activities may have caused heavy, localized disturbances, but they were usually carried out conservatively to ensure an annual supply of food. First Nations people are known to have burned some areas to provide better growth of plants and shrubs, usually in the fall and in a controlled way.

## Grazing

Native animals that depend on grasslands have had to compete with a number of introduced grazing animals over the past 160 years. Since the 1840s, grasslands have been used for grazing horses, cattle, and sheep, and sometimes in very large numbers. Early grazing practices and the sheer numbers of animals on the grasslands have destroyed or altered many grassland communities. Changes in grazing practices, particularly in the past 30 years, have allowed most grassland communities to improve.

Early explorers noted that First Nations people were using and eating horses in the Kootenays before 1800, and in the Fraser River grasslands in 1808. The Hudson's Bay Company, which established in Kamloops in 1812, used as many as 300 horses in each brigade by 1821 to pack out furs and pack in supplies. The brigade routes followed established routes through the grasslands from Alexandria on the Fraser River via Kamloops and the Okanagan Valley to the Columbia River.

Grasslands in the Kamloops area were used to over-winter many hundreds of these horses into the 1870s. There are records of thousands of horses owned by First Nations families in the Kootenays in the 1880s. Wild horses were rounded up in the Kelowna area in the 1890s to sell to miners going to the Klondike gold rush. Reports of wild horses roaming some grassland areas of the Interior continue to this day.

The gold rush of 1858-68 saw many thousands of men heading north through the grasslands of the Southern Interior, and ranches sprang up to raise the livestock needed to supply meat to this growing population. Reports from those times indicate that grazing was uncontrolled and resulted in almost complete destruction of grassland communities in the lower valley areas.

The expansion of Vancouver and other centres in the Fraser Valley, and the coming of the railway through the Thompson Valley in the 1880s, ensured the growth of the ranching industry as cattle were shipped out to the coast. In the Okanagan, cattle were shipped to the booming mining towns of Oliver, Midway, and Greenwood. Similar expansion of the ranching industry occurred in the grasslands of the Chilcotin and Kootenays in the 1880s.

A series of bad winters before and after the turn of the 19<sup>th</sup> century convinced ranchers that they needed to feed hay to their cattle in winter. Some of the grasslands would finally see some rest from grazing for two to six months each year, but other areas were ploughed under to grow the hay crops needed for winter feeding.

Sheep have also been raised on the grasslands since the 1860s. In the 1920s ranchers started to use the alpine meadows of the Southern Interior mountains for summer pasture, and the numbers increased from 51,457 in 1921 to 145,000 ten years later. Thousands of head were sold before they returned to the home ranch in the fall, but there were still thousands to feed over winter. The use of alpine ranges by sheep and the long sheep drives stopped in the 1960s.

Research has been carried out in grasslands since the 1930s in an effort to understand these special ecosystems. Studies of areas excluded from grazing by research fencing have provided important information for livestock managers. It takes from 20 to 40 years for overgrazed grassland to recover to “excellent” condition in open coniferous and higher elevation rough fescue grasslands.

Others studies have shown that cattle grazing impacts habitat structure and the availability of food for a variety of grassland-dependent species. Damage to ground cover that forms protection for ground-nesting birds, mice, and voles can lead to reduction in numbers of those species. However, trampling can also be a benefit to small burrowing animals if it loosens the soil, and manure piles are an important source of insects for birds. Among the larger grassland mammals, livestock grazing seems to have the biggest impact on elk as they both prefer to eat the larger grass species.

Since the early 1900s, various systems of seasonal and rotational grazing have been put in place to control where and how long livestock graze on grasslands. It has been shown that fencing to create pastures allows ranchers to move livestock according to the stage of development of the grassland plant communities, the requirements for feed, the habits of livestock, and to prevent overgrazing. Grazing systems that allow pastures to be rested for as long as 18 months give grassland plant communities time to recover. Most livestock now graze forested areas rather than grasslands from June to September.

Riparian areas are an important plant community in the grasslands. However livestock like these areas next to streams and ponds for forage, as well as for shade from the hot summer sun. Grazing and trampling have damaged many grassland riparian areas through loss of vegetation, soil erosion, bank erosion, and reduced water quality. Fencing of these critical areas, with defined watering places for cattle, results in a rapid recovery of plant and shrub cover.

The number of livestock grazing in grasslands has been reduced substantially since the 1950s, and the BC Ministry of Forests regulates when, how, and where livestock can graze on Crown land. All these management efforts mean that grassland communities are slowly being restored in some areas.

## Agriculture

Grassland soils, especially in the lower grasslands of valley bottoms, are very fertile and attractive for growing a variety of crops for human as well as for livestock use. Many of these areas have been ploughed under for hay production, orchards, vineyards, or ginseng. These developments have removed the native grassland vegetation and altered the structure of the soils, but there could be future opportunities to restore native grasslands.

Grassland rivers, creeks, streams, ponds, and lakes have been channeled, dammed, and diverted to provide water for domestic use, for irrigation to grow crops, and for livestock consumption. Some ponds and lakes have been artificially controlled to provide waterfowl habitat in the spring and hay meadows in summer and fall. Others have been drained for urban expansion, highway and railway routes, or for agriculture.

Many Interior lakes have been stocked with rainbow trout or other game fish species to provide sport fishing opportunities, further altering the natural balance of species. These changes to water-based habitats in the grasslands have contributed to the number of species considered at risk.

## Urban Development

The greatest loss of grasslands in the grassland valleys is to the development of cities, towns, and villages, and the transportation connections between them. The large, flat-bottomed river valleys of the interior of the province are all used by major highways and railways to connect the various communities. Only in the Cariboo-Chilcotin grasslands, where there is little urban development, are there large areas of intact native grasslands.

In the Kamloops, Kelowna, and Cranbrook areas, urban sprawl continues to expand into new grassland areas as demand for housing in these and smaller desirable communities continues. Ranches have been sold for small holdings, golf courses, and resort developments. The original grassland has been covered over with buildings, tarmac, and all the needs of human settlements. In the South Okanagan 60% of the already small area of the antelope-brush ecosystem has been destroyed by agriculture, vineyards, urban development, and highway development.

The influence of urban areas goes far beyond the simple disappearance of the grasslands. The surrounding grasslands are outdoor recreation areas for activities such as hiking, mountain biking, car touring, camping, all-terrain vehicle use, cross-country skiing, and snowmobiling.

## Recreation

Recreation activities such as touring, hiking, and “passive” mountain bike riding in grasslands have a localized, linear impact where roads and trails cross the landscape. Some follow well-used cow trails, and others follow routes that have been used for decades.

The increasing popularity of downhill mountain biking in hilly terrain, however, has created heavily eroded trails that concentrate runoff. Uncontrolled use of all-terrain and other off-road vehicles has an impact over an even wider area. Mud-bogging is a particularly damaging activity in small wetlands and ponds, which may be completely destroyed. The scars of these activities remain for decades.

Wildlife species can be disturbed in many ways by the activities of off-road vehicles. Habitat for ground-nesting birds, waterfowl, reptiles, and amphibians can be lost, while many other species can be disturbed or displaced by the noise and activity.

Golf courses not only destroy grassland habitats, but also alter the landscape itself; non-native species are planted, and irrigation water is needed to keep them green.

Rock-climbing is popular where suitable cliffs can be found. This activity often destroys special plant communities and has the potential to disturb species such as California bighorn sheep and roosting bats.

## Invasive Plants

One of the greatest threats to the remaining natural grassland communities is the introduction and spread of non-native plants, or weeds. These alien species usually have no natural enemies to control their spread, have substantial root systems, and produce large quantities of seeds. They compete with native species for moisture and soil nutrients but won't be eaten by wildlife or livestock. Non-native species reduce the biodiversity of the grasslands and, once established, are usually very difficult to control.

Non-native species arrive in British Columbia in a variety of ways—for example, as seed in imported hay, as imported feed for livestock, or as part of a program of re-seeding grassland. Most are European imports, brought in as early as the 1850s. They have spread very rapidly over the past 30 years in some grasslands, particularly in disturbed areas; along roadsides; in areas of thin, gravelly soils; and in areas that were historically heavily grazed. The spread is often associated with the increased recreation in grasslands over the past 20 years, and particularly the concentrated use of motorized vehicles over many years.

Fourteen plant species are listed in the BC *Weed Control Act* as noxious weeds, which means that owners of private and public lands have legal responsibilities for their control. All these species have caused serious damage to our grasslands or pose a serious threat:

- Diffuse knapweed (*Centaurea diffusa*)
- Spotted knapweed (*Centaurea maculosa*)
- Hounds-tongue (*Cynoglossum officinale*)
- Dalmatian toadflax (*Linaria dalmatica*)
- Rush Skeletonweed (*Chondrilla juncea*)
- Leafy spurge (*Euphorbia esula*)
- Sulphur cinquefoil (*Potentilla recta*)
- Scentless chamomile (*Matricaria maritima*)
- Tansy ragwort (*Senecia jacobaea*)
- Oxeye daisy (*Chrysanthemum leucanthemum*)
- Orange hawkweed (*Heiracium aurantiacum*)
- Yellow hawkweed (*Heiracium pratense*)

The knapweed species are established extensively throughout the lower and middle elevation grasslands in many areas of the province. Their purple or white thistle-like flower heads are easy to recognize. Houndstongue can cause considerable distress to cattle when they become covered in the “Velcro-covered” seeds.

Crested wheatgrass was introduced deliberately in many areas as part of grassland reseeding and restoration programs and to improve forage for livestock. It was a useful species to provide plant cover on bare ground but it has established as a single species over some large areas, with very low diversity of other plant species.

Hundreds of insect predators that feed only on specific plant species have been released into patches of weeds in an effort to control the spread of these noxious weeds. Scientists have researched the native insect enemies of many grassland weed species to make sure none of them will spread beyond the species they are released on. The insects feed on various parts of the plants, including the roots, stems and seed heads, slowly reducing their viability. There is a feeling that in some places this method of control may be having some effect. But there is a long battle ahead to restore some grassland areas to native species.

## Forest Encroachment

The extent of grasslands in BC has changed a number of times over the thousands of years since the end of the last ice age. Grasslands were much more extensive 6,000 years ago when the climate was warmer and drier than it is now. From 1650 to 1850 the province went through a Little Ice Age when grasslands may have been less extensive than they are now.

Grasslands change to forests along a boundary that is not a clean line, but a mix of grasslands with a few trees, to forests with “fingers” of grassland or grassland patches. In most grassland areas in BC, trees seem to have been taking over grasslands more rapidly in recent years.

In the Cariboo-Chilcotin and East Kootenays, it is estimated that the grassland area has been reduced by as much as a third in the past 30 years. This means that livestock and wildlife have much less grassland on which to graze. The reasons why trees are encroaching on the grasslands in this way are not clear, and probably involve a number of factors, both natural and human caused. Much more study is needed to understand the reasons why it is happening and to find solutions to the problem of our disappearing grasslands.

Tree seeds are not able to germinate and grow in areas where a healthy cryptogamic crust covers the ground and where there are many grass and other plants competing for moisture. If the crust is broken or the plants reduced, the chance of tree seeds growing into trees is increased. Livestock grazing is one way in which the crust is broken and the amount of plant cover is reduced.

## Prescribed Fire

The role of fire in grasslands and forests is still being studied and is not well understood. There have been many human-caused changes in the grasslands and nearby forests in the past 150 years that have altered the natural balance. Habitat for many species has been greatly reduced or lost altogether while some of the changes seem to have been beneficial to other species.

A method that is used to burn an area in a controlled way is called prescribed fire. Prescribed fires are planned in advance with specific objectives defined and special efforts made to make sure the fire does not burn beyond set boundaries. It has often been used in grasslands to remove tree encroachment and to improve forage for livestock and wildlife.



The impact of fire on specific species has not been thoroughly researched in British Columbia.

Unfortunately non-game species, non-forage plants and shrubs, and invertebrates are often not adequately studied before a prescribed fire is lit, and the impact of the fire on those species is not recorded.

Natural fires in grasslands are started by lightning strikes hitting trees that explode and spread flames to the surrounding area. Burning quickly breaks down plants and adds valuable nutrients to the soil for a short period of time. First Nations people often used to burn areas to improve berry crops, to encourage particular plants they valued for food or medicinal uses, or to improve food for wildlife they wanted to hunt.

Fires were often started by sparks from wood-fired trains in the late 1800s and early 1900s. Ranchers used to burn areas to get rid of shrubs and small trees and to improve the grasses their livestock preferred to eat.

These natural and human-caused fires often spread through the forests creating large burned areas. Hot fires also destroyed the cryptogamic crust, plants, shrubs and small trees in the grasslands.

Fewer fires have burned in the grasslands and adjacent forests over the last 70 years. First Nations people do not burn areas as they used to. Intensive grazing by livestock removes a large amount of the natural plant cover, which means there is less fuel to burn and for fires to spread. In the last 50 years, every effort has been made to put out fires, whatever their cause, to prevent large areas of valuable forest from being burned.