DAY 8: FIRE

OBJECTIVE

The students will:
Recognize the importance of fire to the creation and maintenance of prairies.

BACKGROUND

At one time in history, fire was the greatest discovery known to ancient peoples. It created warmth, food, protection and gave its possessors great power over other tribes.

American Indians utilized fire on the once-vast prairies of North America not only for personal convenience but primarily for hunting. Bison attempted to escape fires and were directed towards Indians where hunters could kill as many as a hundred in a single day. These planned fires helped to create the prairies of yesterday and the soil of today.

Fire has played an important role in the history of the United States even before it attempted to become an official country in 1776. The American prairie owes its existence to fire. For tens of millennia, fires, for the most part set by man, have deformed the vegetation over large plains of the world (Sauer, 1950).

Records show that 50 to 60 square miles of prairie would burn at one time. The flames of fire would swell up to 40 feet high and the entire sky as far as one could see would be bright red. The wind drove the flames like giant waves over the prairie. The prairie on fire looked like an ocean of fire.

Fire is the best friend of the prairie. Fire burns off any young trees trying to grow on the prairie. If those trees were allowed to grow, they would soon overshadow the prairie grasses, and the prairie would become a forest. Fire helps the prairie in other ways too. It burns off the dead layers of grasses, thereby clearing the prairie floor so that the delicate stems of new plants will have room to push up through the soil. In the ashes left by the fire on the prairie floor there are important nutrient elements. Those nutrient elements enter the soil and are stored there until they are used to help new plants grow. Fire befriends the prairie by helping prairie plants grow and preventing the growth of trees. The really fascinating thing about the prairie and fire is that the prairie plants, unlike trees, can survive fire.

Thousands of years later fire has lost most of its mysticism (except with the very young or young at heart) but it still provides the same functions it did thousands of years ago. Then came the Yellowstone fire of 1988 which ravished 989,000 acres of the majestic park. It burned for five months challenging man to confront it. The fire rekindled ancient fears and humbled all who saw it.

The Yellowstone fire was not a planned fire. It resulted from careless disposal of cigarette butts and lightning; however, it was allowed subsequently to take its natural course. The fire and drought took a toll on the wildlife in the park. The elk and bison populations decreased somewhat, but the fire also created outstanding food opportunities for eagles, ospreys, falcons, hawks, herons, cranes and owls.

The Yellowstone fire created an opportunity to revisit historical prairie fires. The prairie environment can be visited in "museums" throughout our country, but the prairie fires that used to ravage miles of grassland have been lost to history. Small-scale burns can still be observed at local sites, but the impressiveness of what used to be can only be viewed through similar experiences such as the Yellowstone fire.

MATERIALS

* Book, *Addie Across the Prairie*
  Journal
  Prairie Mural construction materials
* Student page - *Prairie Fires*
* *From Beneath the Ashes* video

Starred (*) materials are included in this packet.

VOCABULARY

disembowel: To slice open and remove internal organs.

insulator: A layer that prevents the loss or gain of heat.

slay: To kill.

PROCESS

Observing, critical thinking.

PROCEDURE

1. Introduce background information about the importance of fire. View *From Beneath the Ashes,* if you have not viewed it in its entirety on Day 1. Discuss the positive and negative aspects of the Yellowstone fire. Relate the Yellowstone fire to prairie fires using *Addie Across the Prairie* as a reference.

2. Distribute the student background information on prairie fires. Have the students read and answer the questions as a homework assignment or as a whole-class activity.

3. Continue ongoing activities.

EXTENSION ACTIVITIES

*1. *From Beneath the Ashes*; Lesson 1: Fire at Yellowstone.

*2. *From Beneath the Ashes,* Lesson 3: Fire on the Prairie.

INTERDISCIPLINARY CONNECTION

Art, language arts, mathematics, science.

ASSESSMENT

(Answer are italicized and refer to the Student Pages indicated below. Answers are also included on the corresponding teacher answer pages.)

1. If you were a settler caught on the prairie with a fire coming at you, what could you do? *(Run toward the fire if it is a narrow wall of flame. Start a small fire and wait on the burned area as the large fire goes by on either side of you. In an emergency, kill your horse, cut it open and crawl inside of it.)*

2. Give several reasons why fire could be called "the prairie's friend." *(Prevents trees from growing. Helps improve the quality of the soil. Burns dead plants. Removes dead grass. Helps plants grow in the spring.)*

3. Explain how prairie plants survive fires. *(Deep root systems)*

4. Describe what happens when fire is prevented from occurring in prairies. *(The prairie is overgrown by trees. Prairie grasses and forbs die in the shade.)*

5. How did the Native Americans use fire on the prairie? *(Used it to clear space around their camps to grow new grass and to prevent surprise enemy attacks and to aid in hunting.)*

6. How do you suppose the settlers viewed prairie fires? *(Answers will vary. Settlers saw fires as destructive.)*

Draw a picture of what a prairie fire would look like, or of the Yellowstone fire.

The following list suggests journal ideas or topic questions.

- Describe how prairie plants survive fire.
- Pick one - Fire is Good/Bad for the prairie. Now persuade someone who isn't sure.
- Write about your experiences or impressions of viewing a prairie fire or the Yellowstone fire.

Name_____

Date_____

Prairie Fires

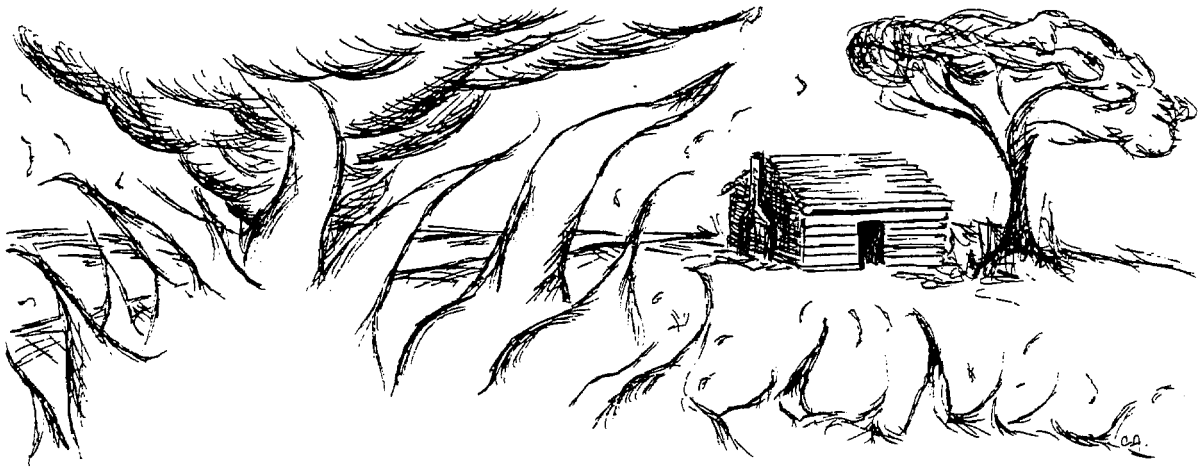
Background

Fires are a natural part of the prairies. Prairie fires were started by lightning or were started by Indians. The Indians used fire to clear space around their camps so they would have a clear view which would help prevent a surprise enemy attack. The Indians also knew that after the prairie burned, tender new grass would sprout. Bison were attracted to these areas of new grass which made them easy to hunt. The Indians commonly started fires to help in hunting. The animals ran away from the fire and were driven to places where they could be killed more easily. Fires were also started accidentally by stray sparks from campfires.

Prairie fires are very intense. The grasses and flowers are very thin and burn quickly. The fire soon becomes a very hot wall of flame 40 feet high, that can be miles wide. Since the grass is thin, the fire does not last in one place very long. The very hot fire burns the dead plant stems and leaves to ashes in just minutes. The wall of fire moves as fast as the wind is blowing and in the old days might roar across the prairie for days, burning 50 to 60 square miles, stopping only at major rivers, or when the wind changed, or a sudden rainstorm occurred. One such fire is described on the next page:

> In November, 1836, a fire started on (the) Spoon River (Stark County) about 10 o'clock in the morning, and with a strong southwest wind, it traveled about 10 miles per hour . . . . having a front eight miles in width, and its roaring could be heard for many miles distant. Before sundown, this fire had burned to the banks of (the) Rock River, where Rockford now stands, passing over a county of about 60 miles in extent (Matson, 1872).

It was rare for someone to be caught by surprise by a prairie fire. At night, the glow of a distant fire was bright enough to read a newspaper. Nicolas A. Woods wrote in 1861 that to escape a large prairie fire, a man had to "ride madly before the wind" ten miles ahead of the flames while lighting small fires behind him. He would then turn his horse around and go through the small fire area that had already burned. The large fire would then go on either side of the burned area while the man waited.



This method would not work in August, when the grass was tallest, because even the small fires would be too large and the path too hot for the horse to step down on. In such cases, according to Woods (1861), the only thing left to do to save his life would be "to slay and disembowel the horse, and literally creep into the cavity till the flames have passed."

Even though a prairie fire can heat the surface of the soil to 400 degrees Fahrenheit in a few minutes, the soil is a good insulator and the fire travels quickly. The temperature as little as one-half inch underground may not change. The roots and other underground stem parts of the prairie plants remain safe below ground, ready to push fresh, green leaves above ground. Many prairie animals have underground tunnels where they are safe from fire or are fast enough to run away.

Fire does not harm a prairie. In fact, it could be called the prairie's friend. Fire kills most of the young trees and shrubs that were growing on the prairie. If the trees were allowed to grow, they would make shade. Prairie grasses and flowers die in shade. The prairie would slowly become a forest.

A second way that fire helps a prairie is by removing the layer of dead grass that is left from the years before. On unburned prairie, the dead plant material at the end of the season does not rot very quickly. Each year more dead material builds up. The dead material acts something like a lid to an ice chest. It keeps the sun and warm air from reaching the ground and warming it. In the cold soil, plants begin growing weeks later and much slower than usual. Some kinds of plants may die off. Another harmful thing about this layer is that in the spring flowers may not be able to grow through it. Fire removes this dead material, allowing the sun to warm the soil. In fact, some people think that the black color from the fire causes the ground to warm up from the sun even more quickly. This warming causes faster plant growth.

When the pioneers arrived, prairie fires were prevented because they could harm farm animals, burn buildings, farm crops and people. As the prairie was plowed and turned into farmland, and as roads were built, they made firebreaks that would stop any fires that began. Many places where there is forest today were once prairie. In the few small remaining prairies, carefully controlled fire is used as a "tool" to keep the prairie "healthy."

Pioneers learned very quickly to guard their property against prairie fires by plowing wide and numerous furrows around all their property - cabins, barns, fields and stacks of hay or grain. Prairie fires most often occurred in the fall when the tall prairie grass was killed by the autumn frost and then dried by the sun. The prairies became tinder boxes waiting for a spark to set them blazing. Often these prairie fires were caused by nature - lightning from a storm - and sometimes by a careless person.

The following is a description of a prairie fire by Alfred Brunson in 1835:

> "The last 12 miles we travelled after sundown, and by fire light over Prairie, it being on fire. This was the grandest scene I ever saw, the wind blew a gale all day, the grass was dry, and the fire being in the Prairie, at a distance, where we entered it some men were kindling fire to burn it away from their fences. As the dark came on, the fire shone more brilliant. A cloud of smoke arose on which the fire below shone, and the reflection could be seen for miles - in some instances 40. We passed 3 different fires in this 12 miles, having to turn out and get round them when they reached the road. . . We had in view at one time from 1 to 5 miles of fire in a streak, burning from 2 to 6 feet high. In high grass it sometimes burns 30 feet high, if driven by fierce winds. By the light of this fire we could read fine print for a half mile or more. And the light reflected from the cloud of smoke, enlightened our road for miles after the blaze of the fire was out of sight."

Discussion Questions:

1. If you were caught on the prairie with a fire coming at you, what could you do?

2. Give several reasons why fire could be called "the prairie's friend."

3. Explain how prairie plants survive fires.

4. Describe what happens when fire is prevented from occurring in prairies.

5. How did the Native Americans use fire on the prairie?

6. How do you suppose the settlers viewed prairie fires?

Discussion Questions:

1. If you were caught on the prairie with a fire coming at you, what could you do? *(Run toward the fire if it is a narrow wall of flame. Start a small fire and wait on the burned area as the large fire goes by on either side of you. In an emergency, kill your horse, cut it open and crawl inside of it.)*

2. Give several reasons why fire could be called "the prairie's friend." *(Prevents trees from growing. Helps improve the quality of the soil. Burns dead plants. Removes dead grass. Helps plants grow in the spring.)*

3. Explain how prairie plants survive fires. *(Deep root systems.)*

4. Describe what happens when fire is prevented from occurring in prairies. *(The prairie is overgrown by trees. Prairie grasses and forbs die in the shade.)*

5. How did the Native Americans use fire on the prairie? *(Used it to clear space around their camps to grow new grass and to prevent surprise enemy attacks and to aid in hunting.)*

6. How do you suppose the settlers viewed prairie fires? *(Answers will vary. Settlers saw fires as destructive.)*

FIRE AT YELLOWSTONE

OBJECTIVES

The students will:

1. identify positive as well as negative effects of forest fires.
2. describe the forest as a cyclical and dynamic ecosystem in which fire is a natural successional event.

BACKGROUND

People have always had an ambivalent attitude towards fire. On the one hand, fire is destructive; unchecked, it consumes everything in its path. On the other hand, fire is necessary for human survival and civilization.

This ambivalence to fire was often expressed in early myths. One of the most enduring of these is the Assyrian myth of the Phoenix, a bird which lives for five hundred years. At the end of its life span, the Phoenix builds a funeral pyre of cinnamon and other aromatic spices on top of an oak or palm tree. From the body of the burned bird rises its offspring. The first act of the offspring is to carry its parent's body to the temple of the sun in Egypt. The five-hundred-year cycle repeats itself as the Phoenix matures, constructs its own pyre, and succumbs to a new flame from which its successor springs. The myth suggests that destruction by fire is essential for the survival of the species.[1]

The myth of the Phoenix, the bird that rises from beneath the ashes, is an ancient expression of an ongoing human dilemma: What is the appropriate human response to fire? If fire is a natural event, should it be allowed to shape the ecosystem at will, or should people intervene in the face of destruction of the ecosystem as it currently exists?

The 1988 fires in Yellowstone National Park, our nation's oldest and one of its most spectacular national preserves, dramatized this dilemma. On the one hand, millions of people watched in horror as daily news clips showed the raging fire consuming nearly half of Yellowstone's 2.2 million acres. On the other hand, new growth and increased diversity of species in the aftermath of the fire have affirmed scientists' theories that fire is necessary to the survival and continued vitality of forest ecosystems.

The film *From Beneath the Ashes* explores some of the regenerative aspects of the fire at Yellowstone:

- Fire maintains the mosaic pattern of growth in a forest. It clears away areas of older growth.
- The ashy residue that covers the soil is a rich source of nutrients for new plant life, including species that have lain dormant for years because the older forest environment was inhospitable to them. The new plants and the seeds provide food for small mammals and birds and for larger ruminants.
- Forest plants are so adapted that fire is necessary to the continuation of the species, e.g. the lodgepole pine has serotinous cones which release their seeds only when stimulated by fire, and the aspen's underground structure responds to fire by sending up as many as 500 new shoots to replace one fire-felled old aspen.

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[1]Bullfinch, Thomas, *The Age of Fable or Beauties of Mythology* (New York: New American Library, 1962), 352-354.

- An increased amount of decaying wood attracts and sustains large insect populations which provide food for small birds which, in turn, attract larger birds of prey.

MATERIALS

Butcher paper
Drawing paper, crayons, markers
* *From Beneath the Ashes* videotape
Terrarium and instruction for making one
Large posters of forest fire and of a forest with animals
Aerial photograph of urban and rural mosaic patterns
Overhead projector (optional)

Starred (*) materials are included in this packet.

PROCEDURE

Part 1:

1. Write the words FOREST FIRE on a large piece of butcher paper. Ask the students what adjectives and images these words evoke.

2. After a brief discussion, ask the students to record their thoughts and feelings about forest fires in drawings, paragraphs, and/or poems. The students may compile their drawings and writings into a collage on the butcher paper around the words FOREST FIRE. They may write adjectives and phrases describing forest fires on the collage. (Save the collage for later reference.)

3. Discuss the images in the collage. Which are positive? Which are negative? Are there more positive or negative images? Why? From where did the students get their images and ideas of forest fires?

4. Introduce the idea of the Phoenix as a bird whose death by fire is necessary for survival of the species (see background information). Ask if the students can think of ways in which forest fires might help the forest survive.

Part 2:

1. Review and list any positive effects of forest fires that were mentioned in the previous session. Tell the students to note any positive effects that are mentioned in the video.

2. View the tape up to the first break.

3. Discuss positive effects and add to the list. Ask how the word "mosaic" was used in the film. Show aerial photos of urban and rural areas as examples of mosaic patterns. Or ask the students if any of them have every flown in an airplane. What did it look like when they looked down at the ground? This will illustrate the mosaic effect.

4. Introduce the idea of forest succession: during various stages of maturity, different plants are prevalent. Show the students the terrarium and demonstrate how to make one. Give the directions to the students so that they can make one at home. In subsequent lessons observe changes.

FIRE ON THE PRAIRIE

OBJECTIVES

The students will:

1. compare and contrast the role of fire in maintaining and/or changing forest and prairie ecosystems.
2. identify prairie adaptations for survival from fire and compare them with forest adaptations.
3. identify ways in which humans use fire to conserve the prairie.

BACKGROUND

The lesson learned from Yellowstone is that fire is a natural force necessary to the evolution and overall health of the western forest ecosystems. Fire is just as necessary to the survival of the prairie ecosystems of the Midwest. Whereas the issue in the western forest is whether to suppress fire or to let it burn, the issue in the Midwest is whether to deliberately set fires.

Much of the original prairie has been destroyed by farming and grazing policies. Many of the original prairie plants and animals are threatened with extinction. Recently, there has been much interest in conserving what little virgin prairie remains and in restoring former prairie lands to their original condition. Fire plays a major role in both conservation and restoration.

Prairie plants are particularly adapted for survival in fire. Many, like the aspen in western forests, have underground systems which may extend more deeply into the earth than does the stalk above the earth. Fire burns off shallow-rooted immigrant plants, thus leaving room for deeply-rooted native plants to send shoots above the ground. Many prairie animals are also adapted for survival during fire. They live in underground burrows which are not touched during the fires.

MATERIALS

* The second part of *From Beneath the Ashes* video
* Poster: Fermilab Prairie Flora and Fauna

PROCEDURE

1. Review the positive role of fire in the forest and the adaptive mechanisms of plants and animals. Show the students the posters of the forest and the prairie. Ask how the prairie differs from the forest. Discuss whether fire would have a similar or different effect on the prairie and on the forest, and whether adaptive mechanisms of prairie plants and animals would be similar or different from those of forest plants and animals.

2. Show the remainder of the tape.

3. Discuss similarities and differences between:
   - effects of fire on the prairie and in the forest.
   - the adaptive mechanisms of the plants and animals.
   - the fire policies.

4. Display poster, Fermilab Prairie Flora and Fauna. Discuss evidence of plant and animal adaptation in the poster.

DAY 9: RESTORATION/CONSERVATION

OBJECTIVES

The students will:
1. Identify the importance of the prairie.
2. Generate ways of protecting, restoring and conserving the prairie.

BACKGROUND

Awareness of the importance of the prairie is the first step in becoming environmentally conscious.

The prairie is the home of animals and other organisms. It has the best type of soil for trees and other vegetation. It is a refuge of wild animals.

Erosion depletes the soil. As part of the environment it is the responsibility of man to protect and conserve the soil.

Between two and three thousand acres of prairie remain in Illinois. Fortunately, most of this prairie is within Illinois Nature Preserves. It is protected by law from being plowed or harmed in any way. There are smaller tracts of prairie along roadsides, railroad beds and in pioneer cemeteries. These little prairies are unprotected and can be destroyed at any time. The biggest prairie in Illinois is at Goose Lake Prairie State Park where there are 1,537 acres of prairie. Altogether, though, precious little prairie remains in Illinois. It is estimated that only one-hundredth of one percent of the prairie is left in the Prairie State.

What has happened to the animals? Some prairie animals, like the meadowlark and thirteen-lined ground squirrel, have been able to substitute other open grassy habitats for their old prairie homes. These animals have learned to live in open habitats such as pastures, old fields, grassy roadsides, cemeteries, golf courses, fencerows, parks and lawns.

Most prairie animals, however, have not been so lucky. These animals, like the bison, must have a large prairie home to survive. These prairie animals have left Illinois for good. Other animals, like the prairie chicken, upland sandpiper, white-tailed jackrabbit and even the marsh hawk, are endangered in Illinois. These animals, along with many prairie plants, are in danger of extinction because there is so little prairie habitat left for them.

It is not possible to return to the days of vast expanses of prairie in Illinois. It is interesting, exciting, and even a little romantic to read about them, but they are gone forever. Today, we need to protect, manage and learn from the prairie remnants. We must plan for the prairie's future in restoration and landscape design.

There are many reasons for entering into a prairie restoration or landscaping project, including the creation of wildlife habitat, aesthetics, education or the sheer enjoyment of prairie plants. Unlike gardens where annual flowers are planted to produce a luxuriant garden in one year, prairie plants will require approximately three years to develop from seed. However, once established, prairie sites can be maintained with a minimal amount of effort.

What Can We Do? In preserving and restoring the prairie resources we have remaining, we are attempting to preserve what is left of the diversity of wildlife habitat vital to the health of an ecosystem. Without preservation and restoration we would discard the above-mentioned benefits as well as any possible undiscovered benefits these plants have to offer. We would further disrupt our environment, endangering the lives of more wildlife and plant species by depriving them of their natural habitat. We would be contributing to the drastically accelerated rate of extinction of species on our planet which reduces our own chances for survival. If we can come to an understanding of the prairie and all the benefits of preserving its components, we can reverse this destructive trend. We can plant new prairie parcels which will help to carry on the species. We can take action with stewardship groups that are contributing physical labor to preserve and protect prairie remnants and restoration projects. And we can fight the political battles sometimes required to save a prairie remnant. But first we have to care.

MATERIALS

* Book, *Addie Across the Prairie*
  Journal
  Prairie mural construction materials
* Student pages - *Prairie Conservation Practices*
  Prairie Restoration Practices
* Teacher pages - *Prairie Conservation Practices Answer Page*
  Prairie Restoration Practices Answer Page

Starred (*) materials are included in this packet.

VOCABULARY

conservation: Preserving something or keeping it unimpaired.

ecology: The study of organisms and their environment.

restoration: Bringing back to the original state.

PROCESS

Recognizing relationships, drawing conclusions.

PROCEDURE

1. Review what the students have learned about the prairie. This is a perfect time to go back to the students' journals. Encourage a sharing time.

2. Imagine that you could start with 100 students, each one representing one percent of the original tallgrass prairie found in Illinois. How many of those 100 students would there be today? (one-hundreth of one percent - a finger)

3. Discuss the importance of the prairie. Emphasize the food web, soil fertility and habitat.

4. Do *Prairie Restoration Practices*. Allow time for discussion and group work.

5. After discussing various conservation practices, allow them time to complete the *Prairie Conservation Worksheet.*

6. Continue ongoing activities.

EXTENSION ACTIVITY

Plant a schoolyard prairie.

INTERDISCIPLINARY CONNECTION

Art, language arts, mathematics.

ASSESSMENT

The following list suggests journal ideas or topic questions.

- Make a list of things that can affect prairies and how.
- List things you could do to help conserve/preserve prairie areas.

Prairie Restoration Practices

NAME:______________________

Seed Selection	Site Selection
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________
Planting	**Maintenance**
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________

Prairie Conservation Practices

NAME:_____

Plants	Animals
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
Soil	**Fire**
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Prairie Restoration Practices

Seed Selection	Site Selection
1. mature	1. Have permit
2. variety	2. under the sun
3. grasses/forbs	3. enough drainage
4. nature	4. good proportion of soil particles
5. seasonal blooming	5. consult a prairie specialist
6. consult a prairie specialist	

Planting	Maintenance
1. scatter not in rows	1. periodic burning (fire)
2. start seedlings early	2. weed but don't mow
3. condition the seeds	3. don't pick flowers or collect seeds
4. consult a prairie specialist	4. consult a prairie specialist

Prairie Conservation Practices

Plants	Animals
1. don't pick or step on them	1. look, don't touch or disturbe them
2. don't mow	2. no trapping
3. seed bare spots	3. consult a prairie conservationist
4. consult a prairie conservationist	
Soil	**Fire**
1. seed bare spots	1. don't attempt to do it yourself, but consult a specialist
2. stay off the soil	
3. consult a prairie conservationist	

DAY 9: CAREER AWARENESS

OBJECTIVE
The students will:
Identify scientific careers related to the prairie.

BACKGROUND
Careers are discussed in the unit about the prairie. Without these careers it would be difficult to know and gather all the content of this study. These careers include the biologist, botanist, agronomist, herpetologist, historian, conservationist, prairie experts and others.

Science is interwoven in our technological society. In order for our society to survive, a scientifically literate population is necessary. Educators are urged to continue teaching students an understanding of the true work of scientists while reminding students that they are the future of the nation.

MATERIALS
* Student pages - *Career Summaries*
  How to be a Good Scientist

Starred (*) materials are included in this packet.

VOCABULARY
career: Occupation, job.

scientist: A person trained in some field of science who studies our universe through observation and experimentation to discover and test theories.

PROCESS
Identifying, drawing conclusions.

PROCEDURE
1. Discuss class stereotypes of scientists using this suggested question:
   What is your mental picture of a scientist? (Students may talk about their aptitudes, physical features, clothing they wear, and what they do.) Have students draw a picture of and describe a scientist.

2. Distribute the career summary sheet. Discuss the job descriptions and familiarize the students with the careers related to the study of the prairie.

3. Talk about the qualities of a good scientist. Distribute the handout to the students.

4. Have students redraw their idea of a scientist. Compare with earlier picture.

EXTENSION ACTIVITIES

Have students cut ads from newspapers and record the careers related to science.

INTERDISCIPLINARY CONNECTION

Art, language arts, mathematics.

ASSESSMENT

The following list suggests journal ideas or topic questions.

- If you could select any related career, what would it be and why? What would you have to do to prepare for this career? How would you help the environment?
- Write a narrative about one of the careers from the career summary sheet.

Career Summaries

agronomist: conducts experiments in field crop problems and develops new methods of growing crops to make farming more efficient and environmentally kind.

biologist: studies living organisms - plants, animals, and viruses - and their relationships to their environments.

botanist: a biologist who studies plants

floriculturist: directs the propagation, cultivation, and care of shrubs, trees, and plants.

forester: plans and supervises the growth, protection, and utilization of trees. One area of interest to them is the use of the outdoors for recreational purposes.

geologist: studies the structure, composition, and history of the earth's crust. The earth's resources are located by geologists.

herpetologist: studies reptiles and amphibians.

horticulturist: propagates and cultivates flowers, identifies and labels plants, and also manages nonflowering plants.

nursery manager: is responsible for the growing, transplanting, and moving of trees, shrubs, and other perennial plants.

prairie specialist: (prairie manager) is responsible for prairie identification, reconstruction, and maintenance.

science technician: works closely under the supervision of a professional scientist and follows written procedures as outlined by the scientist.

soil conservationist: develops programs which make the most productive use of land without damaging the land.

tree surgeon: inspects trees and shrubs for the purpose of maintaining healthy plants. If needed, they perform tree surgery to eradicate any disease found.

zoologist: a biologist who studies animals

Other related careers:

firefighter: controls and helps prevent fires.

historian: writes about things and events related to the past.

environmental journalist: writes information and covers news about the environment to be published in newspapers, magazines, etc.

How To Be A Good Scientist

Are you interested in finding answers to puzzling problems? Good! Then you're great scientist material.

Here are some hints for you to follow as you continue being a scientist.

BE CURIOUS

Keep your eyes wide open and watch for unusual things. Wonder about everything; don't take anything for granted. Constantly ask questions such as: "What will happen?" and "Why is this happening?" and "What did I learn from this?"

BE ORGANIZED

Get all your materials together before you start an investigation. Read and follow directions carefully. Keep good records! Write down what you see and what you learn in a notebook.

BE WISE

Follow all the rules for safe science, and take good care of your science equipment and supplies. You don't want to have a fun science adventure spoiled by an accident or broken equipment.

BE INVENTIVE

Don't be afraid to try different things, to ask more questions, to make guesses about what might happen, or to come up with a different way of checking out something. If something didn't work out or something is still puzzling you, try another experiment. Keep asking questions such as:
"What might happen if I tried this?" and "What more could I find out?"

BE PATIENT

Take plenty of time to perform your experiment or investigation. And if it doesn't work right, be willing to try again. Try to analyze why it didn't work, and keep trying.

ENJOY THE "DOING"!

Don't worry if you don't understand everything or find every answer. Even the most brilliant scientists don't understand everything. There are still lots of mysteries in the world of science. All the fun isn't in getting the answers; most is found in the process of looking for them!

BE AWARE

Appreciate your environment. Remind yourself constantly of your responsibility to help protect and conserve it.

DAY 10: CULMINATION

OBJECTIVE
The students will:
Experience activities as a culmination for the entire prairie unit.

BACKGROUND
This section provides a variety of activities that may only take a short time to complete (Word Search) to activities that may take much longer (School Yard Prairie Restoration).

MATERIALS
* Book, *Addie Across the Prairie*
  Journal
  Prairie mural construction materials
* Student page - *Word Search*
* Teacher pages - *Prairie Pursuit: A Game for the Classroom*
  Word Search Answer Page

Starred (*) materials are included in this packet.

VOCABULARY
See Word Search.

PROCESS
Inquiry, critical thinking, discovery.

PROCEDURE
Choose one or several of the following:

1. Do *Word Search.*

2. Have students give oral reports - (unless these have already been given during mural completion or if students have completed individual research projects).

3. Play Prairie Pursuit.

4. Take a field trip(s) to a prairie site(s).

5. Finish ongoing activities.

EXTENSION ACTIVITIES

1. Read another novel about the prairie.

2. Plant a schoolyard prairie.

INTERDISCIPLINARY CONNECTION

Art, language arts, mathematics, science, social studies.

ASSESSMENT

The following list suggests journal ideas or topic questions.

- Trade your journal with a partner and think about the similarities and differences in your entries. Write a note to your partner telling him/her which ideas he/she used that you thought were clever, and why.
- React to or tell what you have learned about the prairie. How have your ideas changed?

PRAIRIE UNIT WORD SEARCH

D	E	C	O	M	P	O	S	I	T	I	O	N	M	E	S	B	V	R	0
C	M	O	D	I	R	E	I	R	I	A	R	P	E	C	O	S	M	A	T
F	E	W	E	N	A	I	B	I	H	P	M	A	T	N	W	E	B	D	Q
D	T	E	C	S	I	Y	O	K	E	L	M	S	A	E	M	R	O	F	N
P	A	A	O	E	L	O	A	M	C	G	A	I	R	D	L	O	N	W	U
R	M	D	M	D	C	R	L	R	S	M	M	O	B	N	I	V	E	R	I
E	O	A	P	I	H	G	R	E	E	E	M	L	E	E	O	I	N	L	E
D	R	P	O	M	A	A	S	P	R	T	A	R	T	P	S	B	I	H	C
A	P	T	S	E	B	N	O	T	O	S	L	S	R	E	P	R	C	P	O
T	H	A	E	N	I	I	I	I	V	Y	S	S	E	D	O	E	H	M	S
O	O	T	R	T	T	S	L	L	I	S	O	B	V	R	T	H	E	Y	Y
R	S	I	S	L	A	M	B	E	N	O	X	R	N	E	L	O	V	N	S
S	I	O	P	M	T	S	V	C	M	C	E	O	I	T	S	I	L	T	T
A	S	N	E	U	Y	M	O	E	O	E	N	F	S	N	E	C	X	Y	E
W	R	L	P	R	E	Y	N	D	S	L	E	W	S	I	B	F	D	U	M
J	A	H	A	R	R	O	W	E	D	L	A	I	N	N	E	R	E	P	Q
G	K	B	R	E	B	M	I	T	K	L	N	O	I	S	O	R	E	R	N
M	A	N	P	A	N	T	H	R	O	P	O	M	O	R	P	H	I	S	M
V	G	E	T	A	R	G	I	M	L	S	R	I	V	U	L	E	T	S	H
M	F	E	R	T	I	L	E	N	O	I	T	A	N	I	L	L	O	P	T

adaptation
amphibian
anthropomorphism
decomposers
decomposition
ecosystem
erosion
fertile
forbs
gale
habitat
harrowed
herbivores
interdependence
invertebrate
loam
mammals
metamorphosis
migrate
niche
nymph
omnivores
organisms
oxen
perennial
pollination
prairie
predator
prey
reptile
rivulets
sediment
silt
slews
sod
soil
sow
timber
topsoil
yoke

Prairie Pursuit

OBJECT OF THE GAME: To pursue knowledge of the prairie by answering questions about its past, present and future.

MATERIALS:
Question and answer sheets for teacher
Blackboard for scorekeeping

DIRECTIONS:
1. Divide group into teams of 4-6 players. Players will confer with each other in a team effort to answer each question. Have teams select a team name.

2. Draw a chart on the blackboard for scorekeeping.

	PAST	PRESENT	FUTURE
Team 1			
Team 2			
(etc.)			

3. Set a time limit for the game and for each answer.

4. Each team, in turn, selects a question category--Past, Present, or Future--in which to answer a question.

5. The teacher reads a question. Team members consult and answer within the time limit.

6. Some questions may lead to classroom discussions, others may have more than one correct answer. Teachers have some flexibility in deciding when a correct answer has been given.

7. A correct answer earns the team 1 point in the correct column of the scoreboard. If an answer is incorrect the next team will have a chance to earn the point with a correct answer. Questions continue to be passed from team to team until a correct answer is given or each team has had a turn.

8. Each team has a maximum limit of 6 points in each category. Eighteen points, 6 in each category, wins the game. If time runs out before a team has earned 18 points, the team with the most points wins.

POSSIBILITIES: Endless! The teacher is encouraged to add his/her questions to give added meaning to classroom emphasis and experiences.

Adapted from "Prairie Pursuit A Prairie Game for the Classroom," The Morton Arboretum, 1989.

Prairie Pursuit Questions

PAST

1. Early prairie settlers could not find enough time to build barns, houses, and fences. (true or false)
2. The Indians burned the prairie to:
   a. help them hunt bison and other animals they needed.
   b. Bring rain.
   c. Worship the Great Spirit.
   d. Get rid of mice.
3. We learned to live in harmony with the prairie. Who are we? (Native American Indians)
4. Many settlers found prairie life difficult because:
   a. It was too shady.
   b. There weren't enough trees for building and fuel.
   c. It was mountainous.
5. What kept many trees out of the prairie? (fire)
6. Who invented the steel plow? (John Deere)
7. Early settlers usually built homes with brick. (true or false)
8. Pioneers called the prairie a sea of _____. (grass)
9. Ten thousand years ago the prairie was covered by _____. (ice, glaciers)
10. The Native Americans killed most of the bison so that today there are few left. (true or false)
11. Early prairie houses were made of _____. (sod or logs)
12. In the 1800s, Illinois prairie was turned into _____. (farmland)
13. The first humans to live on the prairie were from France. (true or false)
14. What was the largest mammal of the prairie? (bison)
15. The settlers did like the prairie because:
    a. It made great golf courses.
    b. The winters were mild and summers cool.
    c. The soil was good for growing crops.
    d. Disney World was there.
16. Prairie soil began with the help of a glacier. (true or false)
17. How did the settlers come to Illinois? (conestoga wagons, boats on rivers and the Great Lakes)
18. The major change in the prairie since 1832 is the absence of _____. (fire)
19. The first pioneers to settle the prairie believed the prairie soils were not fertile because there were few trees. (true or false)
20. A prairie fire was not dangerous. (true or false)
21. The mosquito disappeared with the plowing of the prairie. (true or false)
22. All the pioneers needed to prepare the prairie for crops was the wooden plow. (true or false)

Prairie Pursuit Questions

PRESENT

1. What are two kinds of plants found on the prairie? _____ and _____.
   (grasses, forbs, trees, shrubs, vines, mosses, lichens)
2. I bend in waves with the prairie wind. Who am I? _____. (prairie grass)
3. Name a predator of the prairie. (hawk, fox, wolf, coyote, spider, human)
4. A prairie is valuable because:
   a. It makes a good soil.
   b. It is beautiful.
   c. It is a home for plants and animals.
   d. All of the above.
   e. None of the above.
5. It is always cool out on the open prairie. (true or false)
6. Fire is a friend to the prairie. (true or false)
7. Illinois prairies have taller grasses than Colorado prairies. (true or false)
8. The prairie always looks green. (true or false)
9. The layer of soil that holds the most nutrients is called _____. (top soil)
10. Prairie fires help keep too many trees and weeds out of the prairie, remove dead plant material, and fertilize the prairie. (true or false)
11. When prairie roots die and decompose, the soil becomes more _____. (fertile, rich, useful, nutritious)
12. Animals need plants for food, oxygen, and shelter. (true or false)
13. Lots of people in the prairie state still live in sod houses. (true or false)
14. Snakes are not good for prairies. (true or false)
15. Prairie grasses are all over 5 feet tall. (true or false)
16. The forests we have in Illinois today are just like the woods we had 150 years ago. (true or false)
17. More top soil is eroding than is being added. (true or false)
18. Prairie plants are easy to find because they grow in any local field. (true or false)
19. Is it reason enough to save prairie remnants for their beauty? (yes)
20. Erosion isn't a problem in Illinois because more top soil is produced than we need. (true or false)
21. Diversity of plants is important to the health of a prairie. (true or false)
22. Are people becoming more aware of prairies? (yes)

Prairie Pursuit Questions

FUTURE

1. To keep the prairie healthy, it should be plowed every year. (true or false)
2. How can we have prairies in the future?
   a. Preserve what prairies remain.
   b. Plant new prairies.
   c. Stop paving everything in sight.
   d. All of the above.
3. To keep the prairie healthy, we should burn the prairie frequently. (true or false)
4. In the United States, farmland that once supported prairie plants and animals is now being made into housing developments. (true or false)
5. If there were no prairies in the future, prairie plants would grow in:
   a. Highway median strips.
   b. Corn fields.
   c. Pine forests.
   d. None of the above.
6. If every family were to plant prairie plants in their yards, the suburbs would become a wild prairie again. (true or false)
7. Give one reason why we should try to save prairies for future generations. (beauty, diversity, habitat, possible medicinal/economic plants, etc.)
8. To restore some of Illinois' prairies would be:
   a. A smart thing to do.
   b. An impossible thing to try.
   c. Not worth the effort.
9. There are no valuable plants in the prairie so there is no need to save it for future generations. (true or false)
10. The future of the Illinois prairie is:
    a. In your hands.
    b. In the politicians' hands.
    c. In your parents' hands.
    d. All of the above.
11. Will wild bison ever freely roam on the Illinois prairie again? (no)
12. If all insects on the prairie were killed the prairie would be better off. (true or false)
13. If we are to have diversity of plants and animals in the future, we must have many different kinds of habitats, including prairies. (true or false)
14. Once lost, top soil is easily and quickly replaced by the natural system. (true or false)
15. There is nothing you can do about prairies and their future. (true or false)
16. The best thing you can do to help preserve prairies is to:
    a. Learn about them.
    b. Appreciate and understand them.
    c. Tell others about them.
    d. All of the above.
17. Right now we have use for the plants farmers grow. Therefore, we won't need prairie plants in the future. (true or false)

18. Prairies will be places for your children to learn about our:
    a. History.
    b. Plants.
    c. Animals.
    d. Insects.
    e. All of the above.
19. Some people in our class may spend their lives studying plants and animals. These persons could help keep them from becoming extinct. (true or false)
20. If the prairie survives, it will be because of the decisions made by:
    a. Older people.
    b. Kids.
    c. Neighborhoods.
    d. Schools.
    e. All of us.
21. Some people living in towns and cities are planning to restore small prairies in their parks, school grounds, and backyards. (true or false)
22. How will Illinois best continue to be the "Prairie State?"
    a. By protecting and extending its remaining prairies and valuing and protecting our prairie heritage when developing land.
    b. By building bigger and better highways.
    c. By opening more shopping malls.

PRAIRIE UNIT WORD SEARCH

D	E	C	O	M	P	O	S	I	T	I	O	N	M	E	S	B	V	R	0
C	M	O	D	I	R	E	I	R	I	A	R	P	E	C	O	S	M	A	T
F	E	W	E	N	A	I	B	I	H	P	M	A	T	N	W	E	B	D	Q
D	T	E	C	S	I	Y	O	K	E	L	M	S	A	E	M	R	O	F	N
P	A	A	O	E	L	O	A	M	C	G	A	I	R	D	L	O	N	W	U
R	M	D	M	D	C	R	L	R	S	M	M	O	B	N	I	V	E	R	I
E	O	A	P	I	H	G	R	E	E	E	M	L	E	E	O	I	N	L	E
D	R	P	O	M	A	A	S	P	R	T	A	R	T	P	S	B	I	H	C
A	P	T	S	E	B	N	O	T	O	S	L	S	R	E	P	R	C	P	O
T	H	A	E	N	I	I	I	I	V	Y	S	S	E	D	O	E	H	M	S
O	O	T	R	T	T	S	L	L	I	S	O	B	V	R	T	H	E	Y	Y
R	S	I	S	L	A	M	B	E	N	O	X	R	N	E	L	O	V	N	S
S	I	O	P	M	T	S	V	C	M	C	E	O	I	T	S	I	L	T	T
A	S	N	E	U	Y	M	O	E	O	E	N	F	S	N	E	C	X	Y	E
W	R	L	P	R	E	Y	N	D	S	L	E	W	S	I	B	F	D	U	M
J	A	H	A	R	R	O	W	E	D	L	A	I	N	N	E	R	E	P	Q
G	K	B	R	E	B	M	I	T	K	L	N	O	I	S	O	R	E	R	N
M	A	N	P	A	N	T	H	R	O	P	O	M	O	R	P	H	I	S	M
V	G	E	T	A	R	G	I	M	L	S	R	I	V	U	L	E	T	S	H
M	F	E	R	T	I	L	E	N	O	I	T	A	N	I	L	L	O	P	T

adaptation
amphibian
anthropomorphism
decomposers
decomposition
ecosystem
erosion
fertile
forbs
gale
habitat
harrowed
herbivores
interdependence
invertebrate
loam
mammals
metamorphosis
migrate
niche
nymph
omnivores
organisms
oxen
perennial
pollination
prairie
predator
prey
reptile
rivulets
sediment
silt
slews
sod
soil
sow
timber
topsoil
yoke

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Glossary

ADAPTATION: A way that a living thing's body or behavior is special to allow it to live more successfully in a certain area.

AMPHIBIAN: Animals who live on both land and water and have a smooth, moist skin without hair or scales. They go through metamorphosis to become adults.

ANCESTORS: Relatives that lived before you.

ANTHROPOMORPHISM: Projecting human feelings onto animals. A good example would be people feeling sorry for the bunny rabbit caught by the hawk, but no one feeling jubilation for the hawk finding nourishment to sustain life.

ARCHAEOLOGIST: One who studies ancient life by excavating (digging) artifacts (objects).

CAREER: Occupation, job.

CARNIVORE: Meat eater.

COLD BLOODED: Having blood that varies in temperature with the outside air, water or land.

CONSERVATION: Preserving something or keeping it unimpaired.

CYCLICAL: Recurring in cycles or periods of time in which certain events or phenomena repeat themselves in the same order at the same intervals.

DECOMPOSERS: The animals, plants and microorganisms which break down dead plants and animals. This process helps to enrich the soil.

DECOMPOSITION: The breaking down of dead things into smaller parts or elements.

DISEMBOWEL: To slice open and remove internal organs.

ECOLOGY: The study of organisms and their environment.

ECOSYSTEM: The living and nonliving things existing cooperatively together.

EROSIONS: The loosening and movement of soil by wind, raindrops, moving water, ice, or landslides.

FERTILE: Producing abundantly.

FIREBREAK: A ditch or clearing created to prevent a forest fire from spreading.

FORBS: Prairie wildflowers.

FOOD WEB/FOOD CYCLE: A series of interrelated food chains. For example, plants are eaten by carnivores (meat eaters). Plants and animals can be eaten by omnivores (plant and meat eaters), all which will eventually die and be eaten by decomposers thus continuing the cycle.

FURROWS: Long, narrow tracks in the soil cut by a plow.

GALE: A very strong wind.

HABITAT: A place where plants and animals grow, live, and reproduce.

HARROW: To use a heavy frame with iron "teeth" to break up the soil.

HAZARDOUS: Dangerous.

HERBIVORE: Plant eater.

HUMUS: A brown or black substance resulting from the partial decay of leaves, roots, and other vegetable matter; organic part of the soil.

INSECT: A group of small, air-breathing arthropods (invertebrates with jointed legs) with a body clearly divided into three segments (head, thorax, abdomen). Insects have only three pairs of legs.

INSULATOR: A layer that prevents the loss or gain of heat.

INTERDEPENDENCE: Living and nonliving things relying on one another in an ecosystem.

INVERTEBRATE: An animal without a backbone.

LARVA or NYMPH: The young of an insect before metamorphosis.

LOAM: A soil containing sand, silt, and clay.

MAMMALS: Warm-blooded animals, with hair, which usually bear their young live. The females have the capability to nurse their babies.

METAMORPHOSIS: A change in appearance.

MIGRATE: To move from one place to another.

MOSAIC: A pattern or picture made by placing together small pieces of glass or stone of different colors; any patchwork pattern.

NICHE: The special role a species plays in an ecosystem.

NUTRIENT: A substance that supplies nourishment for an organism to live.

NYMPH or LARVA: The young of an insect before metamorphosis.

OMNIVORE: Plant and animal eater.

ORGANISM: A living thing.

OXEN (plural of ox): Animals, such as cattle, buffalo, and bison, that are trained for farm work.

PARENT MATERIAL: Materials, such as rock or dead plants, that break down or decay to form soil.

PERENNIAL: Plants that come up from roots and other underground parts year after year.

POLLINATION: The transfer of pollen for the fertilization of plants.

PRAIRIE: A large expanse of land, with few trees, which contains specific plants and animals.

PREDATOR: The hunter.

PREY: The hunted.

REGENERATIVE: Able to give new life or vigor to.

REPTILE: Cold-blooded animals that produce eggs which hatch into young. These young are miniature replicas of the adults (color may change).

RESTORATION: Bringing back to an original state.

RIVULETS: Little streams.

SCAVENGER: An animal that cleans up food scraps.

SCIENTIST: A person trained in some field of science who studies our universe through observation and experimentation to discover and test theories.

SEDIMENT: Soil that is deposited by water or wind.

SEROTINOUS: Relating to the latter and usually drier part of the summer; responsive to heat.

SETTLERS: People who come to a new place to live.

SILT: A medium-sized soil particle. Silt helps the soil become rich and loose.

SLAY: To kill.

SLEWS: Swamp-like area (currently spelled "slough").

SOD: A surface layer of earth containing grass and their matted roots.

SOIL: A dynamic mixture of broken-down rocks, air, water, and plant and animal material.

SOW: Scatter seed on the ground.

STAGNANT: Not moving and not fresh.

SUCCESSION: Following in order.

SUPPRESSION: Putting an end to the activity or existence of.

TIMBER: An area with many trees.

TOPSOIL: The uppermost layer of soil. This is the richest, most productive layer of soil.

VIRGIN PRAIRIE: Prairie that is in the original pre-settlement state.

YOKE: A wooden frame to fasten two work animals together.

Field Trip Suggestions

Any of the prairies listed in the Appendix.

NATIVE AMERICANS

Field Museum of Natural History
Roosevelt Road at Lake Shore Drive
Chicago, IL 60605
(312) 922-9410
contact person: Alexia Tryzna

Schingoethe Center for the Native American Cultures
Aurora University
347 S. Gladstone
Aurora, IL 60506
(708) 844-5402
contact person: Marcia Lautanen-Raleigh

Isle a la Cache Museum
501 E. Romeo Road
Romeoville, IL 60441
(815) 886-1467
contact person: Jack MacRay

PRAIRIES

Fermilab Prairie Interpretive Trail
Fermilab
P.O. Box 500, M.S. 333
Batavia, IL 60510-0500
(708) 840-3161
contact person: David Abler

Morton Arboretum
Rt. 53
Lisle, IL 60532
(708) 968-0074
contact person: Beth Robinson

Garfield Farm Museum
Box 403
LaFox, IL 60147
(708) 584-8485
contact person: Jerry Johnson

SETTLERS

Chicago Historical Society
1601 N. Clark
Chicago, IL 60614
(312) 642-4844
contact person: reservation's desk

Garfield Farm Museum
Box 403
LaFox, IL 60147
(708) 584-8485
contact person: Jerry Johnson

Naper Settlement
201 W. Porter
Naperville, IL 60540
(708) 420-4161
contact person: Peggy Nowicki

Illinois Prairies

Directions to Prairies

BELMONT PRAIRIE
Take Ogden Avenue to Belmont Road (about 2 miles east of IL Rt. 53). Turn south on Belmont. After about 1 mile, turn west (right) on Haddow St. (just south of Puffer School). Turn north (right) at the end of Haddow and look for sign to prairie.

BRAIDWOOD SAVANNAH
Take I-55 south to the Braidwood exit (Rt. 113). Follow Rt. 113 through town and look for the entrance gate on the right side (south) of the road not long after you pass the school.

BREWSTER CREEK
Take Roosevelt Road (Rt. 38) to IL Rt. 59. Turn north (right) on Rt. 50 and go to Army Trail Road (a stop light - about 6 miles). Turn west (left) on Army Trail and proceed for about 1.5 miles to Powis Road. Turn north (right) on Powis to the entrance to Pratts Wayne Woods Forest Preserve. Enter the preserve and proceed to the furthest parking lot.

CHURCHILL PRAIRIE
Take Roosevelt Road (Rt. 38) east to IL Rt. 53. Turn north (left) on Rt. 53 and proceed to St. Charles Road (a stop light). Turn west (left) on St. Charles and after one block look for the Churchill Woods Forest Preserve west area parking lot on the south (left) side of the road.

FERMILAB PRAIRIE
Take Roosevelt Road (Rt. 38) west to IL Rt. 59. Turn south (left) on Rt. 59 and proceed to Batavia Road (a stop light). Turn west (right) on Batavia Road and go to the main building of the lab.

GOOSE LAKE PRAIRIE STATE PARK
Goose Lake Prairie is located in Grundy County about 25 miles southwest of Joliet. Take I-55 south toward St. Louis. Exit right (west) on Lorenzo Road and go 7 1/2 miles west to the park sign. Turn right (north) on Jugtown Road and go about 1 mile to the main entrance. Meet by the visitor center. Allow about 1 1/2 hours to get there.

LOCKPORT PRAIRIE
Lockport Prairie is located near the Illinois State Penitentiary in Lockport. Take Rt. 53 south past Romeoville. Look for Lewis University and Rt. 7. Continue south to Division Street (police radio tower on right). Turn left on Division Street ignoring the bridge out sign. Go 1/2 mile. The Lockport Prairie is on the right. Park on the side of the road by the sign.

GENBERG-MARKHAM PRAIRIE
Take the Tri-State south and get off at 127th St. Continue south on Cicero Ave. (Rt. 50), to 159th St. Take a left turn (east). Go east until Troy St., which is one block east of Kedzie. On Troy, turn left (north). Troy is a dirt road. Continue on Troy north which brings you directly to the prairie.

MCKEE MARSH
Take Butterfield Road (Rt. 56) west to Batavia Road (a stop light). Turn north (right) on Batavia and proceed to Williams Road (about 1/2 mile). Turn north (right) on Williams. At the end of Williams Road, turn west (left) on Mack Road. Parking lot is about 300 feet from intersection on the north (right) side of Mack Road.

MORTON ARBORETUM PRAIRIE
Take IL Rt. 53 south from Butterfield Road (Rt. 56) or Roosevelt Road (Rt. 38) to the entrance to the Morton Arboretum. Proceed to the west side of the Arboretum and park in lot #25. Follow trail to prairie.

MURRAY PRAIRIE
Take Roosevelt Road (Rt. 38) west to IL Rt. 59. Turn north (right) on Rt. 59. Go to IL Rt. 64 and turn west (left). Proceed west on Rt. 64 to Randall Road in St. Charles. Turn north (right). Take Randall Road north about 1/4 mile across the railroad tracks. Turn left (west) on Dean Street. Go about 4/10 of a mile on Dean Street to the parking lot for the Great Western Nature Trail.

POVERTY PRAIRIE
Take Roosevelt Road (Rt. 38) east to IL Rt. 53. Turn south (right). Take Rt. 53 south to 75th Street (a stop light - about 8 miles). Turn east (left) on 75th and proceed to Cass Avenue. Turn south (right) on Cass. Just south of I-55 there is a parking lot for Waterfall Glen Nature Preserve (right side of road). Trail from parking lot leads to prairie. (It is, however, about a 3-mile walk to the prairie.)

SHOE FACTORY ROAD PRAIRIE
Take Roosevelt Road (Rt. 38) west to IL Rt. 59 and turn north (right). Go north on Rt. 59 to Shoe Factory Road and turn west (left). Look for sign on south (left) side of Shoe Factory Road (about 1/2 mile).

WEST CHICAGO PRAIRIE
West Chicago Prairie is located in West Chicago. Take Roosevelt Road (Rt. 38) west past Rt. 59 and the Fabyan Parkway to Kress Road. Turn right (north) on Kress Road. After you cross the Chicago and Northwestern railroad tracks and a small road next to it, take the second concrete road named Western to the right. It dead ends at Industrial Drive. There you will find room to park and a sign for the prairie.

WOLF ROAD PRAIRIE
Take Butterfield Road (Rt. 56) east to Highland Avenue. Turn south (right) on Highland and cross the tollway. Turn east (left) on 31st Street and follow it all the way to Wolf Road. Park along the north side of 31st.

WOODWORTH PRAIRIE
Take the Toll Road (294) north to Dempster Street. Go east on Dempster and take a left at the first stoplight (Potter Road). Continue north on Potter Road to Golf and turn east on Golf Road. Go east on Golf Road to Greenwood which is a large intersection. Go left (north) on Greenwood to Milwaukee. Turn left on Milwaukee Ave. The Peacock Prairie is located next to the McDonald's Restaurant (north) on the east side of Milwaukee.

Illinois Native Prairie Nature Preserves

BOONE COUNTY

FLORA PRAIRIE: Southwest corner of county, east of Illinois Central railroad tracks on north side of Poole Road, 1/2 mile west of Wheeler Road -- A 10-acre dry dolomite prairie owned by Boone County Conservation District; parking and trails.

CARROLL COUNTY

AYERS SAND PRAIRIE NATURE PRESERVE: Three miles southeast of Savanna, 1/2 mile east of Highway 84 -- A dry sand prairie of 115 acres owned by the Department of Conservation; parking, no trails.

CARROLL & WHITESIDE COUNTIES

THOMSON-FULTON SAND PRAIRIE NATURE PRESERVE: Between Thomson and Fulton, west of Burlington-Northern railroad right-of-way -- Dry sand prairie owned by the Department of Conservation, U.S. Fish & Wildlife Service, and Corps of Engineers; scientific study area; parking, no trails.

COOK COUNTY

GENSBURG-MARKHAND PRAIRIE NATURE RESERVE: In Markhand, east of Kedzie Avenue, west of Interstate 294 and between 155th and 157th Streets -- 95 acres of dry-mesic, mesic, and wet-mesic sand prairie owned by Northeastern Illinois University; access by permission only, phone (312) 583-4051.

MORTON GROVE PRAIRIE NATURE PRESERVE: In Morton Grove, at northeast end of 16-acre Prairieview Park, just east of Caldwell Road on Dempster and Newcastle -- 1.9 acres of mesic and wet-mesic prairie owned by Morton Grove Park District; parking and nature trail.

SAND RIDGE NATURE PRESERVE: Near Calumet City, east of Torrence Avenue, west of Penn Central railroad tracks, north of Michigan City Road -- 70 acres of dry-mesic and wet sand prairie owned by Cook County Forest Preserve District, River Forest; no parking or trails.

SHOE FACTORY ROAD NATURE PRESERVE: East of Elgin on south side of Shoe Factory Road, between Sutton Road (Route 59) and Elgin, Joliet, and Eastern railroad tracks -- Nine acres of dry-mesic gravel prairie owned by Cook County Forest Preserve District, River Forest; access only by permission of naturalist at Crabtree Nature Center, phone (312) 381-6592.

SOMME PRAIRIE: Northbrook, 1/2 mile west of Waukegan Road, north of Dundee Road in Somme Woods Forest Preserve -- 18 acres of wet-mesic prairie owned by Cook County Forest Preserve District; no parking or trails.

JAMES WOODWORTH PRAIRIE: Glenview, on east side of Milwaukee Avenue, 1/2 mile north of Golf Road -- Five acres of mesic prairie owned by University of Illinois at Chicago Circle; interpretation center building open and trail guides available daily 10 a.m. - 3 p.m. June through September.

DUPAGE COUNTY

BELMONT PRAIRIE NATURE PRESERVE: Downers Grove, south of Ogden Avenue (Rt. 34), west of Belmont Road at end of Prairie Avenue, on Cross St. -- 10 acres of wet to mesic prairie owned by The Nature Conservancy; parking area to be developed, trails exist.

EFFINGHAM, FAYETTE, & MARION COUNTIES

12-MILE PRAIRIE: From Watson to Kinmundy between Illinois Central Railroad tracks and Illinois Highway 37 -- Mesic black soil prairie maintained by Illinois Department of Transportation.

FORD COUNTY

PROSPECT CEMETERY PRAIRIE NATURE PRESERVE: Southeast edge of Pacton on Vermilion St. -- Five acres of mesic prairie owned by Patton Township Cemetery Trustees; parking on street, no trails.

GRUNDY COUNTY

GOOSE LAKE PRAIRIE NATURE PRESERVE: Southeast of Morris, north of Lorenzo Road, on Jugtown Road -- 1,513 acres including dry-mesic, wet-mesic and wet prairie, and prairie potholes owned by the Department of Conservation; interpretive center and trails.

IROQUOIS COUNTY

IROQUOIS COUNTY CONSERVATION AREA: Northeast of Beaverville in southern and eastern parts of conservation area -- 1,240 acres of wet to dry prairie and marsh; parking provided, no trails.

JERSEY COUNTY

PERE MARQUETTE STATE PARK: West of Grafton on Illinois 100 -- Fifteen 20-acre areas of loess hill prairie within state park; trails and interpretive program provided.

JOHNSON COUNTY

HERON POND - WILDCAT BLUFF NATURE PRESERVE: Four miles southwest of Vienna -- 5.9-acre limestone glade on Wildcat Bluff within 1,861-acre nature preserve owned by the Department of Conservation; parking and trails provided.

CAVE CREEK HILL PRAIRIE: 3 1/2 miles south of Vienna on the east side of Route 45 -- Two-acre limestone glade within 20-acre natural area owned by the Department of Conservation; no trails.

LAKE COUNTY

BERKELEY PRAIRIE: Highland Park, south side of Berkeley Avenue, west of Ridge Road -- 18 acres of mesic prairie owned by Lake County Forest Preserve District.

ILLINOIS BEACH NATURE PRESERVE: Southern part of Illinois Beach State Park, Zion -- 829 acres of wet to dry sand prairie; interpretive center and trails.

WADSWORTH PRAIRIE NATURE PRESERVE: East of U.S. 41, west of the Milwaukee Road Railroad and 1/4 mile north of Wadsworth Road -- 176-acre marsh and prairie owned and managed by the Lake County Forest Preserve District; no trails developed at present.

LIVINGSTON COUNTY

SUNBURY PRAIRIE: 8.5 miles west of Dwight along the abandoned Illinois Central Gulf Railroad -- 20 acres of mesic prairie within the abandoned right-of-way of a railroad owned by the Nature Conservancy.

LEE COUNTY

GREEN RIVER CONSERVATION AREA: 12 miles south of Dixon on County 12 -- Wet to dry sand prairie scattered throughout 2,330-acre conservation area owned by the Department of Conservation.

MASON COUNTY

REAVIS NATURE PRESERVE: 5 1/2 miles south of Easton, eight miles east of Kilbourne, south of County Highway 5 -- 53 acres of loess hill prairie owned by the Department of Conservation.

SAND PRAIRIE - SCRUB OAK NATURE PRESERVE: Nine miles south of Havan and three miles east of Bath, south of County Highway 17 -- 1,460 acres of dry sand prairie and forest; parking and trails on east side of area; owned by the Department of Conservation.

MCHENRY COUNTY

QUEEN ANNE PRAIRIE - ECKERT CEMETERY CONSERVATION AREA: On Queen Anne Road north of Charles Road, northeast of Woodstock -- One-acre mesic prairie leased by the McHenry County Conservation District; interpretive trail around cemetery.

MCLEAN COUNTY

WESTON CEMETERY PRAIRIE NATURE PRESERVE: 1/2 mile east of Weston, north of Route 24 -- Five-acre mesic prairie owned by Yates Township and managed by Illinois State University.

MONROE COUNTY

FULTS HILL PRAIRIE NATURE PRESERVE: One mile east of Fults, on Mississippi River bluffs, north side of Bluff Road -- 532 acres including loess hill prairie owned by the Department of Conservation; parking and trails provided.

MOULTRIE COUNTY

CONEFLOWER HILL PRAIRIE: South of the laboratory building on the Lake Shelbyville Wildlife Management area -- Four acres of hill prairie owned by the Corps of Engineers; leased and managed by the Department of Conservation.

OGLE COUNTY

BEACH CEMETERY NATURE PRESERVE: South of Davis Junction on north side of Big Mound Road -- 2.25-acre dry-mesic prairie managed by Natural Land Institute, Rockford; access by permission only, phone (815) 964-6666.

BICENTENNIAL PRAIRIE NATURE PRESERVE: On Crestview Road 1/2 mile south of intersection of Crestview and Kishwaukee roads in northeastern Ogle County -- 11.5 acres of dry dolomite and gravel prairie owned by the Prairie Preservation Society of Ogle County, Inc.

STEPHENSON COUNTY

FREEPORT PRAIRIE NATURE PRESERVE: South edge of Freeport on Walnut Road -- Five acres of dry dolomite prairie owned by Jane Addamsland Park Foundation of Freeport; parking and trails.

TAZEWELL COUNTY

ST. CREVE COEUR NATURE PRESERVE: South end of Fort Creve Coeur Park in Creve Coeur -- Two acres of glacial till hill prairie; owned by the Village of Creve Coeur; a trail is provided.

GRAVEL TERRACE PRAIRIE: 6.5 miles north of Manito on the north side of the Manito Road -- A 19-acre bluff prairie owned by the Department of Conservation; access by permission of Site Superintendent at the Spring Lake State Park, phone (309) 968-7135.

WILL COUNTY

GRANT CREEK PRAIRIE NATURE PRESERVE: In Des Plaines River Conservation Area, east of Interstate 55, one-half mile south of Blodgett Road -- 78 acres of mesic and wet prairie owned by the Department of Conservation; no trails.

BRAIDWOOD DUNES AND SAVANNA: One mile southwest of Braidwood south of Route 113 -- 145 acres of sand prairie and savanna; owned by the Will County Forest Preserve District.

WINNEBAGO COUNTY

BELL BOWL PRAIRIE: Southwest edge of Greater Rockford Airport, north of Belt Line Road -- 15 acres of dry gravel prairie owned by Greater Rockford Airport Authority; managed by Natural Land Institute; access by permission only, phone (815) 964-6666.

HARLEM HILLS NATURE PRESERVE: East of Route 173 and south of Nimtz Road; one mile southwest of Rock Cut State Park -- 53-acre dry-mesic gravel hill prairie owned by the Department of Conservation; parking and trails.

SEARLS PARK PRAIRIE: Northwest edge of Rockford on Central Avenue -- 42 acres of wet to mesic prairie in southeast area of park owned by Rockford Park District; parking and trails.

LEDERMAN SCIENCE CENTER FIELD TRIP GUIDE

INTRODUCTION

The purpose of this guide is to furnish teachers with the types of activities their students would participate in if they were brought to the Lederman Science Center, at Fermilab, Batavia, Illinois. The activities presented could be adapted to any field trip site if it were not possible for students to experience the Lederman Science Center program.

This field trip consists of three segments: the prairie, the forest, and the bison herd. This trip should be a culminating experience following the presentation of the **Beneath The Ashes** unit of study. This guide is divided into three sections: Prairie Field Trip, Forest Field Trip, and Bison Herd Visit.

Rules for the Fermilab field trip are:

*Students must stay on trails.

*Students are not allowed to collect living or non-living material. Do not collect material for the classroom. All examinations of plants, animals, etc. must be done in the field

*Chaperones must assume responsibility for discipline and take an active role in enforcing good behavior.

Each student should have a clipboard with paper and something to draw or write with. The clipboard could be made from cardboard that has paper stapled to it.

PRAIRIE FIELD TRIP

INTRODUCTION:

Illinois is on the edge of what was once a giant grassland. To the east of Illinois was forest that extended all the way to the Atlantic Ocean. To the west was once 400,000 square miles of grassland. It went from Illinois west to the Rocky Mountains and from Canada south to the Gulf of Mexico.

Most of Illinois grasses were the tall variety, like big bluestem and switchgrass. These grasses grew up to ten feet tall and a person could easily get lost trying to walk through them. Many beautiful wildflowers grew alongside the grasses making the Illinois country a colorful place.

Today only one one- hundredth of one percent of Illinois tallgrass prairie is left. This field trip should help you picture what Illinois once looked like. It will review many of the things that you learned in the classroom.

PRAIRIE EXPERTS

If the class constructed a life-size prairie mural as one of the activities in **From Beneath the Ashes**, there should be individual students or small, cooperative groups of students who should be able to identify "their" plant. If this is the case, stop near a good example of the plant without pointing it out. Ask the cooperative group of "experts" for that plant if they can find it and show the class. With some luck this technique may also be used for some of the prairie animals, such as butterflies.

Several prairie plants deserve to be pointed out. Below is some additional background information on some typical tallgrass prairie plants. The instructor may wish to read this information to the class as the plant is found and identified:

BIG BLUESTEM GRASS. Another name for this grass is turkey foot grass. The seeds usually divide into three branches that resemble a bird's toes. The roots of this plant may go down to depths of twelve feet. The leaves have a blue-green color which becomes reddish after a frost. The Chippewa Indians made a medicine for stomach aches from this plant.

SWITCHGRASS. The loose seed head of this grass reminds some people of a Fourth of July sparkler with the seeds being the sparks flying off.

INDIAN GRASS. This is a very showy grass. It is sometimes used as a border to flower gardens. The seeds are a golden color that have many soft looking hairs in them.

COMPASS PLANT. The leaves of this plant are very large and usually have the thin edge of the leaf facing north and south. This way, they do not get the full force of the hot noon sun. This prevents the leaves from heating up and losing water. Conserving water in the dry prairie habitats is very important. Compass plant also has a very thick root that may grow ten feet or more into the soil. This assures a steady supply of water. The golden yellow blossoms bloom from June to early September.

PRAIRIE DOCK. The large leaves of prairie dock are rough, like sandpaper. The leaves at the base surround a tall leafless stalk that is from three to eight feet tall. The flowers are yellow. Its deep roots supply water to the leaves. As the water evaporates, it keeps the leaves cool. Pioneers often put these large, cool leaves under their hats for some relief from the heat of the treeless prairie. Prairie dock blooms from June to late September.

RATTLESNAKE MASTER. The long, stiff, narrow leaves of rattlesnake master have teeth and spikes along the edge. The plant resembles a desert plant called a yucca. The flowers do not look like a typical flower, They are compact, greenish-white, spiny globes. Rattlesnake master blooms from July to early September. It may have earned its name from the rattling sound that the dried seeds are said to make when the wind blows.

STIFF GOLDENROD. There are many kinds of goldenrod. You can tell if it is stiff goldenrod by gently patting the top of the plant. It will feel stiff. Goldenrods are often mistakenly blamed for causing hay fever. They do not; ragweed plant causes it. Ragweed flowers, however, are small, green, and not easily noticed. They both bloom about the same time so the showy Goldenrod flowers are often mistakenly blamed for causing hayfever.

PRAIRIE ARTWORK

Tell the students that later in the tour they will be given time to make a sketch of a plant, insect, or other natural prairie life that they really like. They should be thinking about the kind of thing that they might want to draw as they walk and do other activities.

When it is time to make the sketch, set limits of where they are allowed to go and how much time they will be allowed. For example, students must stay on the trail and must stay on the section of the trail that is limited to the area between two parent field trip helpers. The students will have five minutes to make their drawing so they must locate something to draw fairly quickly. (Watch progress of students and allow more time as needed).

After allowing time to draw, have the group join together again. Ask some students to describe or show what they have drawn. Students should carefully save their drawing because they will be using them to write something later.

POINT OF VIEW

Tell the students that in a little while they will each receive a hand lens to help them imagine that they are ants. Before handing out hand lenses, establish rules. For example, they must stay on the trail and view the plant from the trail. Parent helpers can be used to stand at the limits of how far the students may spread down the trail. Remind the students that they are not allowed to pick or break the plants. They are not to use the lens to burn anything and are not to look toward the sun with it.

The students should think about these ideas before starting the activity:

> You are an ant. What does the ground at the bottom of the plant look like? Look up at the plant that you are about to climb. What does it look like? As you use the hand lens to "climb" the stem, are there any obstacles that you need to get past? What would the plant feel like to the ant? If you were to meet another ant, how would you talk? What would you say? Do you meet

any other bugs or enemies? Pretend that the ant took a bite of the plant (You are not allowed to actually taste the plant. It may be harmful to you). What do you think it would taste like? What would it smell like? If there is a flower at the top of the plant, use the hand lens to get an ant's-eye view. What would it feel like to walk on a flower? What sounds would the ant hear while on the plant? What is the view from the top?

When it seems that most of the students have finished, have them rejoin as a group. You may wish to collect the hand lenses again to prevent distractions. Reread the suggested idea questions one at a time and ask for answers.

If you wish, ask the group for ideas of what the prairie might look like to a soaring hawk.

PRAIRIE POETRY

Have the students take out the drawing that they made. Tell them that they will be writing a type of poem called a cinquain about their drawing. The term cinquain is taken from French and Spanish words for five. A cinquain has five lines. The five lines do not rhyme, but each line has simple directions.

Have the students stay close enough to you to easily hear these directions, but to spread out on either side of you so that they will not be bothered by other students. They could sit on the path if that is the most comfortable. Read the instructions line by line, allowing the students time to write. They should write the poem on their drawing.

The first line of a cinquain is one or two words long. It is the title. For example, the title could be the name of a plant. If you don't know the real name, make up a good name that pioneer children may have used.

The second line of a cinquain is two to four words long describing the title. (You could ask for examples of adjectives. Color and size words are often given).

The third line of a cinquain is three to six words describing something that it does (action). These words often end in "i-n-g". (You could ask for examples like growing, waving, swaying, moving, etc.).

The fourth line of a cinquain is four to eight words long. This line either tells a feeling about what you drew or describes a job that it does in nature. (Feeling words might be happy, sad, lovely. Jobs might be making food, air, seeds, or attracting butterflies)

The fifth line of a cinquain is one or two words that restates the title.

You may wish to give an example:

RATTLESNAKE MASTER (1-2 word title)
ODD LOOKING, SHARP SPINES (2-4 word description)
GROWING, SWAYING, WAVING (3-6 word "i-n-g" action words)
FOOD FOR ANIMALS (3-6 word job in nature....or MAKES ME HAPPY 3-6 words for feeling)
SPIKE PLANT (1-2 word restated title)

After writing, regroup and ask for some students to share their poems by reading them aloud. Tell the students to carefully save their drawings and poems. They could be included as part of the prairie mural bulletin board at school or they could be put together as a book of prairie poems for all students in the class to have.

SETTLER IMAGINATION

Ask students to envision themselves as settlers crossing the prairie in a covered wagon. Ask them the following questions:

How would you feel? Consider the weather, your clothing, your thoughts, etc. Would you feel positive or negative? Remember, you've just left the comfort of your homes and all of your friends and relatives.

What would you do if you got sick? What would you do if your horse or oxen died?

What might you see as a child walking beside the wagon? What might you see if you were on the wagon seat?

Why do you think prairies were described as oceans of grass?

What might be some of your responsibilities or chores.? What would you do if you were separated from your wagon train?

Imagine seeing a huge wall of smoke and fire in the distance (a prairie fire). What could you do to survive (run towards the fire if it is a narrow wall of flame, because you could probably run through it; build a firebreak around your wagon; or do nothing and kiss your relatives goodbye!)?

PLANT INTERVIEW

The students are placed in pairs. One student chooses any prairie plant of his or her choice. The other student becomes the interviewer. This student could ask any logical questions and the other student would have to answer as best as possible. The students should then switch roles to allow each student the opportunity to be the plant or the interviewer.

TWENTY QUESTIONS

Each student should write the name of at least one plant or animal on a slip of paper. The teacher then draws one and the students must ask yes or no questions until the identify of the plant/animal has been determined. Do not allow the students to just randomly guess.

ANIMAL CHART

On a separate piece of paper draw a simple chart to keep track of all of the different animals which were seen on the field trip. This could be the teacher's task, or it could be delegated to a student. It would be interesting to keep track of the animals seen on the prairie and in the forest. Discuss why you saw the animals in each area. Are there specific reasons for where each animal was located?

PRAIRIE TONGUE TWISTERS

Tongue twisters were originally taught in school to improve student diction. The students could make up their own prairie tongue twisters and share them with the group. This could be done individually or in small groups. Example: A big brown bison bravely bounced across the bumpy big bluestem.

FOREST FIELD TRIP

Before entering the forest area: Ask the students to determine where the safest place would be for a rabbit to make its nest (forest or prairie). Ask the students what predators rabbits have in both the forest and prairie (hawks, coyotes = prairie; owls = forest). The safest place for rabbits would be on the border between the prairie and the forest. If they were chased by a coyote or hawk, they could seek refuge in the forest and if chased by an owl, they could seek shelter in the prairie. If you were hunting rabbits for food, where would you look? (on the edge of the forest between the two habitats)

Upon entering the forest area: As soon as all of the students have entered the forest, ask them to note differences in light, temperature, and moisture levels. It usually gets darker, cooler, and more moist than it was in the prairie. Ask for students to explain why that happens.

Any of the following activities would be appropriate but a star is placed next to those activities which could be considered first choices.

HOW OLD IS THIS LEAF?

*Ask the students to find a 1 year old, a 5 year old, and a 10 year old leaf. Remind them that they must be able to support the ages of the leaves which they find. It is the thinking process that is being stressed here and there really are not any right or wrong answers as long as they can be adequately explained. Hint: Newer leaves will be near the top and older leaves will be underneath the top layers and they will have gone through different stages of decomposition. A ten year old leaf will probably be soil.

WANTED: DEAD AND ALIVE

*Find a log in the process of decomposing. The teacher could grab a handful of the decaying log and pass some of it around to the students in your group. Ask them what they think it is (soil). Ask them to explain their answers. Other questions may include: How old do you think this tree is? How did it get here? What kinds of things are living around, under, in, or on top of the log?

SOIL COMPARISON: PRAIRIE/FOREST

*Which area has the richest soil, the prairie or the forest? Early settlers often cleared forests for their fields and found that the soil was not as rich or thick as they had hoped it would be. The prairie soil was far superior to the forest soil. Ask the students to give reasons why this is true. (The deep root structure, 10,000 years of soil buildup, and the returning of nutrients to the soil resulting from fire.).

LIFE ON AND AROUND A TREE

Point out the different types of life found around a specific tree. These might include; the tree itself, insects, squirrels, worms, moss, birds, bacteria, etc. You might also see signs of life without finding the specific plant or animal. Nuts may be buried under the soil or bacteria may be decaying matter and fertilizing the soil. If anything is turned over, please return it to its original state.

LEAF/SEED STUDY

Ask the students to find two identical leaves or seeds. (That is impossible). Ask the students to find two similar leaves or seeds. All things in nature are similar and all things are different. Ask them to explain how their leaves are similar and how they are different. Then request that they compare themselves to their leaves. How are they similar and/or different from their leaves.

HOW DID THESE TREES GET HERE?

How old is this forest? How many different types of trees are there here? You could expand this to include how the entire area, prairie and forest, got to be here. The intent of this activity is to get students to use higher level cognitive processes.

DESCRIBE A TREE/FOREST

Students will use adjectives and adverbs to describe the forest environment. They should be encouraged to use as many words as possible. Adjectives describe nouns, and adverbs describe verbs. (The large tree swayed briskly in the forest.) Descriptions could also be given about the forest in general (cool, dark, damp, scary etc.).

COMPASS STUDY

While you are in the forest, test these old Indian sayings with your compass (If you did not bring one, make sure that you know which direction is north).

A. Moss grows thickest on the north side of a tree.
B. Bark has more growth on the north side of a tree.
C. Pine tops have a tendency to tip and point in an easterly direction.
D. The north side of a hill is quieter, more moist, and has more moss. The south slope is noisier with dried leaves and twigs.

FOREST ORCHESTRA

Ask the students to be perfectly quiet for 30 seconds to a minute. Tell them to pick out any one nature sound which they find interesting. It will then be their responsibility to reproduce that sound for the entire group. Each student will reproduce their sound individually and then the entire group will work together to produce the student version of a forest orchestra.

A very important aspect to discovering the forest is to be flexible and aware of the specific needs of your group. If you see something that is interesting, investigate it. Disregard these plan sheets and discuss the deer you just saw or draw a sketch of the flower you want to research. Most importantly, have fun!

BISON HERD VISITATION

The purpose of this section is to provide teachers with the type of information their students will be receiving when they visit the Bison Herd at the Lederman Education Center at Fermilab in Batavia, Illinois. If a field trip to this facility is not possible, this information can be used as supplemental materials for students.

BISON BASICS

The ancestors of todays bison (Bison bison) are thought to have come to North America via the Bering Land Bridge. They settled in what is now Canada and the United States, with the greatest concentrations living in the western part of our country. They migrated in a wandering mode, as opposed to a pattern, much as they do today. The herds traveled at an average speed of two miles a day. Scattered groups of bison occupied Illinois in herd sizes ranging from 10 to 500. When the French trappers saw the bison, they called them "BOEUFS" (pronounced buhs), because they reminded the Frenchmen of their own cattle at home. In reality, NO buffalo live in North America, except in zoos. Buffalo make their native homes in Asia and Africa.

PHYSICAL CHARACTERISTICS

The bison is the largest land mammal in North America. There is a big difference between the size of a bull and a cow. The bull, usually twice the size of the cow, ranges in weight from 1,800 - 2,000 lbs. A bull can stand as high as 7 feet at the shoulders, whereas a cow may be 4 1/2 feet at the shoulders.

Bison have a "hump" made of muscle and bone. This helps support the animal's huge head. The hair on the bison's head and hump is 2-5 times thicker than on the rest of the body. The head is used for protection and as a weapon. Bison may charge an enemy with a head butt. The 2 inch thick skin, 4-5 inches of fur on the forehead and double layer of bone is needed to protect the animal's brain. There have been accounts of bullets being fired at the forehead of a bison only to ricochet off without injuring the animal. All this helps to give the bison its formidable appearance.

Another form of protection are the horns. These are not shed like a deer sheds its antlers. Bison horns are hollow and can grow to more than 2 feet long. Bison can use the horns to gouge an enemy (such as a hunter on a horse) or to pick up and toss a threatening wolf.

EATING HABITS

Bison thrived on the prairie because of the endless supply of grasses. However, since bison eat in full view of their predators (grizzly bears, wolves, coyotes and mountain lions) they quickly break off the grasses with their teeth and swallow them whole. Bison can do this because they are RUMINANTS . Ruminants have special stomachs of 3 or 4 sections to help them digest the whole pieces of grass by digesting them partially at first. They then bring up the partially digested food as CUD to be chewed, swallowed and digested again. Bison wait until they are in a safe place away from their predators to chew their cud in peace.

WALLOWING

Sometimes bison will fall to their knees, roll onto one side and kick dust over their bodies. This is called wallowing, and is useful in chasing off biting insects. Bison can't roll completely over like a dog because of their humps.

COMMUNICATION

In bison society, there is always a head bull who is allowed to mate freely. This is usually based on strength and size. A bull may challenge another by pawing the ground, snorting, shaking its horns, and roaring. If a head bull is challenged by a new bull, there will be a shoving match and eventual struggle. The wounded bull must relinquish to the stronger bull and leave the stronger bull to his territory. In general, only the fittest survive, so good breeding is essential.

This use of body language can be seen in other aspects of a bison's life. Even though a bison's tail is always in motion, it can also be used as a communication tool. An angry or frightened bison will have a wagging tail, and a relaxed bison will have a tail that's held downward slowly flicking bugs away.

Sounds are also important. It has been said that on a windless day, a bull's roar may be heard over a mile away. Other sounds a bison uses are sneezes and belches, especially when they play. Trapped or cornered bison will squeak or grind their teeth. Cows call their calves with soft grunts.

NATIVE AMERICAN RELATIONSHIP

Native Americans hunted the bison, yet also respected the animal. They only killed what they needed and thought they could use. Native Americans would use the entire animal, wasting nothing. For example, they ate all the meat; its fat became tallow and soap; tendons and muscles were used as thread and bowstrings; buffalo chips were used as fuel and as diaper powder.

SETTLERS

Settlers, on the other hand, killed the herds with no thought as to what they might do with the animal in general. In 1860, there were approximately 50 million bison on the Great Plains. Within 20 years, virtually all were wiped out. Only five hundred remained. The gun and the great masses of people heading west nearly caused the extinction of the bison. As the railroad was cutting across the U.S. bringing settlers to the west, they would stop the trains just to let the passengers shoot point blank at the grazing herds leaving the carcasses to rot. Thousands of bison were killed for their tongues alone which were considered a gourmet delicacy. It wasn't until the founding of national parks, wildlife preserves, and the America Bison Society that the bison were protected.

BISON TODAY

By 1990, there were about 100,000 bison in private herds and on reserves in the United States and Canada.