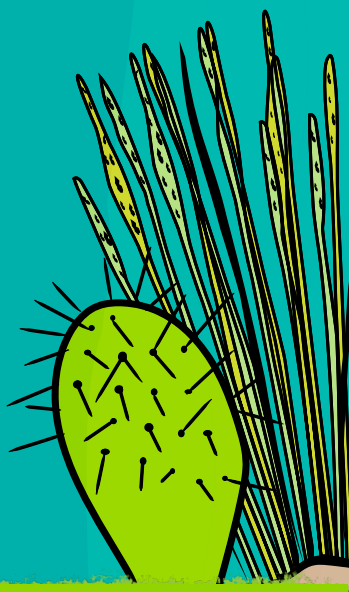
Let's GO to the Grassland!

Field Trip Ideas and Activities to Explore in Grasslands in BC Parks and other Special Places in B.C.

GRADES 4-6 MODULE

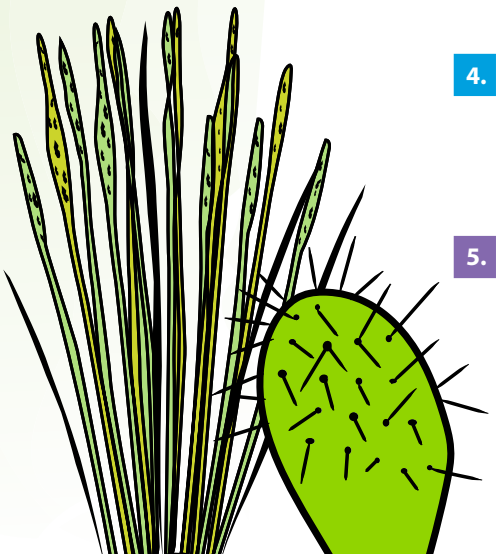


BRITISH COLUMBIA | BC Parks

HCTF Education

HABITAT CONSERVATION TRUST FOUNDATION

In this Module



Meet the Grassland

What do you imagine when you picture a grassland? Do you think of lions and zebras on an African plain? Or herds of bison hunted by North America's First Peoples? Stage coaches and cattle drives? Do you envision an endless horizon of blue sky above a sea of golden grasses rippling in the wind?

In Canada, we often associate grasslands with the prairie provinces of Alberta, Saskatchewan, and Manitoba. But did you know that there are also grasslands in British Columbia? These are our driest places, where summer temperatures reach their highest, where the landscape is dramatic, and the diversity of life is much higher than one might expect. Grasslands are dominated by low lying plants including grasses and shrubs, which require much less water than trees, and that have special ways to soak up rainfall when it comes. These grasslands have been home to countless generations of First Nations who intimately knew the rhythm of the seasons and how to thrive off the land. Today many of these same lands have been transformed into productive agricultural areas, ranches, towns and cities.

Grasslands in British Columbia

If you were to look out over the landscape from a hilltop in the Southern Interior, it might look as though there is an endless expanse of grassland. But the grasslands in B.C. cover less than 1% of the province (0.74 million hectares). Historically grasslands were more extensive, however they were never widespread throughout the province. British Columbia's grasslands occur as narrow bands in the arid valleys or plateaus on the eastern side of the Coast, Cascade, and Purcell mountain ranges. As moisture is carried from the Pacific coast eastward by winds, it is eventually dropped as rain or snow on the lush western slopes of the north-south oriented mountain ranges, leaving the eastern sides to the grasslands, which form in the rain shadow. Grasslands in B.C. are distinct from those in the prairies. British Columbia's grasslands are dominated by bunchgrasses, which grow in a clump from a single root system, in contrast to prairie grasses which form sod and grow from mats of roots. Another difference is that aside from the Peace region, the grasslands of British Columbia were not historically grazed by bison.

Grasslands are more than just grass. They include a mosaic of habitats dispersed across the landscape including not only grassy areas, but also wetlands, lakes, and streams, rocky outcrops and cliffs, and scattered woodlands. Wetlands and other aquatic habitats are a particularly important part of the otherwise arid grassland ecosystem.

There are several main types of grasslands, found in different regions of B.C.. These include the following:

- **Southern Interior Bunchgrass zone** - This is the most extensive of the grasslands in British Columbia and are found in dry valleys in the rain shadows of the mountains. The predominant grass is a perennial bunchgrass, either bluebunch wheatgrass or fescue. The bunchgrass zone can be found in the:
    - Okanagan Valley up to approximately 900 meters elevation from Summerland south to the US border.
    - South Okanagan Antelope-brush ecosystem, often called a "pocket desert", see *A Desert in Canada?*
    - Thompson River Valley from Kamloops to Spences Bridge

A Desert in Canada?

The Antelope-brush ecosystem of the south Okanagan is often called Canada's pocket desert. With its hot, dry summers, its sagebrush, rattlesnakes, scorpions and cacti, this area undoubtedly conjures up visions of the arid lands further south. However, it is not a desert —it gets too much rain and is too cold to be a true desert. Instead this region is an arid grassland habitat called a shrub-steppe. It is one of the four most endangered ecosystems in Canada.

The majority of B.C.'s grasslands are found in the Southern Interior.

Image provided by the Grasslands Conservation Council, 2018

What are the grasslands habitats?

- *Grassy areas*
- *Shrubby areas*
- *Rocky areas*
- *Forest stands*
- *Deciduous trees*
- *Coniferous trees*
- *Wetlands/stream corridors*

Garry Oak Ecosystems

Like the Antelope-brush ecosystem in the south Okanagan, Garry Oak ecosystems are one of the most endangered in Canada, with less than 5% of their original extent remaining. These open woodlands found within the Coastal Douglas fir-zone are distinct in many ways from the grasslands in the interior of B.C.. For more information to learn and teach about Garry Oak Ecosystems see:

- *Garry Oak Ecosystems of British Columbia: An Educator's Guide, https://resourceroom.hctfeducation.ca/products/garry-oak-ecosystems-of-british-columbia*
- *Ecosystems in British Columbia At Risk: Garry Oak Ecosystems. https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/conservation-data-centre/publications/erickson_garry_oak.pdf*

  - Nicola River Valley
  - Fraser and Chilcotin River Valleys, north of Lillooet to south of Riske Creek

- **Northern Grasslands** - Grasslands in the northern zones of the province are not widespread but can be locally important, especially for such species as Stone sheep, mountain goat, caribou and elk. Areas with grasslands are the Stikine River canyon, those on the Nechako Plateau and in the Babine - Bulkley drainage.

- **Mountain Grasslands** - These grasslands occur in drier alpine and sub-alpine areas of the province, usually occurring with a sharp break above the timberline. Mountain grasslands typically have many flowering plants, as well as grasses, for example paintbrush and valerians. These alpine meadows provide summer range for deer, moose, sheep and grizzly bears as well as habitat for ground squirrels and marmots.

- **Coastal Grasslands**:

  - Garry Oak meadows of southeastern Vancouver Island and the southern Gulf Islands are B.C.'s rarest grassland ecosystems.

  - Fraser Valley grasslands - the native grasslands of the Lower Fraser valley, at Langley, Chilliwack and Matsqui prairies, have long ago been plowed under and built upon. Some old fields found around Boundary Bay and at Brunswick Point mimic the native wet meadows that existed before dyking and draining.

Each of the grasslands regions in B.C. is distinct in some ways depending on the specific conditions in that region, such as the altitude, latitude, climate, soils, glacial history and landforms. Take a look at the photographs of the different grasslands found across B.C.

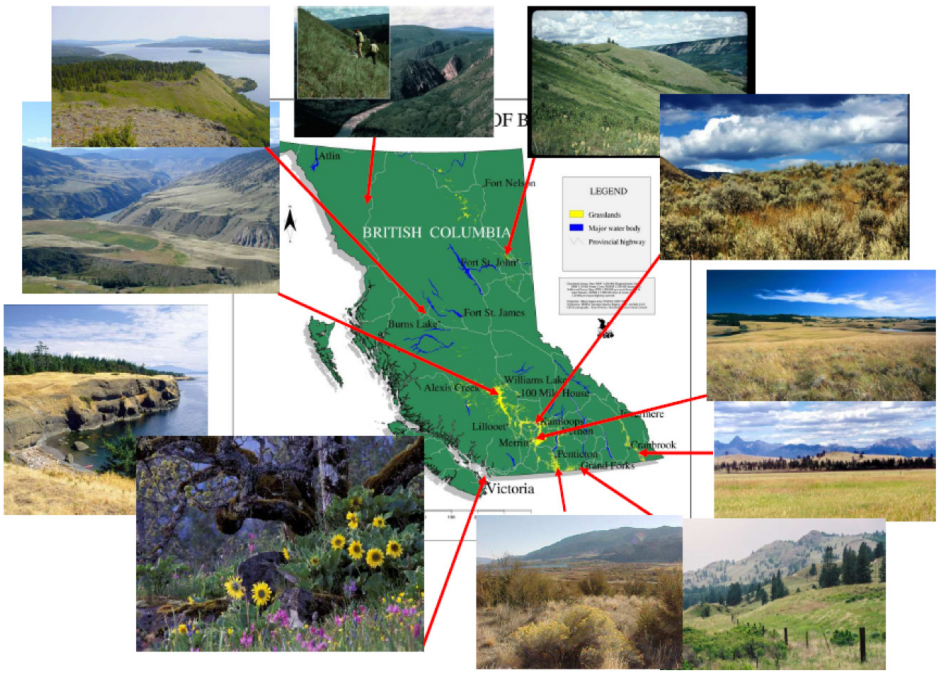


Image provided by the Grasslands Conservation Council, 2018.

Why are grasslands important?

Grasslands have important ecological roles. They improve the quality of our soil, air, and water. The deep, fibrous network of grass roots helps to stabilize slopes and prevents erosion, which helps to maintain a healthy watershed. Grassland plants store carbon and mitigate climate change. Native grasslands provide habitat for bees, butterflies, and other pollinators, supporting food production. Grasslands are also habitat for predatory and parasitic insects, such as wasps and beetles, providing a natural pest control for crops grown nearby. Grasslands are home to diverse wildlife that are specialized to live here, including grazers like bighorn sheep, burrowing mammals such as ground squirrels, and songbirds such as meadowlarks. Wetlands scattered throughout the grasslands are biodiversity hotspots in these arid lands.

Grasslands are sensitive ecosystems

Grasslands are rare in B.C. and are one of our most endangered ecosystems. Almost a third of the species at risk in B.C. live in the grasslands. Because they are found in the low, dry, and more accessible valley bottoms, grasslands have been extensively impacted by human activities. Vast areas have been plowed under for agricultural development or paved to build towns and cities. For example, historical mapping shows that 68% and 77% of two grassland ecosystem types found in the Okanagan Valley were lost between 1800 and 2005. Some wetland ecosystems within the larger grassland landscape in the Okanagan suffered even greater losses—up to 92%- during this time (Taking Nature's Pulse: The Status of Biodiversity in British Columbia, 2009 *http://biodiversitybc.org*). Much of the grassland areas that remain are altered and degraded by livestock grazing, the spread of invasive species, off-road vehicle use, and fire suppression, which has led to forest encroachment and increased fire intensity.

Things To Learn in the Grassland

Why visit grasslands?

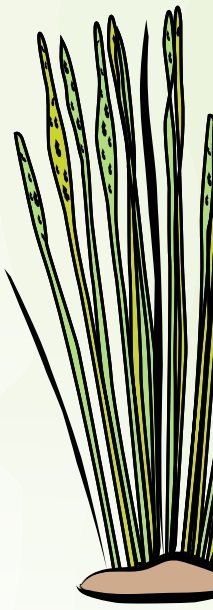
Grasslands are places where students can connect with nature. The sights, sounds, and smells of grasslands are distinctly beautiful and can offer a sense of calm in one's busy life. A field trip to a grassland ecosystem provides an opportunity to experience British Columbia's unique biodiversity, our collective history and heritage. By getting to know these places students can become grassland stewards and help to ensure that healthy grassland ecosystems remain for future generations.

Bringing students into the grasslands offers hands-on learning experiences in one of British Columbia's most threatened ecosystems. Visiting a grassland will spark students' sense of wonder and curiosity about these special places as they exist today, what they may have been like generations ago, and the potential future trajectories of grasslands in B.C..

Some themes to focus on in your grassland field trip could include the following:

Adaptations

Plants and animals that survive in the grasslands are adapted to drought, intense summer heat, dry soils, a lack of shade, and strong winds. This is a place with an environment distinct from our largely forested and mountainous province. As a result, many of the species that live here have special adaptations for grassland life.



Bunchgrasses dominate the plant life in most of the grasslands in B.C.. Their growth form as "bunches" helps them to survive the hot, dry conditions. Bunchgrasses have grass blades that are bent to catch rain and direct it to their roots. Their growth form also protects their roots from the hot sun. The long, fine, extensive network of grass roots are able to soak up water from the soil surface after even a light rain.

Other plants in the grassland have different ways to survive drought and heat, such as deep taproots, hairs that reflect sunlight, or short growing seasons.

Animals of the grassland also have special ways to cope with temperature extremes and drought. Some, such as the pocket mouse, don't need to drink and are able to derive all of their needed water from their food. In the expansive open landscape many animals such as rodents, coyotes, snakes, and invertebrates, seek shelter from the hot sun and cold winters in underground burrows.

Many of the animals that live in the grasslands are grazers that eat…that's right, grass! Deer, elk, and bighorn sheep are among them. Droppings from native animals such as bighorn sheep also help to fertilize the soil and help grasses to grow. Grasses have evolved to tolerate - and even benefit from- moderate levels of grazing. However, if grasses are overgrazed their root growth slows to the point that the grasses may not survive. (See diagram showing grass roots and grazing.) Grasses grow from points called apical meristems which are located at joints below the grass tips. When the grass is nibbled off by animals, it continues to grow from its apical meristem. And each stem of a bunchgrass can live on its own, even if the others die off. These features allow grasses to survive - or even thrive! - mild levels of grazing and fire—disturbances that may kill or seriously damage many other types of plants. Grass roots help to stabilize the soil. When the grass dies the roots leave tunnels in the soil that allows air, water and nutrients to circulate and which helps to support other plants.

Effect of grazing intensity on grass root growth

No grazing | Light grazing | Moderate grazing | Heavy grazing

Grassland ecosystems

Grasslands can exist in a variety of climates, but they share several important characteristics: dry seasons or dry spells, and rolling terrain with prevailing winds.

Grasslands are known by many names in the tropical and temperate regions of the world in which they are found, including the North American prairies, African savanna and veldt, Asian steppes, and the pampas of South America. What all of these places have in common is that they are dry. They are too dry for forests to grow but receive more rain than deserts.

The soils in grasslands and other arid places are special. Unlike the soils that form in areas with more rainfall, grassland soils have a living crust made up of lichens, mosses, fungi, algae, and cyanobacteria—a group of photosynthetic bacteria that is one of the oldest known life forms on Earth. This complex soil layer is called many names, including cryptogamic, cryptobiotic, microbiotic, or soil crust.

Changes and impacts

The grasslands have a long history of inhabitation, transformation, and change. The grasslands changed dramatically after contact, with the introduction of cattle grazing, industrial agriculture, associated wetland draining, and urban growth. Because large areas of grasslands have been degraded or converted to other uses, grasslands offer opportunities to study environmental impacts of human activities, sustainability, and the interconnectedness of systems.

Generations of First Nations, including the Nlaka'pamux (Thompson), Silx (Okanagan), Secwepemc (Shuswap), Stl'atl'imx (Lillooet) and Ts'ilquot'in (Chilcotin) had intimate knowledge of the grasslands and intensely used and managed them with fire to provide them with their food, medicines, everyday materials and technologies, and for spiritual and ceremonial purposes. First Nations Elders from the Southern Interior recall a time when the grasses were "belly-high to a horse", when wetlands were more abundant, and when Greater Sage-grouse - which are now extirpated from B.C. - were a common sight. (Blackstock, Michael D. and McAllister, Rhonda. *"First Nations Perspectives on the Grasslands of the Interior of British Columbia."* Journal of Ecological Anthropology 8, 1 (2004): 24-46. Available at *http://scholarcommons.usf.edu/jea/vol8/iss1/2*).

Fire is a natural part of the grassland ecosystem and helps to maintain its health. Grasslands are adapted to frequent, low intensity fires. Prior to European settlement, fires would sweep through the grasslands every 5-20 years. Fires ignited from lightning strikes as well as by First Nations management practices.

First Peoples intentionally burned the grassland to bring a flush of new plant growth, which attracted grazing mammals such as elk, deer and bighorn sheep, important sources of food and materials. Frequent fires also served to maintain grasses and prevent succession to a shrubland or forest. Some plants, such as the Ponderosa Pine, actually require fire in order for their cones to release their seeds. Frequent fires also kept fuel loads low, preventing the catastrophic fires that we see today.

Curriculum Connections

Curricular Competencies for Social Studies 4-6:

- *Sequence objects, images, or events, and recognize the positive and negative aspects of continuities and changes in the past and present*
- *Differentiate between intended and unintended consequences of events, decisions, or developments, and speculate about alternative outcomes*
- *Take stakeholders' perspectives on issues, developments, or events by making inferences about their beliefs, values, and motivations*
- *Make ethical judgments about events, decisions, or actions that consider the conditions of a particular time and place*

Some sample Big Ideas and Content that may be addressed on a field trip to the grassland include:

- *All living things sense and respond to their environment (Science 4 Big Idea)*
- *Biomes as large regions with similar environmental features (Science 4 Content)*
- *The pursuit of valuable natural resources has played a key role in changing the land, people, and communities of Canada (Social Studies 4 Big Idea)*
- *First Peoples concept of interconnectedness in the environment (Science 5 Content)*
- *The nature of sustainable practices around B.C.'s resources (Science 5 Content)*
- *First Peoples knowledge of sustainable practices (Grade 5 Science Content)*
- *Natural resources continue to shape the economy and identity of different regions of Canada (Social Studies 5 Big Idea)*
- *Multicellular organisms rely on internal systems to survive, reproduce, and interact with their environment (Science 6 Big Idea)*

Quick Facts: Did you know these things about grassland life?

Soil crust

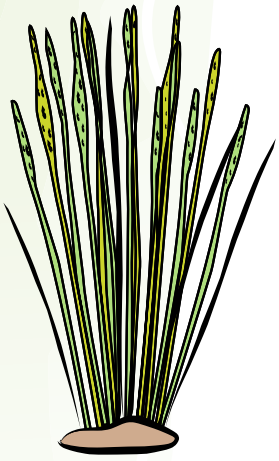
Grassland soils have a living crust made up of lichens, mosses, fungi, algae, and cyanobacteria—a group of photosynthetic bacteria that is one of the oldest known life forms on Earth. This complex soil layer is called many names, including cryptogamic, cryptobiotic, microbiotic, or soil crust. Whatever you call it, this soil crust plays important roles in the grassland ecosystem. It helps to hold the dry soil together and prevent erosion, aids in water absorption and retention, supports nutrient cycling by fixing nitrogen, and provides suitable places for plants to germinate. Soil crusts take decades to form and they are fragile. When they are dry they can easily be crumbled and damaged by vehicles or footsteps. So in the case of soil crusts, "Take only pictures, leave only footprints" does not apply. Take your photographs, but don't leave any footprints. Please stay on the trail and **don't bust the crust!**

American badger (*Taxidea taxus jeffersonii*)

Badgers are made for digging. These stocky members of the weasel family have long claws and powerful limbs that help them to excavate underground dens, called a sett, which have several entrances and chambers, including separate rooms for sleeping and going to the latrine. Badgers usually hunt for their prey at night, digging for ground squirrels, pocket gophers, shrews, ground nesting birds, lizards and even rattlesnakes! They are clever and can outwit their underground prey by plugging up most of their burrow exits and then furiously digging until they find a tasty meal. Sometimes they even team up with coyotes to hunt.

The endangered badgers are important "ecosystem engineers". Their digging action help to aerate soils, increase soil moisture levels, and to increase plant diversity. Abandoned badger dens provide shelter for many species including burrowing owls, rodents, lizards, amphibians and invertebrates. British Columbia's badgers represent a unique subspecies which is at risk due to habitat loss as their grassland habitat is cleared for agriculture, industrial, and residential development. Badgers are also illegally killed by some who consider them to be pests. As people continue to develop land and build houses, roads criss-cross their habitat, dividing and isolating populations and making them more susceptible to being hit by vehicles.

Bluebunch wheatgrass (*Pseudoroegneria spicata*)



This hearty, drought-tolerant bunchgrass is characteristic of many of B.C.'s grasslands as far north as the upper Chilcotin Plateau. They grow 60 to 100 cm tall and grow in bunches that can be as wide as they are tall. They have slender, silvery green, stiff stalks and their roots have a waxy layer that helps prevent them from drying out.

First Nations used the grass as a fire starter and as a medicine for sores and arthritis. Bluebunch wheatgrass was spread on the floors of pithouses like hay; harvested berries were dried on top of the grasses. The large bunches formed by this grass provide shelter and food for small animals, and important forage for large grazers such as elk, bighorn, deer as well as domestic animals. Bluebunch wheatgrass benefits from mild to moderate amounts of grazing but if overgrazed it can die. This grass is easily be propagated by seed and can be an attractive addition to a garden that supports native plants and wildlife.

Burrowing owl (*Athene cunicularia*)

The burrowing owl is a small, sturdy bird which, unlike most other owl species, nests in abandoned underground burrows and mimics the hiss of a rattlesnake for protection. Colonies of burrowing owls were once a common sight in the Okanagan grasslands. They became extirpated (locally extinct) in B.C. by 1980 due to agricultural expansion and loss of burrowing mammal populations from trapping and poisoning. Today the burrowing owl is one of the most endangered birds in western Canada. Conservation efforts including captive breeding, reintroduction and artificial burrow construction, are helping to reestablish burrowing owl populations where they once thrived.

Invader alert! Spotted knapweed (*Centaurea stoebe*)

Spotted knapweed, the "wicked weed of the west", was accidentally brought to North America from Europe in the late 1800s in contaminated soil used as ship ballast and in alfalfa and clover seed. Since then spotted knapweed – and its close relative, diffuse knapweed - have spread across most U.S. States and Canadian Provinces, including in the grasslands of B.C.. Droughts are no match for this invader, which has a deep taproot and can produce up to 140,000 seeds per square meter! People also inadvertently help in the spread of spotted knapweed by transporting seeds and plant fragments long distances in hay and on the undercarriages of vehicles.

Spotted knapweed has serious impacts on the biodiversity and ecology of the grasslands. Native wildlife and livestock don't like to eat knapweed, which chokes out huge areas of their preferred natural food plants. Knapweed out competes native plants and releases toxins into the soil that kill other plants growing nearby (this is called *allelopathy*). Spotted knapweed also affects the water cycle –rainfall in areas with knapweed isn't absorbed in the same way as where native plants are found. Instead water runs off, making dry sites even drier and causing excess sediment to flow into streams. Warning: contact with spotted knapweed sap can cause skin irritation.

Cool fact

The genus name for knapweed, Centaurea, comes from the Greek word for Centaur, a mythical creature with the upper body of a human and the body and legs of a horse. Centaurs were uncontrollable and caused trouble and chaos.

Planning and Preparation

You've decided to go on a field trip to a grassland. Exciting! But now what?

When to Go?

Grasslands transform dramatically from season to season.

In the fall the grasses are golden. This is a good time to discover seeds and to consider how the animals and plants will survive the winter. The autumn is the rutting season of the ungulates, when these grazing mammals come down from the mountains to spend the winters in the grassland lowlands.

In the spring the grasslands burst into life with a flush of green after snowmelt and rains. This is the growing season and breeding season for many animals. It is a good time to learn how to bird watch, to investigate grassland plants, and visit nearby wetlands.

Consider multiple field trips at different times of year to experience the changing seasons and rhythm of life in the grassland.

Multiple trips? Try this:

- *Create a class seasonal wheel that can be added to after each trip to the grassland.*
- *See https://earthzine.org/phenology-wheels-earth-observation-where-you-live/ for tips on using seasonal wheels and wheel templates, courtesy of Anne Forbes, Partners in Place, https://partnersinplace.com/wheels-of-time-and-place*

Where to Go?

Where is a good field trip location to take your class? Ask other teachers if they know of a grassland where they bring students. Next, brainstorm ideas with your students.

Some considerations for a suitable location for your field trip:

- Visit the site ahead of time, especially if you are not familiar with the location.
- Where will drivers park?
- Are there any hazards at the site? Can they be mitigated?
- Are there toilet facilities/outhouses on site?
- Are there trails from which to explore the grassland as well as adjoining habitats such as forest or wetland?
- Are there any covered areas to gather in inclement weather, during nutrition breaks, and to leave belongings while exploring? If not, plan accordingly, such as by bringing a tarp to cover belongings or to sit upon.

Start here by following this step-by-step checklist of outdoor field trip planning:

- *https://hctfeducation.ca/file/field-trip-checklist.pdf*

Learn how to incorporate place-based learning into your teaching and some easy solutions to overcome some challenges associated with outdoor learning.

- *https://hctfeducation.ca/file/c2c-place-based-activities.pdf*

Finding a grassland to explore in British Columbia

Here are some online tools to identify a grassland site that may be near your school:

- BC Parks. Find parks near your school and filter by activity or facility. *http://www.env.gov.bc.ca/bcparks/explore/parks/*
- BC Nature. Find parks and protected areas near you using the BC Nature Guide. *https://bcnature.org/bc-nature-guide/*
- Contact local (municipal or regional) parks offices to see if their parks have grasslands suitable for a class field trip.
- Contact your local Naturalists' Club for suggestions. *https://bcnature.org/bc-nature-clubs/*

- Organizations in your area that work on grassland management and conservation may also be able to help identify areas for field trips and stewardship projects. Such as:
    - Grasslands Conservation Council of B.C.. *http://bcgrasslands.org/*
    - Ducks Unlimited, B.C. Office. *https://www.ducks.ca/about/contact/*
    - Invasive Species Council of B.C. *https://bcinvasives.ca*
    - Nature Conservancy of Canada, B.C. Office. *http:/natureconservancy.ca/en/where-we-work/british-columbia/*

BC Parks in grasslands:

The following sites are some possible BC Parks to visit on a grasslands field trip. It is recommended to contact your local BC Parks office to discuss ideal sites, obtain the most current information and special considerations, such as the best time to visit, sensitive species and habitats, or other specific considerations.

- Find BC Parks by geographic location, by name (alphabetically), by things to do and see (activity or facility), or by fire restrictions. *www.env.gov.bc.ca/bcparks/explore*

Kootenay Rockies

- **Syringa Provincial Park** - 19 km northwest of Castlegar at the southeast end of Lower Arrow Lake.

Northern B.C.

- **Butler Ridge Provincial Park** - 40 km west of Hudson's Hope off Highway 29; gravel road access

Thompson Okanagan

- **Gilpin Grasslands Provincial Park** - located 9 km east of the municipality of Grand Forks.
- **Kettle River Recreation Area** - located 5 km north of Rock Creek.
- **Lac du Bois Grasslands Provincial Park** - spectacular vistas, 3 distinct grassland communities (upper, middle and lower), also forests, cliffs, ponds and lakes. Located near Kamloops.
- **Tunkwa Provincial Park** - mid elevation grasslands also lakes, wetlands and forests, between Ashcroft and Kamloops.

Vancouver Island

- **Ruckle Provincial Park** - located on Salt Spring Island, 10 km from the Fulford Harbour ferry terminal.

Other grassland sites in British Columbia:

Cariboo Chilcotin Coast Region

- **Chilcotin Marshes** - 130 km west of Williams Lake. Managed by The Nature Trust with restoration support from Ducks Unlimited. Includes wetlands surrounded by grassland.

Kootenay Rockies

- **Fort Shephard Conservancy Area** (6 km south of Trail). Owned by The Land Conservancy and open to the public.

Thompson Okanagan Region

- **Laurie Guichon Memorial Grasslands Interpretive Site** (Nicola Valley near Merritt). Lawrence Guichon was a fourth generation rancher and his wife, Judy Guichon was the 29th Lt Gov of B.C.. They manage their ranch holistically and the interpretive site is considered a "hot spot" for bird watching, with 74 species recorded on e-bird.
- **Napier Lake Ranch Conservation Area** - protected and managed by the Nature Conservation of Canada. Mid-elevation grasslands and Douglas fir forests. *https://www.natureconservancy.ca/en/where-we-work/british-columbia/stories/the-story-of-napier-lake-ranch.html* ; or *https://hctf.ca/historic-grasslands-conserved/*
- **NK'Mip Desert and Heritage Centre, Osoyoos** - protects the unique Antelope Brush Ecosystem –found only in the southern Okanagan- one of the most endangered ecosystems in Canada. There is a nature centre and guided walks are available to learn about the ecosystem and First Nations connections to the land by the Syilx First Nations.
- **Osoyoos Desert Centre, Osoyoos**. Admission includes entrance to the interpretive centre, a self-guided tour or guided tour along a boardwalk through the antelope brush ecosystem, and to the native plant garden. (Open late April-early October)
- **Vaseaux-Bighorn National Wildlife Area** - Five km south of Okanagan Falls, 15 km north of Oliver. This refuge is over 750 hectares and was created to protect critical winter habitat for the California bighorn sheep and also protects many species at risk and rare habitats. It includes wetlands around the lake, arid terraces of antelope bitterbrush, and rugged hillsides dominated by exposed rock and ponderosa pine. There is a boardwalk and wildlife viewing tower for visitors to explore.

Preparing for Your Trip

Checklist

Make your field trip plan early. Gather all permissions and required forms, get your class prepared, and order or make your supplies.

Field Trip Materials

Having "exploration tools" for your field trip to the forest can help focus the students and enhance their learning. Basic materials, such as clipboards and sit-upons, can make outdoor learning more comfortable. Many tools are inexpensive and easy to make--making them together as a class can be a fun way to start learning about the field trip topic and activities.

Some Common Grassland Equipment

- **Journals** - Make or bring nature journals to record observations.
- **Binoculars** - Useful for wildlife spotting, bird watching, and looking at distant landforms. See Copy Pages for tips on how to use binoculars.
- **Magnifiers** - To look up close at grassland plants and seeds or insects.
- **Collection containers** - Small clear containers (get from your recycle bin) with lids to temporarily hold insects, seeds, soil, or other natural objects to examine.
- **Field guides** - Bring an assortment of field guides to plants, tracks, birds, or other animals that you may see. See Copy Pages for Grassland Species Cards and see the Grassland Resources and Activity Guides section for some suggestions.
- **Garbage bag** - Pick up trash that you find even if it isn't yours. Also handy for collecting and removing invasive plant parts/seeds that you may find on your clothing and shoes.

Other ideas for making your own field studies equipment:

- *Outdoor Classroom Essentials: materials to make or bring outdoors with your students. https://hctfeducation.ca/file/outdoor-classroom-essentials.pdf*
- *Get Outdoors Essentials Bag, available for purchase from https://resourceroom.hctfeducation.c a/products/get-outdoors-2*

Things to Know Before You Go: Setting the Stage for Curiosity and Wonder

Field trips in nature can be some of the most memorable and meaningful learning experiences for your students, opening a door of wonder and curiosity about the world. Help spark your students' interest by considering some inquiry questions before your trip. Foster a sense of social responsibility early to build appreciation for nature, encourage proper outdoor etiquette and minimize your impact in sensitive outdoor places.

Grassland Inquiry

Introduce students to the animals, plants, and habitats that you might see on your field trip to the grassland. Look at photographs, read books and watch videos about grasslands and the species that live there. Learn about local First Nations and their lives in the grasslands, past and present. Play games to learn about grassland ecosystems. Make a list of questions that students hope to learn from the field trip experience.

Sample Inquiry Questions

- How have plants or animals adapted to living in the grasslands?
- How do animals survive summer heat and drought?
- What species are invasive to the grasslands? What are their impacts on native species and on grassland ecology?
- How are grasslands different today than they were in the past and what caused the changes?
- How are grasslands in B.C. similar or different to grasslands in other parts of Canada and in other parts of the world?
- How is climate change affecting grassland ecosystems?
- How do people value or use grasslands today? How are the different uses compatible or incompatible with grassland conservation?
- What can we do to help to protect and restore grasslands?
- How does a grassland respond to differing levels of grazing?
- What is the role of fire in a grassland and how are fires today different than they were in the past?

Social Responsibility

Start building an environmental ethic as early as possible in the school year to reinforce on outings in and around the schoolyard and on field trips.

Have students collectively come up with rules on how to treat living things in the schoolyard and on the field trip (such as stay on the trail, don't pick flowers, treat all animals with gentle care and respect). Discuss with students the importance of minimizing their impact on fragile grassland soils and how to ensure that they don't spread invasive species. See the sample pre-field trip activities to build social responsibility on the right, and the Copy Pages for Tip Sheets on Conservation Ethics.

Sample Pre-field trip activities to build social responsibility:

- ***Ethi-Thinking/ Des Activités Nuisibles (Project WILD/Atout FAUNE)*** *Students consider activities that are harmful to wildlife and the environment and why; recommend alternatives activities.*
- ***Playing Lightly on the Earth/ Nos Jeux Sont-ils Inoffensifs? (Project WILD; Atout FAUNE)*** *Evaluate the schoolyard for signs of games that have harmed the environment. What could have caused the damage and how could it be prevented? Create schoolyard games that don't harm the environment.*

Pre-Field Trip Learning

Here are some themes on which to focus your learning before your field trip that will foster a deeper appreciation when you visit the grasslands. Build upon these themes with activities when you experience the grassland first hand on your field trip.

Adaptations for Living in the Grassland

Plants in grasslands ecosystems have adapted to grow in dry conditions. They have developed deep root systems to soak up moisture and nutrients. Many animals also make their home in the grasslands and have adaptations to help them survive. Have students research to learn about an animal that lives in a grassland biome. How has it adapted to live there?

Fashion a Grassland Creature (Adapted from Fashion a Fish, Project WILD).

Grassland animals have unique adaptations that help them survive the specific conditions of their habitat. These adaptations may be behaviours (such as migrating when it gets too cold or when food is no longer plentiful), physical traits (such as brown fur to camouflage with grassland soils), or specialized physiology (such as to concentrate urine to survive drought conditions).

In this activity, students learn about some of the adaptations of grassland animals and how their traits help them to survive. Then students create an imaginary creature with specific adaptations that help it to survive in the grasslands. Another option for this activity is to look at plants that also have adaptations to survive in the grasslands See Copy Pages - Adaptations of Animals in Grasslands.

Procedure:

1. Look at pictures or videos of grassland animals to learn about their adaptations. Discuss the environmental conditions of the grasslands and the challenges they present to the survival of the animals that live there. What traits (adaptations) have animals evolved over time that help them to survive these conditions? See **Copy Page - Adaptations of Animals in Grasslands** for some examples and ideas. Add to this list using examples of animals found in your area or other adaptations that you learn about.

2. Have the students classify the main categories of adaptations of grassland animals. Such as physical features (shape, colour, teeth), behaviours (migration, burrowing, nesting sites), and body systems/physiology (hibernation, digestion, water conservation). Consider these adaptation types for grassland animals or other familiar animals. Compare and contrast these adaptations to humans. Where do the animals live? What do they eat and how do they catch their food? Who are its predators and how do they try to avoid them? How does the animal deal with drought, heat, fire, and cold?

3. Have the students imagine a new species of grassland animal. You could create a scenario where scientists discover a new species that somehow was never found living in a remote grassland site. Or it is the year 3050 in the grasslands. How is your creature adapted to survive in the grasslands? Have the students consider its physical characteristics, behaviours, and body systems.

4. Once the students have discussed and brainstormed adaptations, they can draw their animal. They should give their animal a name. Label its features/adaptations, and draw its habitat, including plants that are adapted to live in the grassland. Students should be able to report on how the animal is adapted to survive in the grasslands.

Read about B.C. species and ecosystems at risk:

- *https://bcspeciesatrisked.org*
- *https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/species-ecosystems-at-risk/brochures*

Explore data and reports on B.C.'s species at risk:

- *Species @ Risk, a Primer for British Columbia (Stewardship Centre for B.C.) https://stewardshipcentrebc.ca/sar-primer-hub/*
- *B.C. Species and Ecosystem Explorer (B.C. Ministry of the Environment) http://a100.gov.bc.ca/pub/eswp/*

Go outdoors on a Biodiversity Scavenger Hunt in your schoolyard.

- *Copy Pages - p. 78 from Get Outdoors! : https://hctfeducation.ca/file/get-outdoors.pdf*

- ***Extinct**- gone forever from the planet.*
- ***Extirpated** - eliminated from an area within its range (such as from all of B.C. or all of Canada), but not from its entire range.)*

Grassland Ecosystems At Risk

For in the end, we will conserve only what we love. We will love only what we understand. We will understand only what we are taught.

– Baba Dioum (Seneghalese Forestry Engineer, 1968)

Because of its variety in landscapes, elevations, ecosystems, and climate, British Columbia is home to the greatest number of species in Canada, including over 1,200 vertebrates, 3,000 vascular plants, 4,500 marine invertebrates and over 35,000 insects. However, over 1,500 of these species are at risk of being lost forever.

Numerous factors contribute to a species being at risk, including being found only in specialized habitats or a limited geographical area, having a small population, having few occurrences over its range, and facing threats that are having - or are expected to have - a negative impact on the species. Native grasslands cover less than 1% of B.C.'s land base. Even so, they are home to more than 30% of its species at risk. Grasslands support more threatened and endangered plants and animals than any other habitat type in the province.

Here are few activity ideas to get you started before going out to a grassland area:

- **Grassland Species at Risk in B.C.** - Find out which species at risk occur in the grasslands near you. Have students discuss, research, and write articles about grassland species at risk. What threats do species at risk in the grasslands face? What are the impacts of invasive species on native species in the grasslands? What can be done to help conserve species at risk? Map where species at risk are found. Draw pictures of them. Write an autobiography from the point of view of the species that is threatened.

- **Explore a Grassland Ecosystem** - Explore how food energy makes its way from simple plants to large predators in a sagebrush food web. Click on the images of the different groups to show their connections and to learn more about plants and animals. The Sagebrush Sea: Food Web *http://www.pbs.org/wnet/nature/sagebrush-sea-food-web/*

- **Here Today, Gone Tomorrow/Question d'extinction** (Project WILD/Atout-FAUNE): Students identify and describe some causes for extinction of animals, make a master list of and conduct research on species at risk locally and nationally.

- **Terms of Endangerment** (Backyard Biodiversity and Beyond): An active game of musical chairs based on the life histories and threats to particular species at risk.

- Watch the B.C. Species at Risk Video Series. (See Additional Grassland Activities and Resources Section for links)

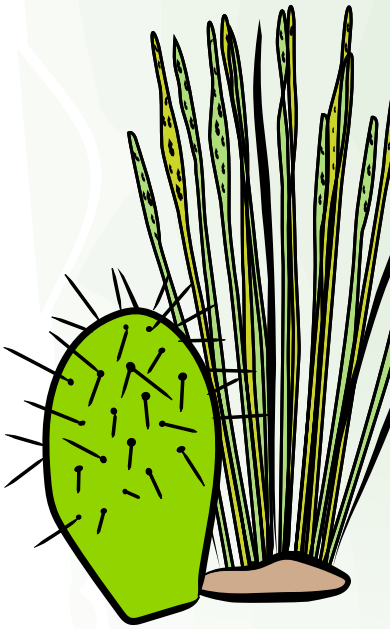
Changes and Impacts

What was it like in the grassland 50 years ago? 100? 250? Make a timeline from 1750 to the present, putting significant dates and historical events on the timeline. Split the class into small groups and have each group research a time period on the timeline.

Ask the students to uncover information about their time period, such as the following:

- Who lived in the grassland during this time? How big were the populations? Were there any towns, cities or settlements in the area?
- How did people use the land?
- What local, regional, or national events happened during that time period that might have affected the grassland?
- Were there any significant natural events to note, such as wildfire, flood, or drought?
- Are there any historic photographs of the region from your time period? Try searching the B.C. Archives for a glimpse of the past. *https://search-bcarchives.royalbcmuseum.bc.ca/*
- Consider that some grassland plants, like sagebrush, can live over 100 years! If the sagebrush could tell a story, what might it reveal about the changes that it has seen in the grassland during its lifetime?

After the research is complete, give each group a single piece of paper or large index card. Have each group summarize their time period with a few major findings and a drawing. Don't include the time period/year on the front of the card! Gather all of the cards and put them in a pile. Shuffle them and deal them out. Have the class try to figure out the correct order of the cards on the timeline.



You Made it to the Grassland!

You made it to the grasslands and no doubt the students are excited to get out and explore. Here are some safety and conservation considerations as well as some activities to do with your group before you get going:

Safety and Conservation Ethics

Before you begin you should review with students the safety guidelines and conservation ethics (see Copy Pages). Remind them that they are guests in a special place and one of the most threatened ecosystems in British Columbia. They have a responsibility to treat this place with care and respect. Reinforce the importance of staying on the trails and not disturbing intact and fragile grassland soils. The quieter they are the more likely they are to see or hear wildlife.

Field Trip Activities

Begin with an Energy Burner!

Especially after a long drive it can be helpful to start a field trip off with an active "energy burner" game before settling down for some focused exploration. Find an open space away from sensitive natural areas where the students can safely run around without trampling plants, disturbing wildlife, soils or other sensitive habitats.

Fire in the Grassland
(Adapted from *Coyote's Guide to Connecting with Nature*. Jon Young, Ellen Haas, and Evan McGown. Owlink Media, California, 2016.)

This is a fun and active game of tag where the person who is "it" is "Fire" and the rest of the students are grassland animals that try to escape the fire. If they get tagged they become burning trees or shrubs that can tag other animals as they run by.

Introduction and Set Up:

1. Clearly define or mark the boundaries of your playing area. Ideally you will have a large and open playing space that is not in a sensitive habitat, ~ 20-30 m long and as wide as you want. The more narrow the more challenging it will be to escape being tagged.

2. Set the stage by describing the grassland in the summer. Can you feel the heat? It hasn't rained for a month. The plants are so dry and brittle that they crunch underfoot. A storm is brewing and lightning strikes. The fire ignites and is coming towards us. All the animals need to flee.

3. Brainstorm with the students some of the animals that live in the grassland. Then choose three of those animals to be used in the game.

4. One person is chosen to be "Fire" and they stand in the middle of the playing field- they are "it". Everyone else chooses (in their head, without telling anyone) one of the three grassland animals that were selected. The grassland animals spread out in a line across one end of the playing field. Their goal will be to run to the opposite end of the playing field without getting tagged.

Play:

1. "Fire" starts the game by calling out one of the three grassland animals. When you hear your grassland animal name, you run to the other end of the playing zone without getting tagged by the Fire.

2. If you get tagged, you freeze in place and become a burning "tree" or "shrub". Trees/shrubs have roots that anchor them in place. They are not able to move but they can pivot and reach out with their "branches" (arms) to tag the animals running by.

3. The game continues with Fire calling out the names of the animals, and the animals running from one end zone to the other without getting tagged by Fire or the burning Trees or Shrubs that are in the way.

4. Fire can also call out "Fire in the grassland!" and then ALL the different animals need to run across the playing field.

Game End and New Beginnings

- When one animal remains this person becomes the new Fire. Have the group choose three different grassland animals and start the game over.

- Optional: Have the students move as their grassland animal would move - jumping, slithering, flying, hopping, bounding, running. Give the animal "adaptation powers" that could help them to survive the fire, such as a bird could fly outside the playing boundaries, a mouse could go into an underground burrow or a snake under a rock (freeze and make a tent with your hands over your head to show you are safe below ground).

- After you are done playing, sit down in a circle to catch your breath and discuss grassland climate, the role of fire, how fire was used by First Nations to manage grasslands, and how animals and plants are affected by fire.

Grasshopper Jump

If you had the jumping powers of a grasshopper, you'd be able to leap the length of a football field in a single bound! Grasshoppers' hind legs act like miniature catapults, projecting them high and far in the air to escape predators. Have a grasshopper jumping contest and see how far you can go. Turn it into a game of tag by adding a grasshopper predator, such as a shrew, who crawls to catch the leaping grasshoppers.

Sensory Awareness

After burning off some energy, the students will be ready to focus their attention and start to explore the pond. Some suggested activities are outlined below that instill a sense of calm and heightened awareness of the natural surroundings.

Guided Imagery

Students become grasses in this guided imagery to enhance the field trip experience and appreciation for the world unseen in the grasslands (see Copy Page).

Blindfold Walk
(Adapted from *Get Outdoors!* and *Grasslands, a Home for Wildlife and People*, Rocky Mountain Bird Observatory.)

In this guided, blindfolded walk, students experience the grassland through senses other than sight. Materials: blindfolds for each student, a rope long enough for the entire class to hold on to, a small sample of sage, antelope brush, or other aromatic grassland plant.

1. Explain to the students that they are going to "lose" one of their senses in order to heighten their experience of their other senses. Explain how blind people have more acute senses of hearing and touch than sighted people.

2. Have students blindfold one another and then hold on to a long rope. The teacher and another adult who is not blindfolded are at the front and at the back of the rope.

3. Give the students a plant to smell, such as an aromatic leaf or grass, as they begin their grassland walk. This gets them started using their non-visual senses.

4. Lead the chain of participants slowly and carefully along a trail or open area in the grassland. Ask the students to walk in silence. Stop at several points along the walk and tell the students notice their surroundings using their senses. They can notice the temperature and feel of the air and wind, the feel of the ground under their feet, the sounds around them. Have them bend down to feel the soil or ground and to notice its moisture content and grain size. Have them gently feel a plant that is next to the trail.

5. Have participants remove their blindfolds and look up, down, and all around them at the grassland and where they just walked. What is it like to see again and how is it different than before they put on the blindfold? What did they notice with each of their senses and what did they learn about the grassland?

Inquire and Investigate

Following a sensory awareness activity, prime the students for some deeper inquiry and investigative activities, such as those described below. Use nature journals to record observations and questions that arise.

Exploring Place with Inquiry

In this activity the students explore the grassland environment using their senses and simple tools. This activity can be used to ignite students in inquiry-based learning in the forest. Students are engaged outdoors in small groups using a selection of different tools to enhance their exploration. The physical tools (such as measuring tapes, magnifying glasses, thermometers, trowels or other simple tools of choice) offer a means for interaction between student and nature, supporting student curiosity and playful exploration of the natural world around them. Students are tasked to come up with some questions from their explorations. The activity can stop there, or be extended to have these questions then become the basis for further inquiry-based learning, be it student-led or teacher guided. See https://hctfeducation.ca/file/exploring-place-with-inquiry.pdf for a full description of the activity.

Focus on Grasses

The grasslands of B.C. have many differences depending on their elevation, latitude, climate, temperature, and other factors. But one thing they all have in common are grasses. But what exactly is a grass? Did you know that grasses are actually flowering plants? They don't have colourful flowers to attract butterflies or bees—their small flowers are wind pollinated. Grasses are found in most habitats and on all continents (yes, even in Antarctica!). The grass family, Poaceae, includes more than 10,000 species. This family includes some of the most important plants to humankind, as it includes our major global cereal crops, such as rice, wheat, barley, and corn, as well as forage that supports wild and domestic herbivores.

Grasses are difficult to tell apart and identify from afar, but when you look closely you can observe their unique anatomy and the features that have contributed to their success across the globe.

A Note on Field Identification:

Don't let a lack of knowledge of species identification hinder your exploration! In fact, learning and exploring together is highly recommended and builds a shared sense of wonder and excitement among teachers and students alike. Make detailed observations and make up your own descriptive names for the animals or plants that you see, like the "tall spiky-headed umbrella grass". Remember that many scientific names are in fact Latin descriptions for what naturalists observed. Take photographs or use field guides to help you identify what you found. Consult with experts or use online sources to aid in identification upon your return.

Use magnifiers and look for the different parts of the grass. See Copy Page for a general drawing of grass anatomy. Sketch what you see. Find two different types of grasses or grass-like plants and compare them. If you have a field guide try to identify the grasses in your area. Are they native or non-native? If you go on multiple trips in different seasons notice how the grasses change. What features do the grasses have that benefit wildlife or that help it to survive where it grows?

Can you find any of these grasses near you?

- Thompson-Okanagan: Bluebunch wheat grass, needle-and-thread grass, Idaho fescue.
- Cariboo-Chilcotin: Junegrass, porcupine grass, Sandberg's bluegrass.
- Kootenays - Columbian Basin: rough fescue, pinegrass, Rocky Mountain fescue.
- Northern B.C. - Peace Region: rough fescue, slender wheatgrass, fuzzy-spiked wildrye.

Keep your eyes peeled for invasive cheatgrass and crested wheatgrass!

Tip:

Learning about grasses is like learning a new language. But don't get bogged down with vocabulary! It is not at all necessary to learn the botanical terms to appreciate the variation, symmetry, and patterns of the grass parts, which come to life when you take a closer look.

Seedy Sock Walk
(Seed Need/Le transport des graines; Project WILD/Atout-FAUNE)

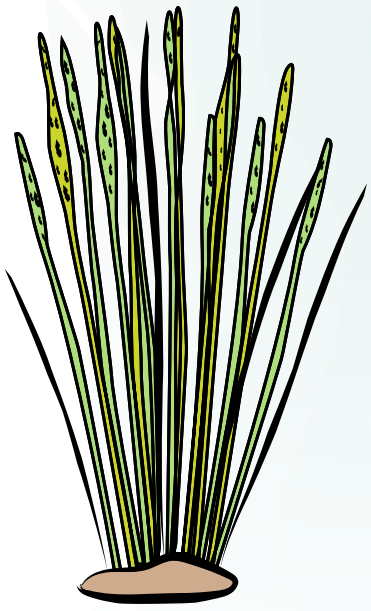
Investigate the variety of seeds in a grassland and their adaptations to help them to disperse. This activity is a good one to do in the grassland in the fall when many plants have finished their growing season and have produced seeds.

Plants can't move, so how do they spread their seeds away from their parent plant to grow in a suitable location? There are many features that seeds have evolved to aid in their dispersal, such as:

- Barbs or hooks that catch onto an animal's fur
- Bright fruits that are eaten by birds and mammals and go through their digestive tract
- Seed pods that catapult and explode seeds far from the parent plant
- Tasty seeds that are carried away and dropped or buried by seed-eating animals such as ants, squirrels, and pocket mice
- Winged seeds that are carried by the wind
- Floating seeds that disperse in water

Have the students put a large wool sock over one of their shoes and pant leg. (Purchase inexpensive socks from a thrift or second-hand store.) Go for a walk with your "sock shoe" and see what seeds your sock picks up. You could do multiple walks in different locations or have different groups of students go in different areas in order to make comparisons. Carefully remove the socks and observe what "data" were collected. Students can put their seeds and other objects collected into ziplock bags, onto a "tape bracelet" (sticky side out) or sort them in egg cartons.

Compare and contrast what objects were gathered, and which were found in different locations or habitats. Look closely at the seeds with a magnifying glass to see their structures that are used for dispersal. Make a tally of the different seed types and record seed size, shape, and other characteristics. Consider what animals might disperse these seeds in the grassland and how wildlife contribute to plant distribution and diversity.



Easy Wrap-up Ideas at the Grassland

Before you leave to go back to school, take the time to share and reinforce the learning from the field trip. Some quick and easy wrap-up ideas include those that follow.

Sharing Circle

Make sure to leave a few minutes before you go back to school to form a sharing and gratitude circle. Have the students share something that was special to them about the field trip and what they are grateful that the land gave to them today.

Grassland Soundscape

Sound is often a part of what makes a place special and gives it a "sense of place". Ask the students to think of and imitate the sounds that make them think of the grassland. These may be sounds that they heard on the field trip (such as blowing wind, grass rustling, grasshoppers, bird calls), or sounds that they imagine would be there at other times (owls, coyote howls, thunder).

- Have everyone join together in a large semi-circle with the teacher "conductor" in the middle, so all can see.
- Divide the circle up into sections and selection some sounds that you will create from the grassland and the order in which you will create them. Start with a quiet sound such as a light breeze; build to a crescendo such as coyotes howling in a thunderstorm; and then quiet down such as grass roots soaking up soil moisture after the rain or birds chirping.
- Make sure that everyone knows their role - have the students repeat which sounds they will make and how they will make them. Don't just use your voices to create the sounds; try other ways of making sounds using your body such as by rubbing hands together, snapping, or stomping feet. Or instead of orchestrating the sounds, they could be done spontaneously and creatively as the students have individually experienced the grassland.
- As the conductor, motion to one section of the class as a time to start a sound quietly, adding sections and sounds, increasing or decreasing in volume and tempo until a moment of silence at the end.

Post Trip Learning Extensions and Connections

Back at school take some time to reflect upon and extend the field trip learning. Play grassland games. Do research to follow up on inquiry questions that arose on the field trip. Write stories or make artwork based on the field trip experience. Share your experiences with a buddy class. See below for some suggested activities to do with your class after the field trip.

Evaluate

If a K/W/L (What I Know/Want to Know/Learned) chart and a list of inquiry questions were made prior to the trip, revisit them. What did you learn? What was different than you expected? What else do you want to know about grasslands?

If you made a grassland timeline (See Changes and Impacts in the Get Set section), revisit the timeline and add two new periods: "Today" and "100 Years in the Future". Have the students draw or write about what the grassland is like today and how it has changed from periods in the past. What might the grassland be like 100 years from now? What events will take place in the next 100 years and how will they affect the grassland?

Communicate

- Have the students work together to create a mural or poster reflecting their visit to the grassland. If a class mural was made prior to the field trip, have the students add to it based on the field trip experience.
- Create or add to the grassland seasonal wheel showing the natural cycles and events throughout the year.
- Have a slideshow with photos or artwork that the students created and including their comments, quotes and observations, and present it to another class.
- Create or add to a timeline of historic, cultural, and ecological events in the grassland.

Apply and Innovate

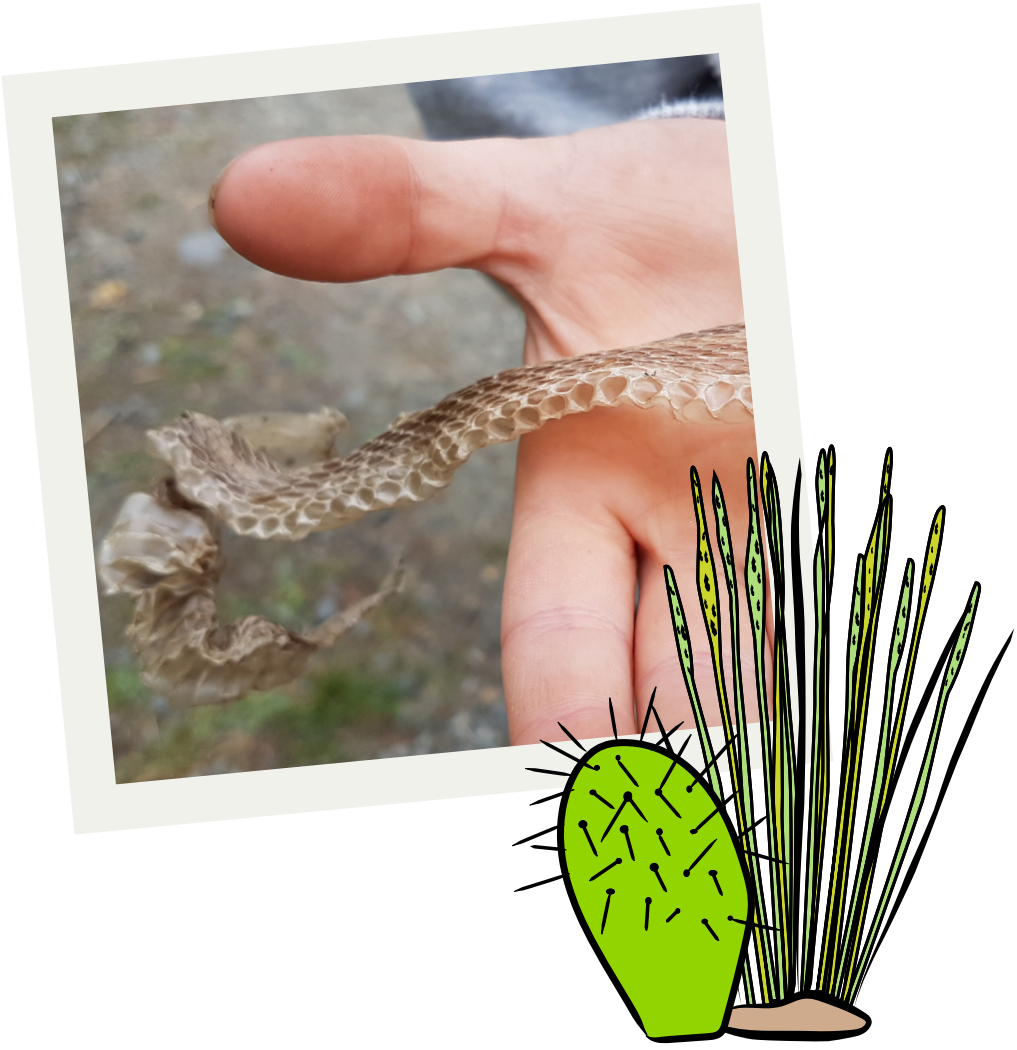
Now that you have learned so much from your field trip your students may be inspired to want to teach others about the importance of the grasslands and to take action to help protect them.

- Become a grassland steward. Connect with your local naturalist group, invasive species council, BC Parks, or other park, land trust, or conservation organization to see if there are opportunities for your class to help restore a nearby grassland.
- If you can find a source of native, local seeds, grow local grassland plants in your classroom. Bring them home to plant in your yard or create a native grassland garden on your school grounds.
- Become a citizen scientist and increase our collective knowledge of grasslands by contributing your observations and data on the natural places nearby. Some organizations include: https://ebird.org/home (birds), https://inaturalist.org (biodiversity) https://www.naturewatch.ca/ (Projects across Canada on worms, ice cover, milkweed, plant bloom time, and frogs)

- Raise money to help protect and restore grasslands near your school.
- Need help with taking on an Action Project? Download the Leap into Action guide for ideas and guidance. *https://hctfeducation.ca/file/leap-into-action.pdf*

Investigate

- Have Seeds Will Travel, a STEM activity from Project Learning Tree. Design a seed prototype to disperse under different conditions. *https://www.plt.org/stem-strategies/have-seeds-will-travel/*



Additional Grassland Activities and Resources

There are so many learning opportunities in the grasslands! If you are looking for more ideas, here are some other favourite activities and resources to support you before you go, during your trip, and when you return.

Additional Classroom and Schoolyard Activities

Here are some additional activities that could be done in the classroom or schoolyard to introduce some concepts before the field trip or to reinforce learning afterwards.

Adaptations

- **Compare and Contrast** - Using pictures of various grassland species or the Grassland ID cards (see Copy Pages), have students sort the images into different types of adaptations. For example, sort species by those with specific behavioural adaptations (such as migrating, hibernating, burrowing, nocturnal, etc) or structural adaptations (such as camouflage, paws for digging, digestive systems adapted to eating grasses etc.)
- **Quick Frozen Critters/Proies et Prédateurs (Project WILD/Atout FAUNE p. 147)** - Students play an active game of freeze tag between predators and prey. Choose pairs of predators and prey from animals that students have learned about that live in the grassland, Have the students move like their predator/prey animals. Prey are safe from predators if they are in designated temporary shelter areas or are "frozen" (representing that they are camouflaged). But prey can't stay frozen or sheltered indefinitely - to survive, the prey need to gather a certain number of food tokens, which are scattered throughout the play area and predators need to tag at least two prey in order to survive. After several minutes see who has survived. Play again, allowing students who were predators to become prey and vice versa.

Ecosystems

- **Make a mural -** Have the class cooperatively create a grassland mural for the season/s in which you will visit. Include biotic and abiotic elements of the grassland ecosystem. Draw or cut out pictures of animals, plants, soils, and natural events (such as fire) that could be found in the grassland. Have the students place the animals and plants on the mural where they would expect them to be found (under the ground, in the grasses and shrubs, in higher elevations of adjoining forests or cliffs, in nearby streams or lakes, etc.) Revisit the mural after the field trip and see if there are additional things you would add or change based on the field trip experience.
- **Soil Ecosystems** - Here are some activities to explore the world of soil.
    - **Soil Crust Investigation.** Explore the function and importance of biological soil crusts in the classroom and in the grassland with some hands-on experiments.
    - **Biomass of Ecosystems.** Did you know that most of the biomass in grassland soils is in the form of bacteria? Learn about grassland soil food webs and compare the biomass of different soil ecosystems. Compare the biomass of different soil ecosystems.
      https://web.archive.org/web/20221006135621/http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/soils/health/biology/?cid=nrcs142p2_053865
- **Create a Grassland Biome** - Check out this activity from Sierra Club on building a habitat for a grassland animal.
  https://sierraclub.bc.ca/wp-content/uploads/2015/08/Grasslands-Safari_3-5.pdf

Changes and Impacts

- **Deadly Links/Les Pesticides et Leurs Conséquences** (Project WILD/Atout-FAUNE). This is a food chain game of tag with a secret twist to learn about bioaccumulation - how toxins accumulate up the food chain. Grasshoppers eat the grass (food tokens scattered in the field- some coloured and some plain), shrews eat the grasshoppers, and hawks eat the shrews. Some of the food tokens scattered around represent grasses that were sprayed with a pesticide. At the end of the game the students look at how many food tokens they have and see if they have survived.

- **Snakes and Ladders/Serpents et Échelles** (Below Zero/Sous Zero). Students enjoy this active game that simulates the dangers that snakes face, including predators, vehicles on roads, and cold weather, to travel from their summer homes to their winter hibernacula.

- **Oh Deer!/Cerf, Cerf, Es-Tu Là?** (Project WILD/Atout-FAUNE). Students learn about components of a habitat (food/water/shelter/space) and how animal populations fluctuate in number based on limiting factors.

- **Invasive Species: Goll-ly! Don't Take a Knapweed!** (Grades 6 and up). Can gall flies control invasive spotted knapweed? Controlling an invasive species is complicated business and sometimes efforts have unintended ecological consequences. In this activity from the USDA Forest Service, students read about a problem in the grassland and learn about how real scientific research is done. Students will meet the scientists, learn how they are trying to solve the problem, analyze their data, and discuss their findings. *http://www.naturalinquirer.org/Dont-Take-a-Knapweed.-a-69.html* . PDF of activity: *http://www.naturalinquirer.org/modules.php?name=NaturalInquirer&op=download&article_id=69&type=pdf_eng*

- **Climate Change in the Grasslands.** (Grades 6 and up). Climate change is expected to affect grasslands by increasing temperatures and decreasing rainfall in certain areas. Some species' habitat may be found farther north or at higher elevations. Read about climate change in the prairie grassland ecoregions from GlobalChange.gov: *https://downloads.globalchange.gov/toolkit/eco-regions/Prairie_Grasslands_6_9_09.pdf* . Do activities associated with this case study including Wetlands/Migration Simulation, Graphing/Data Analysis, and Landsat Activity. Available at *http://www.globalchange.gov/browse/educators/wildlife-wildlands-toolkit/eco-regions/Grassland*

Social Responsibility

- **Wildlife is Everywhere/La Faune est Partout** (Project WILD/Atout-FAUNE). Supports an awareness that all living things deserve respect and have needs similar to our own. In this activity, the students go on a hunt for "mini-beasts", looking for signs of wildlife in the classroom (insect exoskeletons, spider webs near windows and baseboards, dead insects near lights, invertebrates living in plants). and realize that we share our environment with other living beings. Then the students go outside in the schoolyard to look for animals or signs that animals have been there (tracks, feathers, droppings, webs), using magnifiers or focusing tools to look closely. Record what is found in drawings or writing and discuss findings, emphasizing our shared spaces and homes.
- **Adopt a Rancher** – An Interactive, Hands-on Learning Program From Saskatchewan Prairie Conservation Action Plan http://www.pcap-sk.org/education-programs-and-resources/adopt-a-rancher . This program was developed in Saskatchewan, but could be adapted for British Columbia. Students in the Adopt a Rancher program analyze a ranch ecosystem in a case study that they develop themselves. By using a student guide and online resources and communicating with the adopted rancher, students will answer this question: How can ranching protect native grasslands while providing economic benefits for people? (SK PCAP requests to be acknowledged in the use of their education material and contacted to be made aware of the impact of their education programs.)
- **To Compromise or Not to Compromise/Protéger ou détruire.** (Project WILD/Atout-FAUNE). This is a role-play activity that examines social and ecological issues related to land-use and wildlife habitat needs.

Additional Field Trip Activities

Energy Burners

Stalking the Prey

(Adapted from Coyote's Guide to Connecting with Nature. Jon Young, Ellen Haas, and Evan McGown. Owlink Media, California, 2016).

This is a version of the classic children's game "Red Light-Green Light", relying on body control, stalking, and getting in tune with sound and sight. Choose a pair of animals found in your area with a predator that quietly hunts its herbivorous prey, such as cougar/deer, coyote/ground squirrel, cougar/bighorn sheep, owl/pocket mouse. One or two people are chosen to be the prey (in this case, deer). The deer pretend to be grazing, with their backs towards all the other students who are some distance (~15 metres) away. Deer occasionally look up and look around if they hear a noise, always making sure that they are safe. All other students are the predators (in this case, cougars) who need to catch their dinner. Remind the students that cougars are stealthy predators who sneak up on their prey until they are within a single bound (or two). Teach the students the "fox walk" to silently and slowly stalk their prey. This is done by placing the foot down from the outside ball of the foot, to the inside ball of the foot, and then lastly the heel. If the deer hear someone moving, they can turn around. If the cougar is still and frozen when the deer turns around it is camouflaged and unseen by the deer. But if the cougar is moving when the deer turns around, its hunt is over and must go back to the starting line. When a cougar reaches the deer, it taps the deer on the shoulder and then the cougar becomes a deer. The caught deer can become a cougar. Tip: Make sure to have at least one "referee" to moderate decisions on whether a cougar is safe (not moving) when the deer turns around.

Sensory Awareness

The wonders of nature are all around us. Discovering them simply requires a bit of patience and practice, and for us to take some time to unplug from our modern technological world and to reconnect with our senses. The following recommended activities are easily done in any location, including the schoolyard, and help to develop awareness and connections to nature.

- **Sensory Awareness** - For Good Mind and Body. A selection of simple and engaging activities to build sensory awareness. *https://hctfeducation.ca/file/c2c-sensory-awareness.pdf*
- **Sense Walk** - Students use their five senses, one at a time, on a nature walk. *https://hctfeducation.ca/file/sense-walk.pdf*

Sensory Wake Up Circle (Get Outdoors!).

Everyone in the class forms a circle in silence and the teacher guides them to slowly focus on one sense at a time, "waking up" each sense. Wake up the sense of touch by rubbing your hands together vigorously. Feel all the energy that you create by rubbing your hands together. Put your energized hands over your eyes to wake them up. Then take them off, look up high and down low. Do you notice anything that you didn't see before? Rub your hands together again as fast as you can. Wake up your sense of smell by putting your hands over your nose. Remove your hands and take a big sniff. What do you smell? How would you describe the smells in the air? Is it different than at the school? Continue to do the same for all the senses: taste the air (or raindrops), close your eyes and count how many sounds you can hear and in which directions they are coming from. Use "deer ears" to channel sounds from in front and then from behind you.

Inquire and Investigate

Grassland Pollinators

Examine the various ways pollination occurs on the grasslands. Some grasses are dependent on wind for pollination while many other plants depend on insects, birds and other animals for pollination. Some plants have evolved sophisticated structures for wind dispersal. These plants typically have inconspicuous flowers without nectar, light pollen, and feathery female parts of the flower (stigma) that catch the pollen. They grow in dry, open, treeless areas with strong, winds and fertile soils.

Here are some recommended resources and activities on pollination.

- Insight free mobile app to engage citizen scientists in pollinator research and conservation. *https://insightcitizenscience.com/*
- Art, Science, and Pollinators: A Teachers Guide. Developed by Border Free Bees, a research project of UBC Okanagan and Emily Carr University of Art + Design. *http://borderfreebees.com/wp-content/uploads/2017/09/Teacher-Guide-Okanagan-Edition-July-2017.pdf*
- Pollinator identification guides from Border Free Bees. *http://borderfreebees.com/resources/*
- Pollinator Partnership Canada. Dedicated to the protection and promotion of pollinators and their habitats. *https://pollinator.org/canada*

Grassland Scavenger Hunt

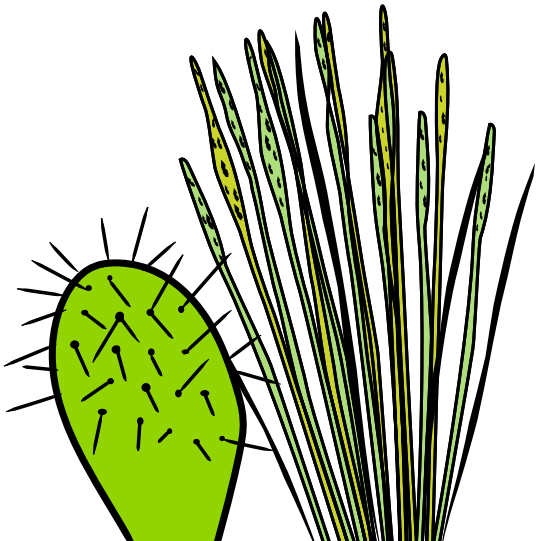
Conduct a grassland scavenger hunt (see Copy Page, Grassland Scavenger Hunt).

Make a Mini Park!

(Adapted from Get Outdoors!)

Students discover the beauty of the grassland in miniature and consider the reasons that parks are created. Choose an area alongside a trail or in a place where sensitive plants and soil won't be disturbed by this activity, but where students may be able to examine the tiny world of lichens and miniature mosses.

- Materials needed: 3m length of string and 5 toothpicks for each group of (2-3) students.
- First brainstorm as a group the different reasons why parks are protected and think of examples in parks that you are familiar with. (Some reasons could be to protect biodiversity, rare species or habitats, animal travel corridors, geological features, cultural heritage, historical sites, and recreational uses or aesthetic values.)
- Split the class into small groups of 2-3 students. Tell the students that the job of each group is to create a "mini-park" for someone the size of their thumb to visit.
- Each group receives a piece of string to delineate the park boundary, and five toothpicks to place at specific spots in their mini-park as "interpretive sign posts" to highlight special features. At least one of the special features should include a site where a research (inquiry) question will be undertaken by experts. Students should be prepared to describe why they chose each of their particular areas to protect.
- Once the groups have created their park they should pair up with another group. Each group gives a "tour" of their park to another group, pointing out the highlights and reasons for protecting certain areas, then reverse roles. Make sure to clean up and collect all of your materials when you are done.
- Come back together as a class and discuss the experience, things that you noticed, and questions that arose. Why do we create and protect parks? If your field trip to the grassland is in a park, why do you think that particular park was created?



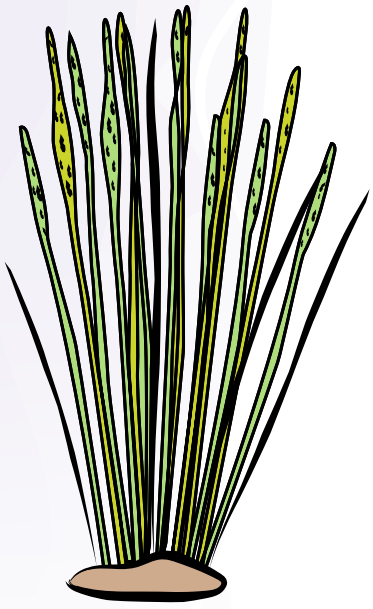
Books and Other Resources

Field Guides

- *Birds of Interior B.C. and the Rockies.* Richard Cannings. Heritage House Publishing, 2009.
- *Common Birds of Interior British Columbia: Okanagan and Rocky Mountains.* J. Duane Sept. Calypso Publishing, 2017.
- *Field Guide to Noxious Weeds and other Selected Invasive Plants of British Columbia*. David Ralph and Val Miller. Invasive Species Council of B.C., 2014. *https://bcinvasives.ca/documents/Field_Guide_to_Noxious_Weeds_Final_WEB_09-25-2014.pdf*
- *Field Guide to the Insects of the Pacific Northwest* (water resistant, durable pamphlet). Robert Cannings. Harbour Publishing, 2018
- *Interior Grasslands and Traditional Uses of Interior Grassland Plants,* laminated placemat/field guide. Available for purchase from the Friends of Ecological Reserves. *http://ecoreserves.bc.ca/get-involved/buy-ecoproducts/*
- *Plants of Southern Interior British Columbia and the Inland Northwest*. Roberta Parish, Ray Coupe and Dennis Lloyd. Lone Pine Publishing, 1999.

Educator Guides

- *Backyard Biodiversity and Beyond*. A Handbook for Students and Teachers. Susan Dulc. Canadian Heritage and Canada-British Columbia Partnership Agreement on Forest Resource Development: FRDA II. 1999. Available in English and French. *https://resourceroom.hctfeducation.ca/products/backyard-biodiversity-beyond*
- *Get Outdoors!: An Educator's Guide to Outdoor Classrooms in Parks, Schoolgrounds and Other Special Places*. Sue Staniforth. WildBC and B.C. Ministry of Environment. 2009. PDF : *https://hctfeducation.ca/file/get-outdoors.pdf* HC: *https://resourceroom.hctfeducation.ca/products/get-outdoors*
- Grasslands, a Home for Wildlife and People, Rocky Mountain Bird Observatory *https://birdconservancy.org/wp-content/uploads/2015/08/Grasslands.pdf*
- Grassland activity ideas. *https://grasslandslive.org/teachers/lesson-plans*
- *Project WILD*. Canadian Wildlife Federation, 2010.



Background Information for Teachers

- *B.C. Grasslands Stewardship Guides: A Guide for Ranchers and Recreation Users*. Useful information on sustainable grassland management. *http://best-practices.ltabc.ca/media/resources/land-management/Grasslands_Stewardship_Guide_SS.pdf*
- Grasslands Conservation Council produces reports and informative guides on grassland ecology and management, available for free download at *http://bcgrasslands.org/resources/*
- *The Grasslands of British Columbia*, Brian Wikeem and Sandra Wikeem. Grasslands Conservation Council of British Columbia, April 2004. *http://okcp.ca/images/resources/land-use-planning/grasslands-of-bc-2004.pdf*

Student Resources

- Explore Sagebrush Prairie, Project WET kids activity booklet (small cost to download pdf) *https://store.projectwet.org/sagebrush-prairie-kids-activity-booklet-download.html*
- *https://sierraclub.bc.ca/wp-content/uploads/2015/08/Grasslands-Safari-Backgrounder_3-5.pdf*

Grassland Stories

- *Butterfly Eyes and Other Secrets of the Meadow*. Joyce Sidman. HMH Books for Young Readers, 2006.
- *On Meadowview Street*. Henry Cole. Greenwillow Books, 2007.
- *One Day in the Prairie*. Jean Craighead George. Harper Collins, 1986.
- *The Gibson Park Grassland Detectives*. Diane Swanson. Pacific Edge Publishing, Gabriola, B.C.. 1997. (Available to order from *www.strongnations.com*)
- *We Are All Connected: Nlaka'pamux, Dry Grasslands and Rattlesnakes*. Brenda Boreham, Terri Mack, John Haugen. Strong Nations Publishing, 2017. (Available to order from *www.strongnations.com*)

Grassland Songs

- Lucas Miller, the singing zoologist: *https://singingzoologist.com*
  - *https://www.youtube.com/watch?v=gjTfZ1cpzFg*
- Remy Rodden, environmental educator and performer: *https://remyrodden.com/*
  - *Biodiversity: https://remyrodden.com/track/376758/bio-diversity*
  - *Where a Border Need Not Be: https://remyrodden.com/track/386336/where-a-border-need-not-be*

Videos

- Badgers of 100 Mile. *https://vimeo.com/45987959*
- Birds of the Okanagan, a Vanishing Legacy *https://vimeo.com/62265879*,
- Can Sage Grouse be Saved without Shutting Down the West? *https://vimeo.com/151686891*
- In Search of a Skink. *https://vimeo.com/45916937*
- Vanishing Desert, Portrait of a Rattlesnake. *https://vimeo.com/45160085*

Organizations

- Columbia Basin Trust. Has community and environmental programs and offers grants for projects in southeastern B.C. *https://ourtrust.org*
- Ducks Unlimited. Conserves wetlands throughout BC including in the grassland regions. *https://www.ducks.ca/places/british-columbia/*
- Grasslands Conservation Council. A registered charity dedicated to education, the protection, and stewardship of British Columbia's grasslands. *http://bcgrasslands.org/*
- Nature Conservancy of Canada. Conserves natural areas and biological diversity across all regions of Canada. One area of focus in their work in B.C. are the Heritage Grasslands in the valleys of the Nicola River and parts of the Thompson River. *http://www.natureconservancy.ca/en/where-we-work/british-columbia/our-work/heritage-grasslands.html*
- Okanagan Collaborative Conservation Program. A partnership of organizations and government focused on conservation issues in the Okanagan Basin. *http://okcp.ca*
- South Okanagan-Desert Society in Osoyoos. Supports education, conservation, restoration and research of the antelope-brush ecosystem in the South Okanagan. They run a Desert Interpretive Centre outside of Osoyoos with guided walks (entrance fee applies). Website has useful resources including information on native plants and animals, native plant gardening, how to build bat and bird boxes to support native wildlife and more. *http://www.desert.org/*
- South Okanagan Similkameen Conservation Program. A partnership of fifty organizations that work together to conserve the unique biodiversity and environment of this region. *http://www.soscp.org*