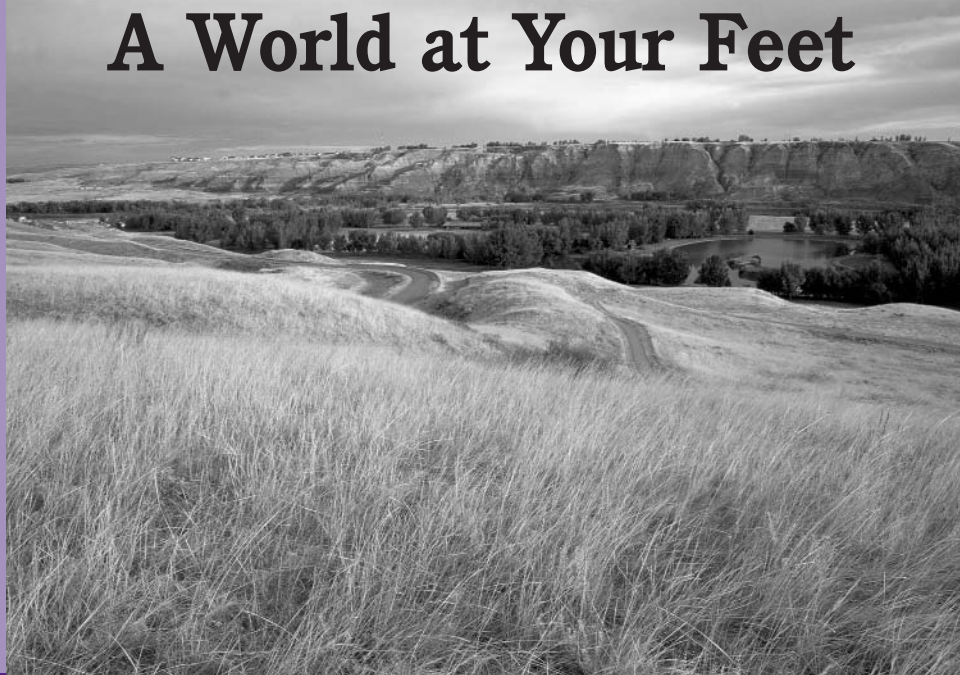
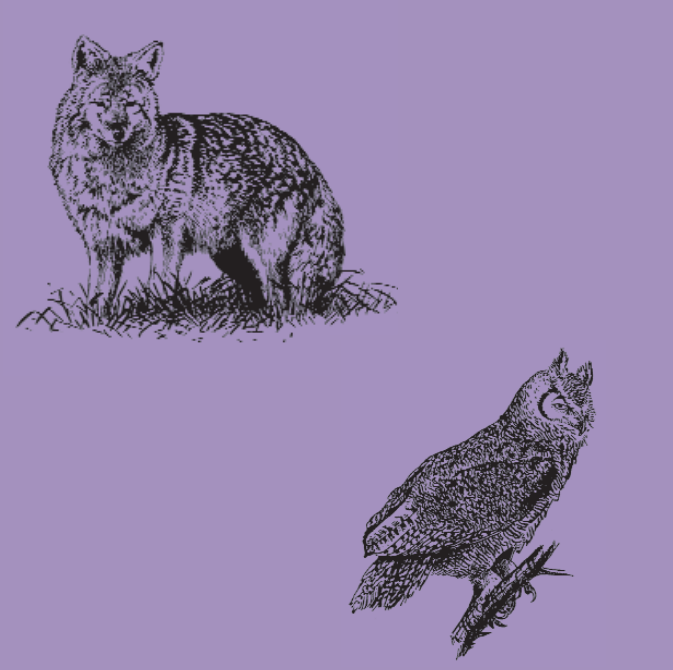


Alberta Grasslands

A World at Your Feet



**Teacher's
Guide
Grade 7-9
Science**

Alberta

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Alberta
Grasslands



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Grassland Education Kit

Alberta
Grasslands



The Grasslands Education Kit is a package consisting of:

- Two grasslands posters
- Set of activity masters
- Teacher's guide

The intent of the kit is to provide resource material focused at increasing students' awareness, understanding, and appreciation for the native grassland ecosystem of Alberta. Students will be introduced to the history, biology, geography and even the economics of the grasslands. They will discover the diversity and value of life provided by our grasslands. A complete Grasslands Education Kit includes:

Poster Front - (Illustration) - The illustration is designed to introduce students to the flora, fauna, landscape features and human impact associated with the grasslands environment. It illustrates ecological relationships that occur and the effect of human intervention on the grasslands habitat.

Poster Back - (Content and Activities) - The activities and information on the poster back can be used in combination with the poster front. The activities connect to the sections outlined in the Teacher's Guide.

Activity Masters: All the information on the poster back can be duplicated in unlimited quantities for non-profit educational use.

Teacher's Guide: The Teacher's Guide provides background information, discussion questions and additional activities. The guide supplements the material presented in the poster.

Students will be introduced to 5 major areas of study related to Grasslands.

Features and Characteristics

Geological and Historical Connection

Biodiversity of Living Things

Human Impact

Management and Conservation



Curriculum Fit

| | | |
|-------------|-------------------------|---|
| Grade 7 | Science | Interaction and Ecosystems Plants for Food and Fibre |
| Grade 8 | Science | Freshwater and Saltwater Systems |
| Grade 9 | Science | Biological Diversity |
| Grade 7 - 9 | Environmental Education | |

Learning Objectives

The Grasslands Education Resource package provides material to meet six learning objectives. Students will:

1. learn about Alberta's geological formation
2. study aboriginal connections to the grasslands
3. discover the inter-relationships of grassland organisms
4. learn about basic grassland ecological processes
5. explore current environmental issues
6. apply new knowledge to conserve and protect the environment

Outcomes for Science, Technology and Society (STS) and Knowledge

Students will:

1. Investigate and describe relationships between humans and their environments, and identify related issues and scientific questions.
2. Trace and interpret the flow of energy and materials within an ecosystem.
3. Describe the relationships among knowledge, decisions and actions in maintaining life-supporting environments.
4. Investigate plant uses and identify links among needs, technologies, products and impacts.
5. Investigate life processes, structures, and needs of plants in a local environment.
6. Identify and interpret relationships among human needs, technologies, environments, and the culture and use of living things as sources of food and fibre.
7. Identify the significance of water to the needs of humans and other living things.
8. Analyze human impacts on aquatic systems and the role of science and technology.
9. Identify impacts of human action on species survival and variation.



Cross-Curricular Connections

| | |
|----------------|--|
| Art | Working with natural materials, drawing Creating dioramas and models |
| Science | Observing, experimenting, collecting data Evaluating, graphing, inferring |
| Social Studies | Human needs and impact Geographical and demographical studies Map work |
| Math | Data collecting and graphing |

Topic Layout

Each section addresses the topic by presenting the learning objectives and background information. This is followed by several related questions that can be used as an assignment or a basis for discussion.

Note to the Teacher

The activities in this guide are designed to complement the poster. Choose activities that meet your objectives and teaching style. In presenting the material to your students, incorporate several strategies - discussions, library research, computer research, presentations, debates, role playing, field trips, guest speakers, etc.





Features and Characteristics

The grasslands region is found on every continent except Antarctica. It may go by a different name in other parts of the world.

Grasslands

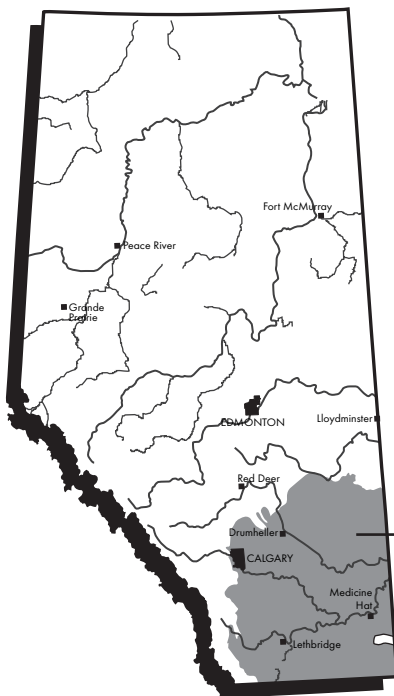
Steppes in Russia

Savannah or Veldt in Africa

Pampas in South America

Plains or Prairie in North America

Outback in Australia



The grasslands natural region of Alberta covers 14.5% of the Province's area. This amounts to 24 million acres or 96,425 square kilometres of landmass.

Alberta Grasslands



All grasslands have common characteristics.

1. The dominant vegetation is grass, usually fescue.
2. The region has a semi-arid climate and normally receives 30 - 40 cm of precipitation annually.
3. The terrain is flat or slightly rolling.
4. The landscape includes riparian valleys, eroded coulees, shallow lakes and sand dunes.

The Grasslands region has a distinctive character. Grassland vegetation forms a relatively low ground cover with many wide-open spaces. While at first the space may feel lifeless, a closer look reveals a diversity of living things that have adapted to these relatively harsh conditions.

In many parts of the world, the native grassland region is becoming nonexistent. Although Alberta has experienced large losses of native prairie habitat, approximately 40% still exists in an area called the Palliser Triangle.

What has happened to the remaining 60% of the native prairie?

In the past 150 years, human activity has transformed it into a much different looking setting. Human activity has altered the natural landscape of the grasslands area through urbanization, agriculture, resource extraction, mining, dams, irrigation development, roads and transmission lines. Consequently, many ecological processes, plants and animals were affected. At present, over 70% of Alberta's "at risk" wildlife species rely on the prairie habitat. Species such as the burrowing owl, sage grouse, swift fox and short horned lizard cannot survive elsewhere. Albertans have an obligation to sustain and preserve their native grasslands region.

For more information visit: Prairie Conservation Forum: www.albertapcf.ab.ca

The Challenge

Throughout this guide, students are challenged to envision a future for the grasslands. The issues that affect the region are often complex and controversial. Mutually acceptable solutions to specific land use issues will help the grasslands survive in their natural setting.



Geological and Historical Connections

How it all Began?

Objective:

To help students understand the developmental changes that occurred in the grasslands region over time.

Background Information

Over 200 million years ago, a shallow inland sea known as Logan's Sea covered southern Alberta. Prehistoric shelled animals died and sank to the bottom. They became the limestone layer that underlies much of southern Alberta. As the sea dried up, sandy beaches formed and created layers of sandstone. Plants and animals of that time died and were buried in amongst the layers. The intense heat and pressure of layer upon layer of material produced some of the richest coal, oil, gas and fossil formations in the world. Scientists have labeled this the Devonian Formation.

Over 35,000 years ago glaciers were formed during the Ice Age and started to advance into Alberta. They moved over the land grinding the rocks and changing them into soil. When the glaciers retreated some 12,000 years ago, the landscape was reshaped into the forms we see today.



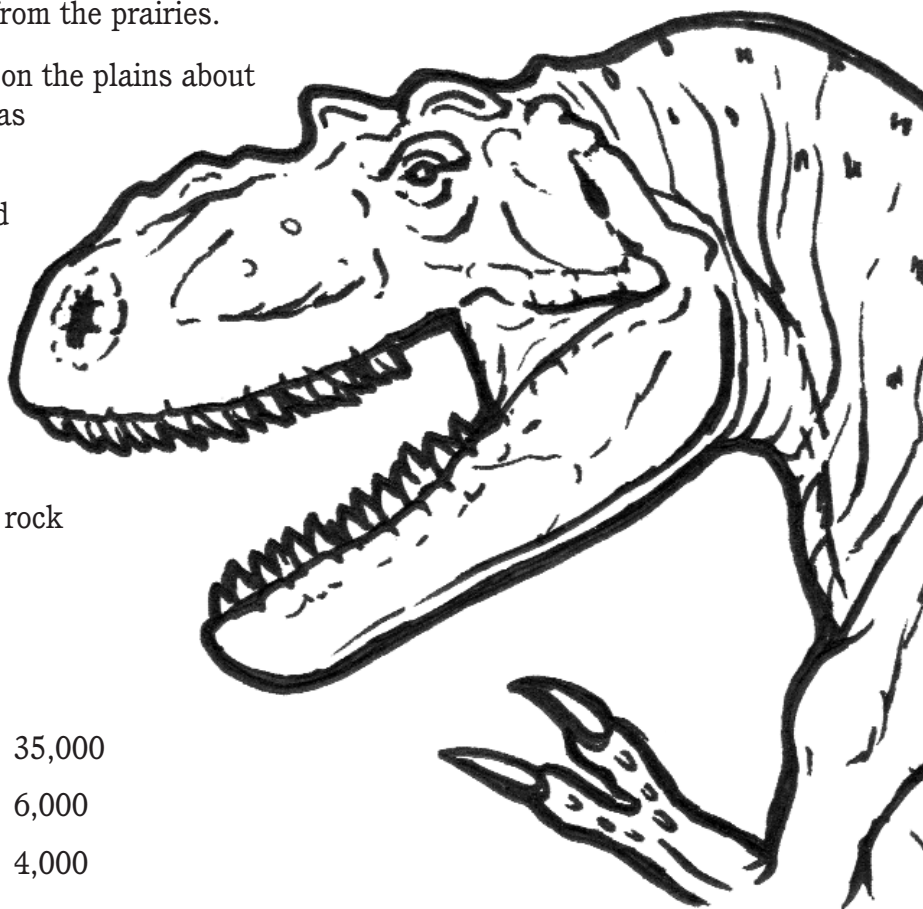
Activity 1

When Did It Happen?

Study the events related to the grasslands through geological time. Match the event with the closest possible answer.

Prehistoric Events:

- _____ 1. During the Jurassic period, Logan's Sea covered the southern half of what is now Alberta.
- _____ 2. The last glaciers retreated from the prairies.
- _____ 3. Medicine wheels were built on the plains about the time that Stonehenge was constructed in England.
- _____ 4. Most of Alberta was covered with a layer of ice.
- _____ 5. Dinosaurs became extinct.
- _____ 6. Head-Smashed-In Buffalo Jump was used to obtain food.
- _____ 7. Oil was formed in Devonian rock structures.



Possible Answers:

How many years ago did each occur?

- A. 12,000
- B. 35,000
- C. 100 million
- D. 6,000
- E. 65 million
- F. 4,000
- G. 200 million

Recent Events:

NOTE: Answers to these questions will require students to recall previous historical knowledge or conduct research.

- _____ 1. Members of the Canadian government and North West Mounted Police met with the aboriginal people at Blackfoot Crossing for the signing of a Treaty.
- _____ 2. The last spike was driven into the tracks of the transcontinental railway.
- _____ 3. Hudson Bay Company sent Henry Kelsey westward. It is believed that he is the first white person to see bison on the Canadian plains.
- _____ 4. Paul Kane traveled west and painted pictures of the plains landscape and its people.
- _____ 5. Prince Andrew officially opened an interpretative center at Head-Smashed-In Buffalo Park.

Possible Answers:

- A. 1848 B. 1877 C. 1987 D. 1885 E. 1690

Challenge Question:

Use the “Recent Events” to construct a geological time line. Begin your time line with the year 1600 and end it with today. (Accuracy is important)





Grasslands Landscape Through Time

Draw a picture sequence through time to show what the Alberta grasslands may have looked like 65 million years ago,

| | |
|--|--|
| | |
| | |

Activity 3

Where Is It Found?

On an outlined map of Alberta (next page):

1. Shade in the major grasslands region of Alberta.
2. Indicate the location of 3 major cities in the grasslands region.
3. Indicate the location of the Royal Tyrell Museum of Paleontology, Brooks Aqueduct Interpretive Center and Head-Smashed-In Buffalo Jump Interpretative Center.

To download an up-to-date map of the Natural Regions of Alberta, go to:
www.cd.gov.ab.ca/preserving/parks/anhic/natural_regions_map.asp

Aboriginal Connection

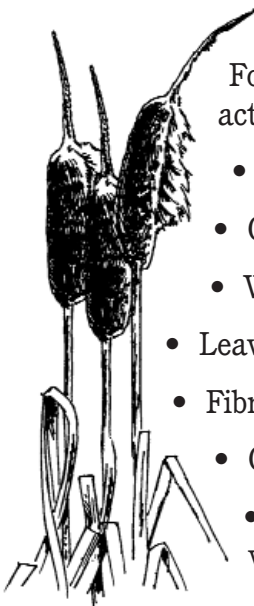
Objective:

To increase student's understanding of how native people survived in the grasslands region.

Background Information:

For thousands of years native people used plants for food, medicine and ceremonial activities.

- The downey seeds of cattails were used as diaper padding for cradleboards.
- Cattail roots contained starch and were used for food.
- Willow bark extracts were used to tan animals hides.
- Leaves from wild mint were used for lining meat storage containers.
- Fibre from nettle stems were made into rope.
- Cow parsnip was used as a pain reliever and a poultice for boils.
- Saskatoon berries were picked and made into a pemmican. Saskatoon bush stems were made into arrow shafts and pipe stems.



Natural Regions of Alberta



Perhaps the best known of all plants used by the aboriginal people is **sweet grass**. Sweet grass is aromatic grass that grows naturally in low-lying abandoned areas. The plant has a distinctive odour and is used in the spiritual ceremony of purification.

Sweet Grass Ceremony - What does it symbolize?

The Sweet Grass spiritual ceremony is conducted at the beginning of a get-together as a form of purification. A small braid of sweet grass is lit and the smoke is first offered to the Creator, then to the Spirit Keepers of the four directions (East, South, West and North). Finally it is offered to Mother Earth and Father Sky.

This is followed by the **smudging** ceremony. The smoke from the sweet grass is directed to the head, heart and body of each participant to evoke clear thinking, kindness, generosity and good health.

For Discussion:

1. What did the physical grasslands region look like 20,000 years ago?

It was covered by ice and glaciers

2. What species of animals were common to the grasslands when humans first arrived to this area?

Bison, grizzly bears, wolves, swift fox, and burrowing owls

3. Imagine crossing the grasslands area of southern Alberta 150 years ago and again today. List the differences that one may have noticed.

Greater variety of species then, fewer now

Less agricultural activity then, more now

More natural terrain then, less now

Others:

4. What hunting technique did the Aboriginal people use for obtaining food?

Herding bison into drive lanes

5. Discuss the use of plants by the Aboriginal people for food, shelter and ceremony.

Saskatoon berry for food, Saskatoon tree for shelter, sweet grass for ceremony

Others:

6. List 5 factors that have affected the natural grasslands area in the past 150 years.

Use of land

Agriculture

Pollution

Resource expansion

Urbanization

Dams

Others:



Activity 4

The Ways of the Aboriginal People

Research one custom of the Aboriginal people.
(e.g. dress, dance, sweet grass ceremony, hunting
practices, etc.)

Present your information in the form of a one-page
report.





Aboriginal Uses of Plants

Aboriginal people used plants for many different purposes.
Match the plant with its intended use.

NOTE: Many but not all the plants can be found on the poster.

Plant

1. Sagebrush
Answer _____
2. Three flowered avens
Answer _____
3. White clover
Answer _____
4. Willow
Answer _____
5. Wild rose
Answer _____
6. Sweet grass
Answer _____
7. Cattail
Answer _____
8. Colorado rubber weed
Answer _____
9. Scarlet mallow
Answer _____
10. Prickly pear cactus
Answer _____
11. Saskatoon
Answer _____

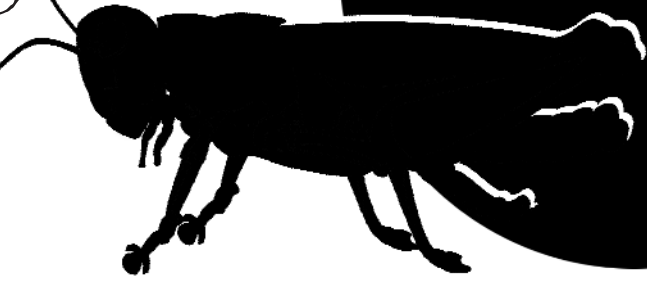
Uses

- A) Downy seeds used as diaper padding for cradleboards
Rootstocks are rich in starch and are edible
- B) Chewed plant applied in the form of a sticky paste to
scalds, sores and burns
- C) Leaves chewed to relieve thirst
Extract of plant taken to restore hair
Forage for horses in fall and winter
- D) Dried fruit is used as famine food and to make beads
Alberta's provincial flower
- E) Crushed leaves applied to wounds to stop bleeding
A four-leafed one is considered lucky
- F) Stems used for arrow shafts
Fruit is eaten fresh or in pemmican
Juice used to make black and purple dyes
- G) Used for making furniture
Shrubs are bent to form frame of sweat lodge
- H) Used for headaches and colds to make you sneeze and clear
your head
- I) Lit or placed on hot coals for all holy ceremonies or
spiritual events
Has a sweet odour and is eaten fairly readily by animals
- J) Seeds brewed and gargled for sore throats
Ripe seed pods crushed and used for perfume
Extract of boiled roots used for eyewash
- K) Insert spines into flesh of area affected by rheumatism and
set afire. Spines burn to the point of insertion and by that
time the patient has forgotten about their aches and pains.



Biodiversity of Living Things

Alberta
Grasslands



Biodiversity of Grassland Species

Objective:

To show the significance of biodiversity in the grassland ecosystem.

Background Information:

Biodiversity is a scientific term that refers to the variety of plants and animals existing and interacting in an ecosystem. Diversity of plant and animal species is essential to the viability of life in the grasslands. Animals interact with plants and other animals. Part of the process involves interaction through food chains and food webs.

What is a food chain?

A **food chain** refers to a dependency relationship whereby one organism is eaten by another. In the typical grassland community a 3-member food chain may look like this:

Grass → Grasshopper → Short Horned Lizard

Several interacting food chains represent the energy flow from one level to the next. Simply stated, several food chains make up a food web. A food web shows that the energy flow can vary, depending on the animals involved.

For Discussion:

1. Use the Poster to determine a four-member food chain present in the grasslands region.
Grass eaten by grasshopper, eaten by short-horned lizard, eaten by coyote.
2. With the help of the Poster, and the Grasslands Poster Identification Key found near the back of this guide, construct a 10-member grasslands food web.

Grass

Grasshopper

Garter Snake

Pronghorn Antelope

Lark Bunting

Short Horned Lizard

Swift Fox

Sage Grouse

Burrowing Owl

Ferruginous hawk

Ground Squirrel

Painted Lady Butterfly



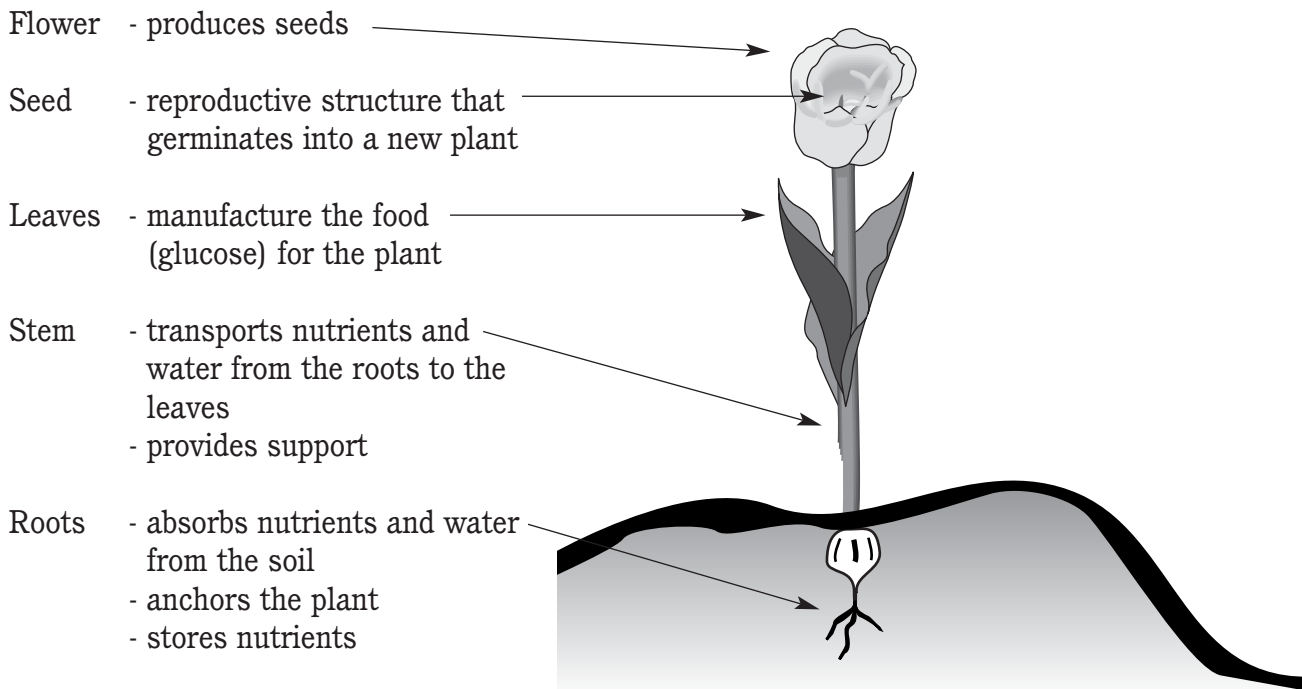
Grassland Producers

Objective:

To examine the characteristics of plants and to relate these characteristics to grasses.

Plant Structure

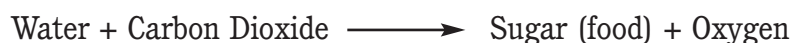
Take for example, a geranium plant, a tree or an individual grass. Each is a producer plant that has several main structural parts performing specific functions.



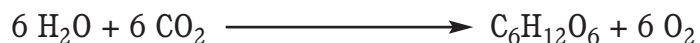
Additional Facts - Did You Know That?

- Fibrous roots hold the soil together decreasing erosion - tree or grass roots
- Taproots provide food for animal and human consumption - carrot or beet roots
- Upper surface of leaves have a waxy cuticle that prevents excess water evaporation
- Stems bend towards the light in a process called phototropism

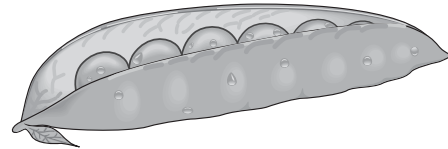
Word Equation for *Photosynthesis*



Balanced Chemical Equation for *Photosynthesis*



- Leaves produce food and oxygen through a process called photosynthesis
- Leaves are green in color due to a pigment called chlorophyll.
- In order to produce seeds, flowers must be pollinated by insects, other animals, or wind.
- Fruit is the protective covering for the seed and is often edible such as in the case of an apple, pear or orange.

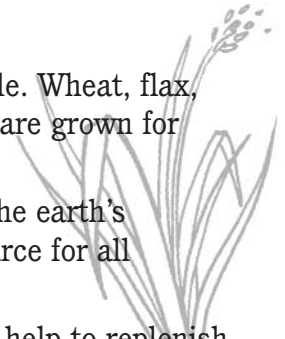


- Seeds are dispersed by wind, water or animals (In the case of seed dispersal by animals, seeds have a hook, or burrs that cling on to animals fur, or they may pass through the animal's digestive system).

About Grasses

Facts:

- Grasses are the principle source of food for living organisms including people. Wheat, flax, oats, barley, corn, rice and rye are considered to be grass-based plants that are grown for human consumption.
- Grasses, like all green plants, have the property of replenishing oxygen in the earth's atmosphere through the process of photosynthesis. They are the energy source for all consumers.
- Grass roots hold and bind the soil together preventing soil erosion. Grasses help to replenish the groundwater table by trapping snowfall and slowing down run-off.
- Grasses help to improve the quality of the soil by adding organic material and nutrients as they decay.
- Grasses have herbaceous stems (soft, not woody), usually arranged in vertical clusters called spikes or branched clusters called panicles.
- Grasses may be annuals (one-year life cycle) or perennials (multi-year life cycle).
- Grasses reproduce from seeds and by vegetation propagation. Grass plants can be produced from underground stems.
- Grasses tend to grow from buds located near the base of the plant. Growing points on the lower stems enable the grasses to be mowed or grazed and still develop into healthy plants.
- Grass flowers are clustered at the top of the plant to catch the wind for pollination.



- Grasses have the ability to survive fire. In fact a burnt out area promotes good healthy growth.
- Grasses vary in how palatable they are. Some are easy to chew others are not.
- Quack grass is a troublesome weed grass that spreads from underground stems called rhizomes.

Alberta has approximately 150 species of grass

Important Conditions For Plant Growth

Certain conditions must be met in order for plants to grow and remain healthy.

Conditions for Healthy Plant Growth:

| | |
|-------------------|---|
| Sunlight | provides the energy required to carry on photosynthesis |
| Air | provides the carbon dioxide needed for food production |
| Water | carries nutrients by diffusion, osmosis and active transport to all parts of the plant |
| Nutrients | required for proper plant development <ul style="list-style-type: none">- nitrogen - required for growth and green colour- phosphorous - required for root development- potassium - required for disease resistance |
| Warm Temperatures | necessary for optimal growth |
| Space | provides for non-crowded conditions and less competition |
| Time | provides for proper seed germination and growth to maturity |

For Discussion:

1. The dandelion is a common weed found in the grasslands and many other environments. List two adaptations of the dandelion plant that help it survive and thrive in the prairie region.
 - ***Extensive taproot system for seeking out moisture***
 - ***Production of a large number of seeds which are carried great distances by the wind***
2. Rough fescue is the provincial plant emblem. What characteristics is it particularly noted for?
 - ***Strong and resilient***
 - ***Excellent forage plant***
 - ***Forms large tussocks with a purple stem***



- Why does grass continue to grow when it is cut or mowed?
 - Grass grows from the base of the stem, which is still left intact after mowing.***

4. Experimental Problem

Design and write up an experiment, using the steps in the **scientific method**, to prove or disprove that “Space affects the growth of plants”.

State the manipulated and responding variable in this experiment.

Indicate 3 controlled factors?

Hints: Plant 50 seeds of one species (wheat, oats, grass, flowers) close together in one container and far apart in another. Water both equally and place in the same well-lit area. Observe over a period of one month.

| Scientific Method | | | |
|-------------------|------------------------|------------|-------------|
| problem | background information | hypothesis | materials |
| procedure | observation | conclusion | application |



Role of Plants

Refer to the illustration on the poster to answer the following questions.

- How is the pincushion cactus (located under the bee) different from the blue grama grass (located next to the grouse)?

The pincushion cactus has short needle-like leaves while the blue grama grass has blade-like leaves. The cactus grows much shorter than the blue grama grass. The flowers on the cactus are more colourful. Cacti generally produce flowers and seeds in a much shorter time.

- What is happening to the hillside, left of the pronghorn herd? Why?

It is lacking grass cover and appears to be eroding away.

- Seeds are often dispersed by the wind. In what direction is the wind blowing? Provide evidence to support your answer.

The wind appears to be blowing from left to right on the poster. The rain in the distant clouds is slanting to the right. So are the taller grasses in the foreground.

- What evidence is there that the climatic conditions in the grassland region are generally dry?

The presence of short grass and lack of treed areas indicates relatively dry conditions. The precipitation averages 30-40 cm/year.





Herbarium (plant) Mount

Collect several grassland area leaves and plants. Dry and press them. Then glue on to construction paper and label. Laminate if possible.

Grassland Consumers

Background Information

The grasslands are home to hundreds of species of large and small animals ranging from tiny insects to larger mammals. Many of these animals are herbivores feeding on plant material. These include grasshoppers, bees, butterflies, ground squirrels, grouse, deer and pronghorn.

Carnivores are 'flesh eaters' and feed on other animals. Grassland carnivores include lizards, snakes, owls, hawks and coyotes.

Survival in the Grasslands Habitat

Objective:

To provide an understanding of the features that help plants and animals survive in a grassland environment.

Plant Adaptations

Grassland plants are adapted for survival in relatively dry conditions. Plants are generally short and possess small leaf surfaces or silvery leaves to minimize evaporation.

Many grassland plants have a short reproductive cycle. They will flower and produce seeds quickly after a rainfall. The needle and thread grass has a special **awn** that helps the seeds twist into the ground.

If drought conditions persist, many grassland plants will go into dormancy and remain resting until conditions become favourable.

Animals Adaptations

Grassland animals rely on 3 main adaptations for survival.

1. camouflage
2. speed
3. ability to burrow



Because the grassland region is an open plain with short vegetation, many animals such as the mouse or the grouse are coloured to blend in with their surroundings. Others such as ground squirrels are adapted with large digging claws and seek shelter in underground burrows. Pronghorn must rely on speed to outrun their predators.

About the Pronghorn:

- It has telescopic eyesight and can spot movement a kilometer away
- Hollow hairs provide insulation against the winter's cold
- Large windpipe can help increase the energy level
- It can leap up to 4 m and run at speeds of 100 km/hr
- Its white rump patch is a signal for danger (hairs will stand on end)

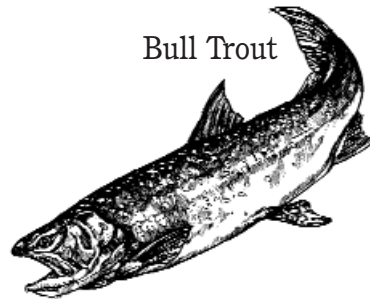
Did You Know?

Here is something interesting!

Do you know the Alberta Natural Provincial Emblems?



Bighorn Sheep



Bull Trout



Great Horned Owl



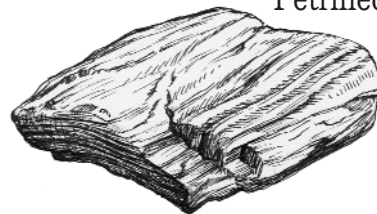
Wild Rose



Rough Fescue



Lodgepole Pine



Petrified Wood

For Discussion:

1. What is the definition of the term 'adaptation'?

Adaptation refers to a set of traits that improve an organism's chance of survival.

- a) Examine the prickly pear cactus located in the bottom left corner of the poster. How is it adapted for survival in the grasslands?

The cactus can tolerate dry conditions. It has needle-like leaves to prevent water loss and to serve as a means of protection.

- b) Examine the ground squirrel located in the middle left side of the poster. How is it adapted for grassland survival?

The ground squirrel has sharp claws to dig underground burrows. Its brownish fur color blends in with the surroundings.

2. Examine the poster and name 4 predators of the mouse.

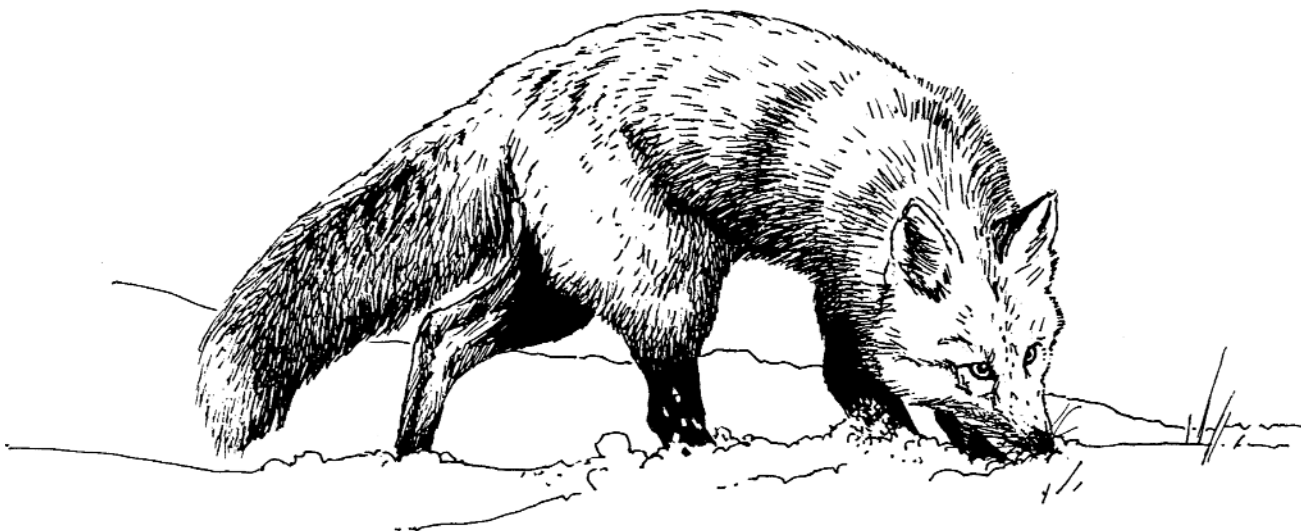
Burrowing owl, coyote, fox, hawk, snake

3. Seed dormancy is common in the grassland region. What does this mean?

Seed dormancy refers to a resting stage for seeds until such time that the conditions are favourable. Many seeds require a cold spell for proper germination. They survive the winter in a dormant state and are ready to germinate in spring.

4. Rough fescue is Alberta's Provincial grass emblem. How is it adapted for survival?

Strong rolled leaves help reduce moisture loss. A massive roots system allows for survival in dry conditions. Rough fescue will remain standing above the snow cover and provides food for many herbivores such as deer and pronghorn.





Adaptations of Grassland Animals

Animals have developed characteristics to help them live successfully in their environment. For each of the following animals identify:

- a) what it eats
- b) how is it adapted for survival
- c) possible predator

| | What it Eats | Adaptation for Survival | Predator |
|---------------------|---------------------|--------------------------------|-----------------|
| Pronghorn | | | |
| Sage Grouse | | | |
| Grasshopper | | | |
| Short Horned Lizard | | | |

Activity 9

Identify the Animal Species

Have a student choose a specific animal. The class then asks individual questions until someone identifies the animal. The questions can only be answered with a YES or NO answer.

Example: Animal chosen

DUCK

Possible Questions:

- | | |
|---|-------------|
| 1. Is the animal a mammal? | NO |
| 2. Is the animal a bird? | YES |
| 3. Does the bird live and feed on land? | NO |
| 4. Does the bird prefer water? | YES |
| 5. Is it a duck? | YOU GOT IT! |

Students can be divided into teams and the score can be kept.

Activity 10

Become a Poet

Write an eight-line poem about the grassland region. Include animals, plants, adaptations, geographic features, etc.

Leave this to the student's imagination.



Activity 11

Life History Magazine

Make a magazine illustrating the “life history” of a single grassland species. Include a:

Title Page

Subtopics (one per page)

Bibliography

For example:

Richardson Ground Squirrel

Subtopics could include:

Classification

Characteristics

Adaptations

Feeding Habits

Reproductive Cycle

Enemies



Activity 12

Biodiversity Name Game Challenge

Objective:

To increase student awareness of the variety of plant and animal species existing in the grasslands region.

Materials:

Biodiversity question cards



Procedure:

1. Divide the class into 2 teams.
2. Read the information on the cards, one at a time, until an answer is obtained.
3. Assign points for the correct answer
 - 10 if determined from the first clue
 - 8 if determined from the second clue
 - 6 if determined from the third clue
4. Alternate teams when asking questions.
5. Allow 10 seconds to answer.
6. Keep track of the points.

Helpful Hint:

Have a copy of the poster for the students to look at, for many of the species do appear on the poster.

Biodiversity Challenge Cards

| | |
|---|--|
| <p style="text-align: center;"><i>Rubberweed</i></p> <ol style="list-style-type: none"> 1. I am yellow but I am not a dandelion. 2. I can be found on overgrazed pastures. 3. My flower has yellow petals and a brown centre. | <p style="text-align: center;"><i>Buffaloberry</i></p> <ol style="list-style-type: none"> 1. My red fruit can cause stomach upsets. 2. I am often thorny. 3. The first part of my name is often used instead of bison. |
| <p style="text-align: center;"><i>Needle and thread grass</i></p> <ol style="list-style-type: none"> 1. A twisted awn helps spread my seeds. 2. I am a grass that can survive on dry plains. 3. People have this in their sewing kits | <p style="text-align: center;"><i>Blue beard's tongue</i></p> <ol style="list-style-type: none"> 1. I belong to the Figwort family. 2. I am most colourful in May or June. 3. I am a blue flower. |
| <p style="text-align: center;"><i>Broomweed</i></p> <ol style="list-style-type: none"> 1. A deep root helps me find water. 2. My leaves are like wire - good to sweep. 3. Last part of name means unwanted plant. | <p style="text-align: center;"><i>Gumweed</i></p> <ol style="list-style-type: none"> 1. I can be rather sticky. 2. I resemble tarweed but smell better. 3. First part of name is something people like to chew. |
| <p style="text-align: center;"><i>Snowberry</i></p> <ol style="list-style-type: none"> 1. My twigs were used for arrows. 2. My berry-like fruit may be poisonous. 3. First part of my name is a sign of winter. | <p style="text-align: center;"><i>Rabbit brush</i></p> <ol style="list-style-type: none"> 1. My leaves and stems are hairy. 2. I am shrubby. 3. First part of name is associated with Easter. |
| <p style="text-align: center;"><i>Greasewood</i></p> <ol style="list-style-type: none"> 1. I can poison livestock. 2. I am shrubby and grow on saline soils. 3. Another name for thick oil and lumber. | <p style="text-align: center;"><i>Chokecherry</i></p> <ol style="list-style-type: none"> 1. I can live along stream banks. 2. Birds, bears, and rodents eat my fruit. 3. My fruit is black and very bitter. |
| <p style="text-align: center;"><i>Grasshopper</i></p> <ol style="list-style-type: none"> 1. I am a farmer's enemy. 2. I am 90% of the burrowing owl's diet. 3. I prefer to hop instead of walk. | <p style="text-align: center;"><i>Black Widow Spider</i></p> <ol style="list-style-type: none"> 1. I am an arachnid, not an insect. 2. I am not often found in Alberta. 3. I am black and spin a web. |
| <p style="text-align: center;"><i>Western Blue Flag</i></p> <ol style="list-style-type: none"> 1. I am a rare blue flower in Alberta. 2. I prefer moist meadows and stream banks. 3. Country and _____ music. | <p style="text-align: center;"><i>Swift Fox</i></p> <ol style="list-style-type: none"> 1. I am a small dog like animal. 2. I was reintroduced to Alberta after a 50-year absence. 3. A fast smart animal. |

Biodiversity Challenge Cards

| | |
|---|--|
| <p style="text-align: center;"><i>Brown-headed cowbird</i></p> <ol style="list-style-type: none"> 1. I lay eggs in nests of other birds. 2. I will sit on the backs of cattle. 3. My head is brown and my body black. | <p style="text-align: center;"><i>Painted Turtle</i></p> <ol style="list-style-type: none"> 1. I occur only along the Milk River. 2. I feed mostly on vegetation and insects. 3. I am known for walking very slow. |
| <p style="text-align: center;"><i>Yellow-headed blackbird</i></p> <ol style="list-style-type: none"> 1. My name describes me. 2. I nest in rushes and reeds. 3. I am a blackbird with a yellow head. | <p style="text-align: center;"><i>Loggerhead Shrike</i></p> <ol style="list-style-type: none"> 1. I am a grey and white songbird with a black mask through my eyes. 2. I have a hooked beak to kill my prey. 3. It is illegal to kill or disturb me. |
| <p style="text-align: center;"><i>Burrowing Owl</i></p> <ol style="list-style-type: none"> 1. I eat grasshoppers. 2. I nest underground. 3. Most of my species are nocturnal, not me! | <p style="text-align: center;"><i>Short-horned lizard</i></p> <ol style="list-style-type: none"> 1. I am found in sandy coulees of southeastern Alberta. 2. I am a reptile but not a snake. 3. I appear to have small horns on my head. |
| <p style="text-align: center;"><i>Pintail duck</i></p> <ol style="list-style-type: none"> 1. I eat underwater plants. 2. I lay up to 12 eggs near a slough. 3. My tail is “pointy” and I quack. | <p style="text-align: center;"><i>Rattlesnake</i></p> <ol style="list-style-type: none"> 1. I am very long and slim and eat rodents. 2. I let people know when I am startled. 3. Many people are afraid of me. |
| <p style="text-align: center;"><i>Ground Squirrel</i></p> <ol style="list-style-type: none"> 1. To many, I am considered dinner. 2. I provide underground homes for others. 3. Many landowners consider me a pest. | <p style="text-align: center;"><i>Bull snake</i></p> <ol style="list-style-type: none"> 1. I can climb trees to raid bird nests. 2. I am not poisonous but imitate a rattler. 3. First part of my name is a male moose. |
| <p style="text-align: center;"><i>White-tailed jackrabbit</i></p> <ol style="list-style-type: none"> 1. I can outrun coyotes but not eagles. 2. I change my colour in winter. 3. I bring Easter eggs. | <p style="text-align: center;"><i>Kangaroo Rat</i></p> <ol style="list-style-type: none"> 1. I am found only in sandy areas. 2. I am small with a long tail. 3. My first name is a famous pouched animal in Australia. |
| <p style="text-align: center;"><i>Pronghorn</i></p> <ol style="list-style-type: none"> 1. My top speed is 100 kph. 2. I can't jump fences. 3. I am often incorrectly called an antelope. | <p style="text-align: center;"><i>Western jumping mouse</i></p> <ol style="list-style-type: none"> 1. Garter snakes, hawks, and others hunt me. 2. I am very small and like to jump. 3. I do not like to play Cat and _____. |



Human Impact



Grassland 'Species and Space' At Risk

Objective:

- To inform the students of Alberta 'species at risk'.
- To help indicate the reasons for decreasing species populations.
- To help students understand the importance of protecting our natural habitat.

Background Information:

Human activity has altered the landscape and natural ecological processes of the prairie region. Consequently, several Alberta grasslands species are 'at risk',

Ord's Kangaroo Rat

Sage Grouse

Swift Fox

Ferruginous Hawk

Burrowing Owl

Peregrine Falcon

Western Blue Flag

Piping Plover

Verbena

As certain plant and animal species decrease in numbers or become non-existent, other that are a part of the interacting food chains, become affected. For instance, animals that depend on the Western Blue Flag now have a limited food supply.

For more information check out the Alberta's Species At Risk package developed by Alberta Sustainable Resource Development. Visit their website at: www3.gov.ab.ca/srd

6. What are two consequences of draining marshland and sloughs for the purpose of agriculture?

Marshland plant and animal biodiversity is lost. Ducks, blackbirds, water and insects can no longer survive. This affects the food chain and web of other organisms.

7. Should resource development be allowed in protected areas such as our National Parks or Ecological Reserves? (For example: Should the development of a ski resort be permitted in Jasper National Park?)

Your discussion should focus on pros and cons.

8. Name five Alberta non-grassland species, which are "at risk".

whooping crane trumpeter swan northern leopard frog white pelican
bull trout woodland caribou lake sturgeon



Search-Search-Search!

Refer to the back of the Grasslands poster to find the answers to these questions.

1. What does the organization COSEWIC stand for?
Committee on the Status of Endangered Wildlife in Canada
2. The COSEWIC has placed species at risk into five categories. List, explain and give examples of each category.

| Category | Description | Examples |
|-----------------|--|------------------------------|
| Extinct | Species no longer exists | Passenger pigeon |
| Extirpated | Species that was once common but no longer exists in a particular area | Grizzly bear in Saskatchewan |
| Endangered | Species whose numbers are extremely low | Burrowing Owl |
| Threatened | Species that is likely to become endangered if not protected | Western Blue Flag |
| Vulnerable | Species whose numbers are fairly low and can be on the verge of being threatened | Monarch Butterfly |

3. The peregrine falcon is a raptor. What does this mean?

Raptor refers to a “bird of prey”

4. What two factors have caused a rapid decline in the peregrine falcon population in the 1970's?

Peregrine falcons declined because pesticides (DDT in particular) affected the reproductive system.

The accumulation of DDT through the food chain made the eggshell very thin and breakable when nested on.

5. Bison populations drastically disappeared as a result of over hunting to supply the fur trade. Indicate the hunting technique used at Head-Smashed-In Buffalo Jump.

Hunting technique used was called drive lanes. Buffalo were herded in restricted channels and over a cliff.

6. Ducks tend to nest in hay meadows close to sloughs and potholes. A study in 1993 showed that half the female ducks that nest in hay fields were killed by haying machinery. What did an organization called Ducks Unlimited do to reduce this problem?

Ducks Unlimited worked with farmers to develop a “flushing bar” that attaches to the front of a tractor. This scares the duck off its nesting site.



Recovery Program

Research an assignment on the recovery program for one of the following prairie “Species at Risk”:

swift fox, peregrine falcon, burrowing owl or western blue flag.

Present your findings in any format you wish (written report, power point presentation, poster presentation, etc.).

Information is available at these websites:

Alberta Species At Risk
COSEWIC

www3.gov.ab.ca/srd/fw
www.cosewic.gc.ca/index.htm



Management & Conservation

Alberta
Grasslands



Effective Management of the Grasslands

Objective:

- To emphasize the importance of agricultural range management
- To show the significance of riparian habitat and ways of protecting it
- To maintain good water quality

Background Information: Grazing Land Management

Over the past one hundred years, much of the prairie has been cultivated to be used in the production of cereal and forage crops. Careful management is required to ensure that the rangeland provides a balance between agriculture and nature.

Interesting Comparison

Cattle have replaced bison as chief grazers on natural and seeded forage areas. Studies have shown that there is a close similarity between the feeding habits of bison and that of cattle.

1. their hooves grind dead material, seeds and manure into the soil
2. both graze an area extensively and then move on 'to greener pastures'

It is important that once an area has been grazed out, it be allowed a period of time to re-cooperate. This is called **rest rotation**. This period may be weeks or months and in other cases years.

Background Information: Riparian Area Management

A green belt occurs along streams, rivers and wetlands? This is the **riparian area**. It represents the greatest biodiversity of life in the grasslands. "Green zones" are significant in that they:

1. support a diversity of plant and wildlife species
2. provide water, forage and shade for wildlife and livestock



3. maintain a suitable habitat for fish and water organisms
4. control erosion
5. purify and keep the water clean
6. provide for recreational activities

Careful management and conservation of grazing and riparian areas is crucial to the balance between nature and agriculture. The ***Alberta Riparian Habitat Management Project*** is a cooperative program to help land managers restore the grazing and riparian areas. This can be accomplished through:

1. Improved livestock distribution
 - keep cattle oilers, mineral salts, and rubbing posts away from riparian areas
2. Rotational grazing
 - divide the pasture into units
3. Timed grazing
 - avoid grazing riparian areas when stream banks are saturated and vulnerable to trampling
4. Balance supply with demand
 - avoid overcrowding an area with too many cattle

For additional information on riparian habitat, check out the Alberta Riparian Habitat Management Project (also known as called Cows and Fish) Visit their website at: www.cowandfish.org

Background Information: Water Quality Management

The grasslands area of Alberta has 20% of the natural water supply but consumes 80% of that available supply. Managing and conserving the water resources, is therefore, crucial.

First Concern

Large numbers of cattle in small confined feedlot areas are a common present day farming practise. Such feedlots result in an accumulation of large quantities of manure. Because the same water is required for drinking and recreation, it is important to manage the farming operation properly to ensure conservation of water and safety in its use.

What can be done?

Since livestock feedlots are small fenced-in areas with large numbers of cattle, farmers must ensure that these feedlots control runoff and are located away from any aquifers or surface water supplies.

Many farmers apply manure to their fields in order to increase the nutrients in the soil. This is a good practise but must be properly monitored. Heavy manure application could result in bacteria and disease carriers leaching into the water supply.



Second Concern

Alberta is the “Irrigation Capital of Canada” with about 65% of all Canada’s irrigation. Irrigation in Alberta occurs on less than 6% of the cultivated land base in the province, but contributes more than 19% of farm production.

If not properly monitored and managed, excessive water use can cause **leaching** producing a soil with high concentration of salt. Such a soil would no longer be suitable for healthy plant growth.



Water for Life?

Alberta’s quality of life, and life itself, depends on having a healthy and sustainable water supply for the environment, for our communities and for our economic well-being.

The Government of Alberta is committed to the wise management of Alberta’s water quantity and quality for the benefit of Albertans now and in the future.

Water for Life: Alberta’s Strategy for Sustainability is our response to develop a new water management approach and outline specific strategies and actions to address the province’s water issues.

The *Water For Life* strategy is based on three key goals, or outcomes:

- Safe, secure drinking water supply
- Healthy aquatic ecosystems
- Reliable, quality water supplies for a sustainable economy

For more information visit our website at: www.waterforlife.gov.ab.ca

For Discussion:

1. What are 2 drawbacks of overgrazing pastureland?

*Trampling and destruction of native prairie plants
Disturbing the land leading to increased erosion*

2. Explain how a riparian area in a grasslands region is different in biodiversity from the general grasslands prairie.

Because of the availability of water, a riparian area contains a greater variety of vegetation. The plants tend to also be much taller. Trees such as the cottonwood are often present. More plants means a greater diversity of animals.

3. Explain where the water for irrigation comes from and how it is monitored.

Water flow is controlled by dams and accumulated in reservoirs. The water flow from the reservoirs is regulated into special canals for irrigation. For example, the Oldman Dam provides water for the Western Irrigation District.

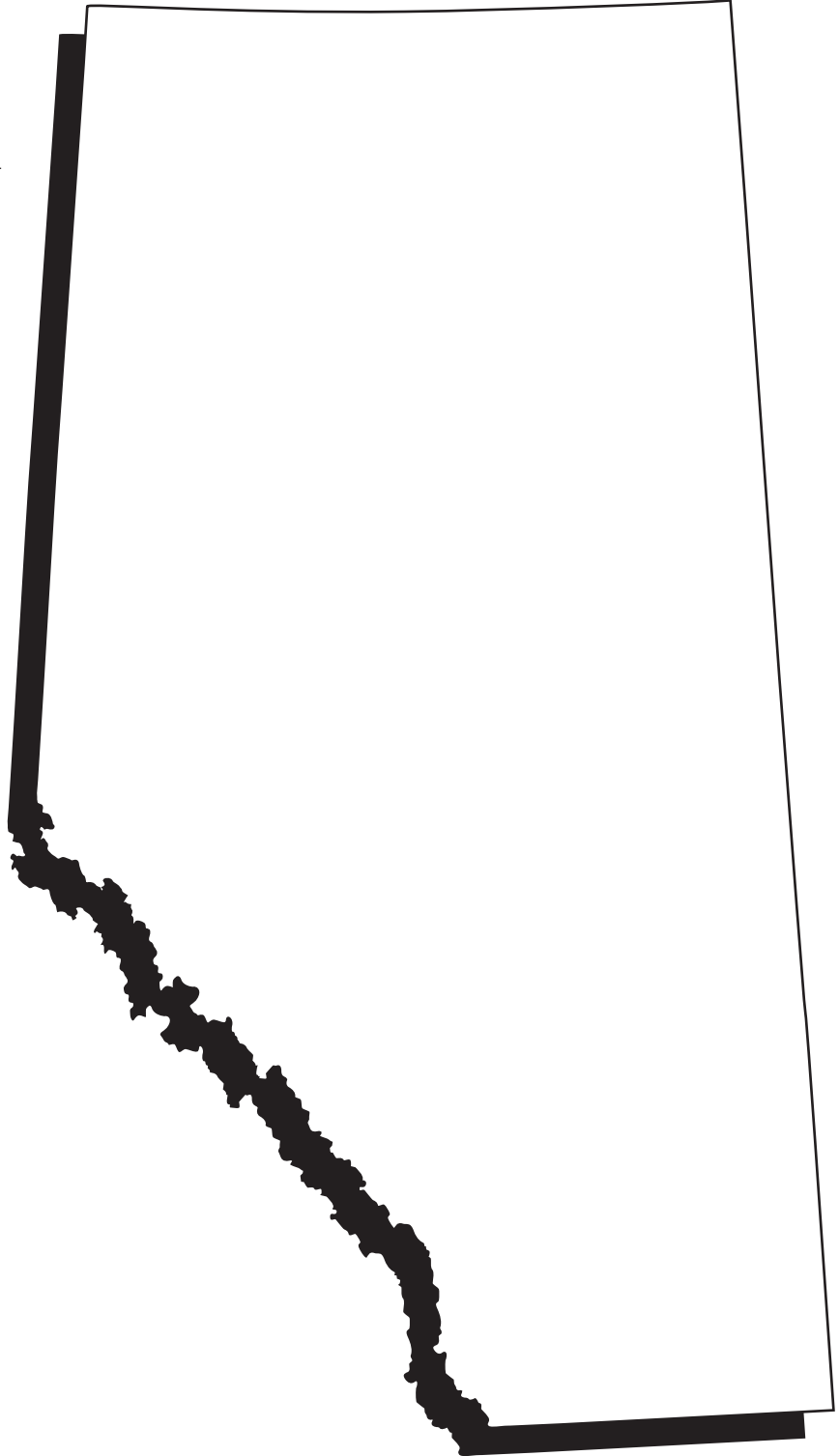


Activity 15

Water, Water, Everywhere!

Using the map of Alberta, locate or illustrate the following:

- Three major grasslands river systems: (Bow River, Oldman River, and Milk River)
- Oldman River Dam
- Western Irrigation District
- Eastern Irrigation District

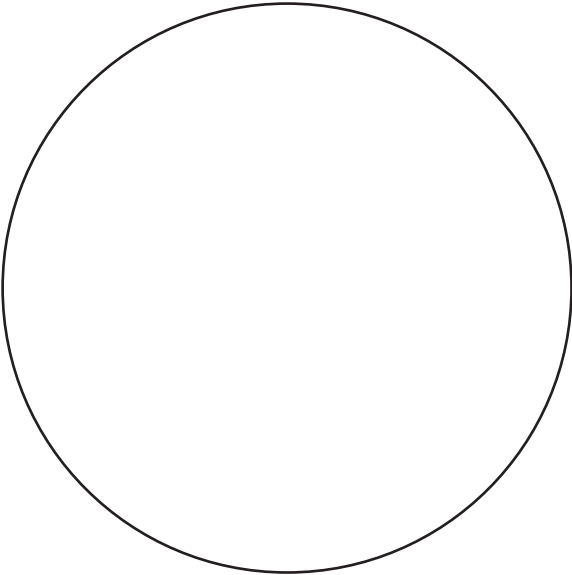


Activity 16

Water - What is it Used For

Construct a circle graph to show **surface water** allocations in the Province of Alberta.

| | |
|---------------------|-----|
| Commercial/Industry | 15% |
| Irrigation | 71% |
| Habitat Enhancement | 3% |
| Water Management | 4% |
| Others | 7% |



Activity 17

Irrigation Systems

Show your understanding of irrigation systems used in Alberta in a one-page research project. In your research outline the benefits and drawbacks of each system you investigate.





In Conclusion

The prairies of North America have often been referred to as the “bread basket of the world”. Unfortunately they are among the most extensively developed landscapes as well. Fertile, gently sloping, accessible farmland not only attracts farmers, but also must compete with urban developers, recreationists, and industry. Agriculture, industry, urban sprawl, roads and utilities have all affected the sustainability of this region.

Issues like pollution, water quality and quantity, air quality, and fragmentation of habitat all have an impact. Human population growth and fragmentation are recognized as the most serious threat to biological diversity.

An international environment report (Brundtland Report) called for every country to preserve at least 12% of its landmass in a natural state. The Government of Alberta implemented the ‘Special Places’ program in the late 1990’s to establish a balance between environmental priorities and economic growth. Areas protected by its implementation include provincial and national parks, wilderness areas, natural and ecological reserves.

As part of an ever-changing world, we must set a balance between population increase, progress and nature. It is the responsibility of each individual to do their part to preserve the natural areas that we have left.



Additional Student Activities



Activity 18: Walk About

Take a walk through your school field collecting or recording information on:

- Plant and animal species
- Evidence of interaction
- Evidence of human impact

Activity 19: Debate

An oil company is requesting permission to purchase land for its pipeline right-of-way project. The land is located in a prime grasslands area. The pipeline itself would be constructed on land where the burrowing owl population is threatened. The pipeline will create jobs, and reduce the cost of oil products for the consumer.

Debate the issue: Should the company be granted permission to go ahead with the project? Can you think of any alternatives or options that could be considered?

Activity 20: Leave My Home Alone!

Ask students to pretend they are a member of a species whose home might be at risk. Construct a poster advertising the need for protecting its habitat. Come up with an appropriate slogan and illustration.

Example: Burrowing Owl Give A Hoot!

Activity 21: The Adventures of The Raindrop

A raindrop falls into the reservoir of the Oldman Dam. Prepare a travelogue or story in the life of a raindrop as it travels for one week down the Oldman river crossing the grasslands of Alberta. Include in its journey downstream, adventures related to: being consumed by a cow, passing through the gills of a fish, splashing on the side of a boat, being absorbed by a plant root, and the list goes on and on.

BE IMAGINATIVE AND CREATIVE!



Activity 22 - Crossword Puzzle Level 1

Across:

2. a creature that contributes to soil quality
4. the major vegetation type of the prairie
8. people who visit an area
10. a tiny species of this bird lives underground
11. summer _____ may dry out the soil
13. a kangaroo ____ needs sandy soil for its burrow
14. petrified prehistoric remains
15. the plains grizzly _____ is extinct
16. provide shade and habitat on the prairie
17. found in a nest

Down:

1. industry that provides beef for local and international markets
3. this grows only in shaded, moist places
5. the Richardson's ground _____ is a keystone species in the grassland food web
6. _____ can be sensitive to changes in water temperature
7. many animals hibernate to avoid this
9. a farm vehicle
12. land ____ decisions are important for habitat
14. grasslands are not always _____
15. one of many insects important as pollinators

Teaching Strategy:

This list of answer choices could be given to the students having difficulty working through this assignment.

- | | | | | |
|---------|-------|--------|----------|----------|
| bee | bear | cattle | cold | eggs |
| fish | flat | fossil | grass | heat |
| moss | owl | rat | squirrel | tourists |
| tractor | trees | use | worm | |



Crossword Puzzle Level 1

| | | | | | | | | | |
|----|--|----|--|---|--|----|---|--|---|
| | | 1 | | | | 2 | | | 3 |
| 4 | | | | 5 | | | | | |
| | | | | | | 6 | | | |
| 7 | | 8 | | | | | 9 | | |
| 10 | | | | | | | | | |
| | | | | | | 11 | | | |
| | | | | | | | | | |
| | | 12 | | | | 13 | | | |
| 14 | | | | | | | | | |
| | | | | | | 15 | | | |
| | | | | | | | | | |
| 16 | | | | | | 17 | | | |

Activity 23: Crossword Puzzle Level 2

Read the story about the grasslands and determine the answers to the blanks. Use the answer to complete the puzzle on the next page. (Hint: A - across, D - down)

Alberta's ancient history is evident underground. It can be seen in the (12A) _____ remains of dinosaurs, in oil and gas deposits and in the coal (22A) _____ that exist in many areas. All three are present in the (14D) _____ of southern Alberta, an area that was once covered with ice. As the glaciers melted, they sometimes left large boulders known as (31A) _____ such as the one near Okotoks. When settlers came west, the dominant vegetation was (7A) _____. A grass plant has a fibrous (29A) _____ that helps to hold the soil. It also has a narrow (16A) _____ that can reduce evaporation in a dry climate.

At one time, (2D) _____ often raged across the grasslands. Near the edges of the grasslands, fire was used by aboriginal people to maintain grazing areas for bison and other animals and this kept an area (11A) _____ of trees.

Ground (1D) _____ are an important part of the food chain for many animals, including bird species such as the ferruginous (15D) _____ and the burrowing (6A) _____. These species and other plant and animal species including the bull trout, the western blue flag, the (4D) _____ fox, Baird's (8D) _____ and the Northern Leopard (9A) _____ are considered to be at (27A) _____. Of course, we can (25A) _____ many other species of wildlife such as the (14A) _____, which is sometimes called an antelope, the rattle (19A) _____, the little (17A) _____ (small bird) and millions of (20D) _____ such as the grasshopper and the (23A) _____ all contribute to the biodiversity of the grasslands.

The grasslands are generally fairly (5A) _____ with a (32A) _____ annual (24D) _____. Winters are (30D) _____. If you like to fly a (28D) _____, this is a good area because it is often windy. The soil has a high (13D) _____ content that can sometimes lead to salinization where farmers use (3D) _____ to water fields.

Loss of habitat, such as the drainage of (33A) _____ can endanger species. The use of chemicals for (10A) _____ control can also be a problem, but regulations exist for (1A) _____ use of such products. Farming methods that include integrated pest management, leaving soils covered by stubble, and spreading mulch and manure on fields, helps with the (18D) _____ of soils.

Although some people are concerned about the (30A) _____ of conservation programs, such programs are important for the survival of some species. For migratory birds, conservation efforts in Alberta are often hampered by the risks they face in (22D) _____ and South America. As biologists (21A) _____ more knowledge, they help us to understand the complexities of the world's ecosystems. It (19D) _____ that we all have a (26A) _____ in helping to preserve the ecological integrity of our world.

Teaching Strategy:

This list of answer choices could be given to the students having difficulty working through this assignment.

- | | | | | | | | |
|--------|-----------|-------|-------|----------|------------|--------------|----------|
| bee | clear | cold | cost | dry | erratics | fires | fossil |
| frog | gain | grass | hawk | insects | irrigation | kite | leaf |
| Mexico | mines | name | owl | pest | prairie | pronghorn | rainfall |
| | risk | root | safe | salt | seems | snake | sparrow |
| | squirrels | stake | swift | wetlands | wren | regeneration | |



Crossword Puzzle Level 1

| | | | | | | | | | | |
|----|----|----|----|----|---|----|----|----|---|----|
| | 1 | | 2 | | | | | | 3 | |
| | | | | | | 4 | | 5 | | |
| | | | | | 6 | | | | | |
| | | | | | | | | | | |
| 7 | | | | 8 | | | 9 | | | |
| | | | | 10 | | | | | | |
| | | | | | | | | | | |
| 11 | | | | | | 12 | | | | |
| | | | | | | | | | | |
| 13 | | 14 | | | | | 15 | | | |
| | | | | | | | | | | |
| 16 | | | | | | | 17 | 18 | | |
| | | | | 19 | | | | | | 20 |
| | | | | | | | 21 | | | |
| | 22 | | | | | | | | | |
| 23 | | | | | | 24 | 25 | | | |
| | | | | 26 | | | | | | |
| 27 | | | 28 | | | | 29 | | | |
| | | | | | | | | | | |
| 30 | | | | | | | | | | |
| | | | 31 | | | | | | | |
| 32 | | | | | | | | | | |
| | | | 33 | | | | | | | |

Activity 24: Team Jeopardy - Grasslands Style

Resources required:

- question and answer cards, timer

Procedure:

1. Select a quizmaster, scorekeeper and 2 teams of 4 players
2. The quizmaster selects a card at random, reads the question and gives its value.
3. Questions are answered in jeopardy style - 'What is a?'
4. If the answer is incorrect, the other team has a chance to answer.
5. Questions are read to alternate teams.
6. A tally of scores is kept

Feel free to modify the procedure to you own class needs.

Students could be encouraged to make their own Question Cards with additional category names. A blank student Worksheet is provided.



Team Jeopardy

Game Cards

| | |
|--|--|
| <p>Category - Insects and more!</p> <p>Value 10</p> <p>Question flying mammals that catch insects in the air often at dusk</p> <p>Answer <i>What is a bat?</i></p> | <p>Category - Insects and more!</p> <p>Value 30</p> <p>Question a plant that can be controlled by the black dot spurge beetle</p> <p>Answer <i>What is leafy spurge?</i></p> |
| <p>Category - Insects and more!</p> <p>Value 10</p> <p>Question egg-larva-pupa-adult</p> <p>Answer <i>What are the stages in an insect's life cycle? (metamorphosis)</i></p> | <p>Category - Insects and more!</p> <p>Value 40</p> <p>Questions a web spinner whose venom is much more poisonous than a rattlesnake's</p> <p>Answer <i>What is a black widow spider?</i></p> |
| <p>Category - Insects and more!</p> <p>Value 20</p> <p>Question a significant insect food source for the burrowing owl</p> <p>Answer <i>What is a grasshopper?</i></p> | <p>Category - Insects and more!</p> <p>Value 40</p> <p>Question a large flying insect with 2 sets of wings, more than 2 eyes and whose nymph stage is found in water</p> <p>Answer <i>What is a dragonfly? (damselfly)</i></p> |
| <p>Category - Insects and more!</p> <p>Value 20</p> <p>Question a system of pest control which combines chemical, biological, and other control methods</p> <p>Answer <i>What is integrated pest management?</i></p> | <p>Category - Insects and more!</p> <p>Value 50</p> <p>Question the larval stage of the moth (<i>Mamestra configurata</i>) and a pest that attacks canola and other crops</p> <p>Answer <i>What is a Bertha armyworm?</i></p> |
| <p>Category -Insects and more!</p> <p>Value 30</p> <p>Question a migrating insect, poisonous because as a caterpillar, it eats milkweed</p> <p>Answer <i>What is a Monarch butterfly?</i></p> | <p>Category - Insects and more!</p> <p>Value 50</p> <p>Question a hawk, named for its rusty red colour, needs about 480 ground squirrels to raise a family of 4 chicks</p> <p>Answer <i>What is a ferruginous hawk?</i></p> |



Team Jeopardy

Game Cards

Category - The business of grasslands

Value 10
Question the largest Alberta city south of Calgary

Answer *What is Lethbridge?*

Category - The business of grasslands

Value 30
Question the industry that provides the most jobs in Alberta

Answer *What is agriculture?*

Category - The business of grasslands

Value 10
Question A museum of palaeontology that attracts many people to Drumheller is named for this man.

Answer *Who is Tyrrell? (Joseph Burr Tyrrell)*

Category - The business of grasslands

Value 40
Question the industry that provided fossil fuel before the oil and gas industry became important

Answer *What is coal mining?*

Category - The business of grasslands

Value 20
Question this hunting site once used by aboriginal people, is a United Nations World Heritage Site and is visited by tourists

Answer *What is Head-Smashed-In Buffalo Jump?*

Category - The business of grasslands

Value 40
Question the location of a pottery industry in Alberta in the 1920's

Answer *What is Medicine Hat?*

Category - The business of grasslands

Value 20
Question the industry that benefits from the presence of parks and historic sites

Answer *What is tourism?*

Category - The business of grasslands

Value 50
Question a place where cattle are fed and prepared for market

Answer *What is a feedlot?*

Category - The business of grasslands

Value 30
Question the industry that contributes the most money to Alberta's economy

Answer *What is the oil and gas (or petroleum) industry?*

Category - The business of grasslands

Value 50
Question a farm operation that grows fruits and vegetables

Answer *What is a market garden?*



Team Jeopardy

Game Cards

Category - Grassland history
 Value 10
 Question police force established in 1873 to control American traders.
 Answer *What is the North West Mounted Police?*

Category - Grassland history
 Value 30
 Question the doctor who accompanied the first police force west to Fort Macleod
 Answer *Who is Dr. Nevitt?*

Category - Grassland history
 Value 10
 Question fossils of these giant reptiles are found in the Badlands
 Answer *What are dinosaurs?*

Category - Grassland history
 Value 40
 Question the artist who portrayed life on the plains in the 1840's
 Answer *Who was Paul Kane?*

Category - Grassland history
 Value 20
 Question the year that Alberta became a province
 Answer *What was 1905?*

Category - Grassland history
 Value 40
 Question This fur-trading company united with the North West Company in 1821.
 Answer *What is the Hudson's Bay Company?*

Category - Grassland history
 Value 20
 Question the structures remaining when soft parts of rocks are eroded
 Answer *What are hoodoos?*

Category - Grassland history
 Value 50
 Question the year the Trans-Continental Railway was completed
 Answer *What was 1886?*

Category - Grassland history
 Value 30
 Question led an expedition in 1857 to determine if the west was suitable for settlement
 Answer *Who was John Palliser?*

Category - Grassland history
 Value 50
 Question an 1877 agreement between native people and the government of Canada
 Answer *What is Treaty 7?*



Team Jeopardy

Game Cards

Category - Grassland Relationships
Value 10
Question a grazing species, sometimes called an antelope, that's unable to jump and must instead crawl under fences
Answer What is a pronghorn?

Category - Grassland Relationships
Value 30
Question a tree found along riverbanks. Its seedlings need flooding to survive
Answer What is a cottonwood?

Category - Grassland Relationships
Value 10
Question a large mammal that aboriginal people hunted for food and other purposes
Answer What is a bison?

Category - Grassland Relationships
Value 40
Question a burrowing animal that is considered critical to the food web
Answer What is a ground squirrel?

Category - Grassland Relationships
Value 20
Question a bird that eats grasshoppers and nests in burrows left by ground squirrels and badgers
Answer What is a burrowing owl?

Category - Grassland Relationships
Value 40
Question a prickly species that sometimes serves as food for pronghorns
Answer What is prickly pear cactus?

Category - Grassland Relationships
Value 20
Question this was used to drive bison; it helped maintain grazing areas
Answer What is fire?

Category - Grassland Relationships
Value 50
Question the species that causes most habitat fragmentation
Answer What are human beings?

Category - Grassland Relationships
Value 30
Question a long period with very little moisture; it can affect all species by limiting plant growth as it did in the 1930's
Answer What is drought?

Category - Grassland Relationships
Value 50
Question the group of creatures necessary for pollination of most plants
Answer What are insects?



Team Jeopardy

Game Cards

| | | | |
|--|-------------------------------|---|-------------------------------|
| <p>Value 10</p> <p>Question a system that provides water for crops</p> <p><i>Answer What is irrigation?</i></p> | <p>Category - Agriculture</p> | <p>Value 30</p> <p>Question the loss of topsoil by the action of wind or water</p> <p><i>Answer What is erosion?</i></p> | <p>Category - Agriculture</p> |
| <p>Value 10</p> <p>Question an animal doctor</p> <p><i>Answer What is a veterinarian?</i></p> | <p>Category - Agriculture</p> | <p>Value 40</p> <p>Question the name of a program which helps cattle producers manage riparian (stream and steam bank) habitat</p> <p><i>Answer What is Cows and Fish?</i></p> | <p>Category - Agriculture</p> |
| <p>Value 20</p> <p>Question an insect whose nymph and adult stages sometimes cause serious crop damage</p> <p><i>Answer What is a grasshopper?</i></p> | <p>Category - Agriculture</p> | <p>Value 40</p> <p>Question an agreement to allow cattle on land owned by the government</p> <p><i>Answer What is a grazing lease?</i></p> | <p>Category - Agriculture</p> |
| <p>Value 20</p> <p>Question during a thunderstorm, these balls of ice can damage a crop very quickly</p> <p><i>Answer What is hail?</i></p> | <p>Category - Agriculture</p> | <p>Value 50</p> <p>Question higher, dry areas of land, often used by waterfowl for nesting</p> <p><i>Answer What are uplands?</i></p> | <p>Category - Agriculture</p> |
| <p>Value 30</p> <p>Question an agricultural or commercial chemical used to control or eliminate weeds or unwanted plants</p> <p><i>Answer What is a herbicide?</i></p> | <p>Category - Agriculture</p> | <p>Value 50</p> <p>Question a drought-resistant grass introduced during the 1930's that is now moving into native grasslands</p> <p><i>Answer What is crested wheatgrass?</i></p> | <p>Category - Agriculture</p> |



Team Jeopardy

Game Cards

Category
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Answer

Category
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Answer

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Resource Appendix

Alberta
Grasslands



Appendix 1: Conservation Programs

Organizations providing programs and funding for native grassland conservation projects:

1. Ducks Unlimited Canada

Provides non-financial incentives to landowners for wetland and upland habitat protection.
Phone: (780) 489-2002 Web Address: www.ducks.ca/province/ab

2. Wildlife Habitat Canada

Provides financial support for private stewardship programs or protection of unique native habitat.
Phone (613) 722-2090 Web Address: www.whc.org

3. Alberta Conservation Association

Provides incentives to protect wildlife habitat.
Phone: 1-877-969-9091 Web Address: www.ab-conservation.com

4. Nature Conservancy of Canada

Dedicated to preserving ecological areas through outright purchase, donation and conservation easement.
Phone: 1-877-262-1253 Web Address: www.natureconservancy.ca

5. North American Waterfowl Management Plan

Protect waterfowl habitat through long-term leases (native grasslands qualify).
Financial assistance to develop conservation farming practices including grazing systems on native grassland.
Phone: (819) 997-2392 Web Address: www.nawmp.ca

6. Alberta Fish & Game Association - Operation Grassland Community

Work with landowners to build sustainable prairie landscapes that support native wildlife and agriculture through voluntary stewardship agreements, conservation easements and management plans.
Phone: (780) 437-2342 Web Address: www.afga.org/Conservation/ogc.htm



Appendix 2: Paper Resources

Adams, Barry and Lorne Fitch. 1995. *Caring for the Green Zone: Riparian Areas and Grazing Management*. Alberta Riparian Habitat Management Project.

Alberta Sustainable Resource Development. 2002. *Species at Risk Series*. Edmonton

Burnie, David *et al.* 1998. *The Firefly Nature Encyclopedia: A Dorling Kindersley Book*. Willowdale, Ontario.

Fisher, Chris C. 1995. *Prairie Birds*. Edmonton: Lone Pine Publishing.

Hardy, W.G. *et al.* 1977. *Alberta A Natural History*. Edmonton. Hurtig Publishers.

Heath, Meg *et al.* 1996. *The High Plains Ecosystem: National Science Teachers Association*.

Salt, W. Ray and Jim R. Salt. 1976. *Birds of Alberta*. Edmonton: Hurtig Publishers.

Spry, Irene S. 1995. *The Palliser Expedition*. Originally: Toronto: Macmillan. 1963.

Reprint: Saskatoon: Fifth House Ltd.

Wilkinson, Kathleen. 1990. *Trees and Shrubs of Alberta*. Edmonton: Lone Pine Publishing.

Appendix 3: Website Resources

A number of websites contain valuable information on issues related to agriculture, environment, wildlife, parks etc. The following will provide good starting points:

Agriculture Canada
www.agr.gc.ca/pfra

Alberta Agriculture, Food and Rural Development
www.agric.gov.ab.ca

Alberta Environment
www.gov.ab.ca/env

Alberta Sustainable Resource Development
www3.gov.ab.ca/srd

Canadian Wildlife Service
www.cws-scf.ec.gc.ca

Head-Smashed-In Buffalo Jump
www.head-smashed-in.com

Parks Canada
www.parkscanada.pch.gc.ca

Prairie Conservation Forum
www.albertapcf.ab.ca

Royal Tyrrell Museum of Palaeontology
www.tyrrellmuseum.com

The Alberta Native Plant Council
www.anpc.ab.ca

The Green Lane - Environment Canada
www.ec.gc.ca



Appendix 4: Field Trip Opportunities

1. Ann & Sandy Cross Conservation Area (403) 931-2042

Located: One mile south of Hwy 22X on 160 St. SW. (SW of Calgary)

www.crossconservation.org.

The Ann and Sandy Cross Conservation Area is a 4800 acre nature preserve donated to the Province of Alberta by Ann and Sandy Cross for the purposes of protecting wildlife habitat and providing conservation education opportunities. The area is a transition zone between the dry prairies and the rugged mountains and contains both grassland and aspen forest habitats. Between 4-8% percent of the area is intact native grassland.

Recognized for our high quality programming, we are the proud recipients of the 2002 Alberta Emerald Award for excellence in environmental education. We believe that offering quality conservation education programming will inspire an awareness, understanding and appreciation of the natural world that will lead to environmentally conscious and active environmental citizens. With over 45,000 students participating in education programs at the Cross Conservation Area since 1993, these programs continue to build awareness and change public attitude towards the environment.

We offer the following experiential and curriculum-based Nature Discovery day school programs sponsored by the Suncor Energy Foundation:

Winter Walkabout (Grades 1-2) - Discovery into winter survival of plants and animals

The Amazing Mini Adventure (Grades 2-3) - Exploration of pond, forest and grassland insects

Web of Life (Grades 3-5) - Investigation of the interconnection of forest species and humans

Keepers of the Land (Grade 4) - Exploration of past, present and future land use and conservation

Forest Explore (Grade 6) - Study of forest ecology, plant identification and the value of forests

Care for the Land (Grades 7-9) - Study of biodiversity, conservation, stewardship and land management

Along with our day school programs, we offer the Chevron Texaco Open Minds week-long school program in which teachers bring their classes to the Cross Conservation Area each day for an entire week making the area their classroom. We also offer Conservation Education programs for families, children and adults in the evenings and on weekends. We present on a variety of environmental topics from bats, coyotes, and stargazing, to composting, sustainable buildings, and conservation easements for landowners.



2. Bar U Ranch

1-800-568-4996

Located 13 km south of Longview, on the corner of Highways 22 and 540

www.pc.gc.ca/lhn-nhs/ab/baru

The Bar U Ranch commemorates the history and importance of ranching in Canada. The site has 35 buildings and structures, illustrating various stages of ranching development, and is rich in cultural landscape features.

3. Glenbow Museum

(403) 268-4100

130 - 9th Ave. S.E. Calgary

www.glenbow.org

Glenbow is western Canada's largest museum, with over 93,000 square feet of exhibition space spreading over three floors. More than 20 galleries are filled with artifacts from Glenbow's collection of over a million objects.

4. Head-Smashed-In Buffalo Jump Interpretative Center

(403) 553-2731

Located 18 km north & west of Fort Macleod on Highway 785.

www.head-smashed-in.com

This world heritage site is among the oldest, largest and best preserved of hundreds of buffalo jump sites across the plains. On this tour you may view the 305 m long cliff that was so effectively used to provide the natives with the essentials to sustain life. The cliff, located at the southern end of the Porcupine Hills, offers a spectacular view of the prairie to the east. The jump was used for 5,000 years and is a unique example of the communal way of hunting used by the natives of the Great Plains of North America.

5. Provincial Museum of Alberta

(780) 453-9100

12845 - 102 Ave. Edmonton

www.pma.edmonton.ab.ca

The Museum offers a full range of exhibitions and activities for every age level and interest. Feature exhibitions at the museum are changing all the time. Behind the scenes, 13 curatorial programs are responsible for building and making accessible some of the finest human and natural history collections in the country.

6. Royal Tyrrell Museum of Paleontology

(403) 823-7707

Located on Hwy. 838, Midland Provincial Park in Drumheller

www.tyrrellmuseum.com/home

The Royal Tyrrell Museum is known the world over as an outstanding palaeontology museum and research facility. Their mandate is to collect, conserve, research, display and interpret palaeontological history with special reference to Alberta's fossil heritage.



Appendix 5: Grasslands in Review

| Item | Details or Type | |
|------------------------|---|--|
| % of Alberta | 14% | |
| Soils | Brown Solonetzic (saline soil) | Dark brown Black |
| Climate | Semiarid | Mean precipitation = 340mm |
| Vegetation | Short native prairie grasses Speargrass, wheatgrass, blue grama, rough fescue, needlegrass Domesticated monocultures of wheat, barley, corn, canola, and other specialty crops | |
| Wildlife | rattlesnake spadefoot toad black tailed prairie dog great plains toad white tailed jack rabbit Domesticated animal species include cattle, hogs, and poultry | short horned lizard pronghorn pocket gopher Nuttall's cottontail Richardson's ground squirrel mule deer |
| Wildlife at Risk | swift fox piping plover northern leopard frog burrowing owl western spiderwort yucca moth western silvery minnow lake sturgeon | sage grouse Ord's kangaroo rat ferruginous hawk peregrine falcon soapweed western blue flag small-flowered sand-verbena |
| Human Activity | Agriculture, ranching Pipelines Dams, electric power and hydro lines Recreation (ATV's, hiking, snowmobiles, skiing) | Seismic, oil and gas exploration Transportation corridors (highways, roads, air strips) |
| Land Use Concerns | Erosion (wind and water) Loss of native vegetation Land stress from farming Use of fertilizers Soil compaction from livestock and farming equipment Use of freshwater for irrigation practices | Potential water siltation Loss of species habitat Pesticides used in farming Over grazing range land Urban expansion and sprawl Loss of nutrients in the soil |
| Technology (solutions) | Zero or minimum till farming Shelter belts | Reclamation with native seeds Crop rotation |



Appendix 6: Grasslands Glossary

| | |
|-------------------|---|
| adaptation | inherited characteristic that enables an organism to survive in its environment |
| awn | a bristle-like appendage possessed by certain grasses |
| biodiversity | variety of species, ecosystems and the ecological processes |
| cereal crops | group of grass plant species cultivated for food (oats, wheat) |
| conservation | effective management of our resources |
| COSEWIC | Committee on the Status of Endangered Wildlife in Canada |
| crown land | land held in trust by the government |
| cultivated land | land tilled and prepared for crops |
| Devonian Era | period of geological time 300 million years ago |
| dormancy | periods of inactivity during unfavourable conditions |
| draws | small land basin into which water drains |
| ecosystem | environment where the living interacts with the nonliving |
| erratic | boulder rock deposited by glacial action |
| food chain | food dependency involving the flow of energy |
| forage crop | crops such as alfalfa and sweet clover grown for animal feed |
| fragmentation | breaking apart an area into smaller unconnected patches |
| genetic diversity | differences in the hereditary makeup of living things |
| grazer | animal that feeds on grass |
| habitat | natural environment of an organism including food, water, shelter and space |
| infrastructure | human built structures such as roads, power lines and pipelines |
| manure | animal fecal remains |
| pesticide | chemical used in controlling animals harmful to crops |
| photosynthesis | process used by green plants to produce food and oxygen |
| rangeland | land that supports grassland biodiversity |
| riparian habitat | green belt along a water supply |
| sustainability | balancing human needs with preserving the natural environment |
| urbanization | development of a city-like environment |



Appendix 7: Grasslands Poster Identification Key

(The following flora and fauna are illustrated on the poster)

Flora:

blue grama grass (*grass by grouse*)

Colorado rubber weed (*yellow plant*)

june grass (*similar to wheat above house*)

needle & thread grass (*hairy grass reaching into rain cloud*)

prickly pear cactus (*under meadowlark*)

saskatoons (*located above erratic*)

three flowered aven (called prairie smoke)
(*red plant above meadowlark*)

blue beards tongue (*blue plant by owl*)

cottonwoods (*beside farmhouse*)

lichen (*bottom right corner on rock*)

pincushion cactus (*pink cactus under bee*)

sagebrush (*beside fence post*)

scarlet mallow (*pink plant right of mouse*)

western porcupine grass
(*right of brown butterfly*)

Fauna:

broad-banded grasshopper (*blue head by Huffman's name*)

burrowing owl (*bottom left*)

ferruginous hawk (*top right corner*)

large-headed grasshopper (*below sage grouse*)

Meliza blue butterfly (*blue and white wings with dots*)

painted lady butterfly (*centre of poster*)

prairie ringlet caterpillar (*left of yellow flowers*)

rattle snake (*below fence post*)

short horned lizard (*bottom right*)

two-striped grasshopper (*below burrowing owl*)

western meadowlark (*bottom left*)

bumble bee (*bottom centre*)

coyote (*behind erratic*)

Hereford cattle (*under rain storm*)

lark bunting (*black & white bird*)

mule deer (*running above fence post*)

pintail duck (*above riparian area*)

pronghorn (*left of fence post*)

sage grouse (*bottom centre*)

swift fox (*in front of erratic*)

vesper sparrow (*on fence post*)

white-footed deer mouse
(*front & centre left*)



Teacher's Answer Guide

Student Activity 1

Prehistoric Events

Answers: 1 - G 2 - A 3 - F 4 - B 5 - E 6 - D 7 - C

Recent Events

Answers: 1-B 2-D 3-E 4-A 5-C

Student Activity 5

Aboriginal Uses of Plants

Answers: 1 - C 2 - J 3 - E 4 - G 5 - D 6 - I 7 - A 8 - H
 9 - B 10 - K 11 - F

Student Activity 8

Adaptations of Grassland Animals

Answers:

Pronghorn

- eats vegetation
- extremely fast and camouflages with the surroundings
- coyote, human

Sage Grouse

- feeds on seeds and plant material
- feather color blends in with the surroundings, claws for scratching the ground, quick flight
- coyote, fox, hawk

Grasshopper

- feeds on grasses
- powerful jumping legs, armour like cladding, rapid flight
- snake, lizard, burrowing owl

Short Horned Lizard

- eats small insects
- blended color, low metabolism
- owl, hawk, fox, coyote



Student Activity 22

Crossword Puzzle Level 1

Answers: **Across:**

- 2. worm
- 4. grass
- 8. tourists
- 10. owl
- 11. heat
- 13. rat
- 14. fossil
- 15. bear
- 16. trees
- 17. eggs

Down:

- 1. cattle
- 3. moss
- 5. squirrel
- 6. fish
- 7. cold
- 9. tractor
- 12. use
- 14. flat
- 15. bee

Student Activity 23

Crossword Puzzle

Answers: **Across:**

- 1. safe
- 5. dry
- 6. owl
- 7. grass
- 9. frog
- 10. pest
- 11. clear
- 12. fossil
- 14. pronghorn
- 16. leaf
- 17. wren
- 19. snake
- 21. gain
- 22. mines
- 23. bee
- 25. name
- 26. stake
- 27. risk
- 29. root
- 30. cost
- 31. erratics
- 32. low
- 33. wetlands

Down:

- 1. squirrels
- 2. fires
- 3. irrigation
- 4. swift
- 8. sparrow
- 13. salt
- 14. prairie
- 18. regeneration
- 19. seems
- 20. insects
- 22. Mexico
- 24. rainfall
- 28. kite
- 30. cold

