TALLGRASS PRAIRIE:

A MULTIDISCIPLINARY CURRICULUM

Description

The **Herbert Hoover National Historic Site** produced *The Tallgrass Prairie: A Multidisciplinary Curriculum* for school teachers and their classes.

Classes may visit the National Historic Site's reconstructed prairie as part of this learning experience.

The curriculum may be used in the classroom with some activities requiring access to the outdoors.

The author focused on subject matter and activities relevant to middle school students, but any grade can utilize the materials.

Objectives

Teachers and students will be prepared for a visit to the Herbert Hoover National Historic Site's 81 acre reconstructed prairie.

Students will become acquainted with Iowa's tallgrass prairie, its formation, and its demise.

Students will be introduced to ecological principals and concepts through study of the tallgrass prairie.

Students will recognize that environmental issues are multidisciplinary in scope.

Students will strengthen their skills in observation, analysis, and interpretation, both in the field and in the classroom.

Academics

Teachers will find that *Tallgrass Prairie: A Multidisciplinary Curriculum* provides opportunities for learning and activities in science, social studies, mathematics, language arts, and reading. It encourages observation, problem solving, and higher order thinking.

Middlemis-Brown, S. A. 1996. *Tallgrass Prairie: A Multidisciplinary Curriculum.* Herbert Hoover National Historic Site, National Park Service, West Branch, Iowa. pp. 32.

Herbert Hoover National Historic Site

National Park Service, Department of the Interior

Index Of Lessons

TALLGRASS PRAIRIE

Description

Read this introduction to packet before your visit

Age Group

intermediate and middle school

Academics

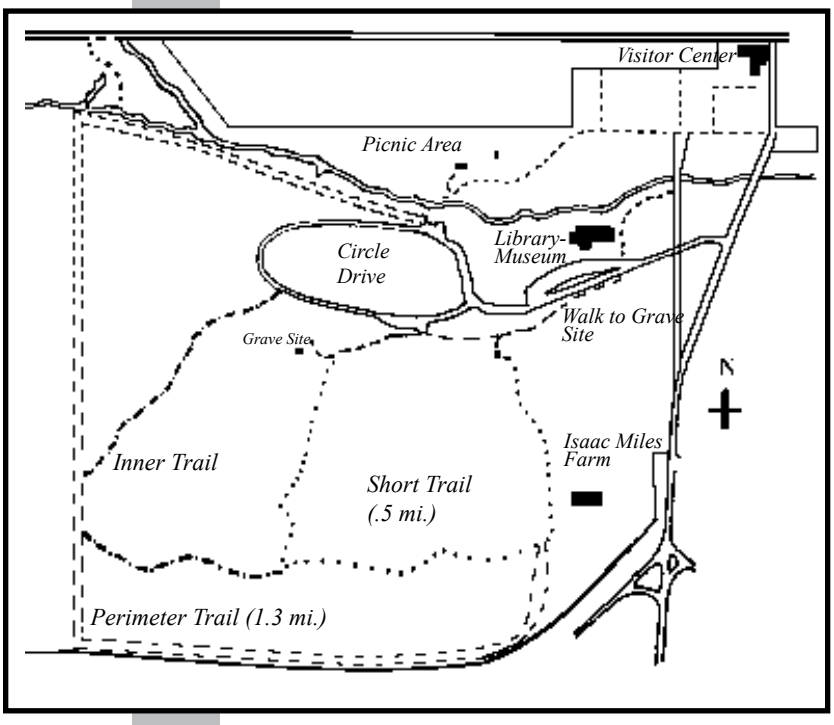
A multidisciplinary approach to studying environmental concepts including science, math, social studies, and language arts activities.

Introduction

The Herbert Hoover National Historic Site offers a glimpse into our cultural and natural history. A 81 acre reconstructed prairie represents the vast tallgrass prairie that once covered 85 percent of Iowa and much of our nation's heartland. Three trails, including the one-half mile Short Trail, guide you through a unique ecosystem. Signs interpret both the natural and cultural heritage. Wander among the grasses and experience the mood and character of this rare environment on the Inner Trail. Imagine how the Native American Indians depended on this land. Picture the changes that settlers brought to this rolling sea of grasses and wildflowers on the 1.3 mile Perimeter Trail.

This educational packet will give you a better look at the tallgrass prairie and its importance to Iowa. Please use this packet in conjunction with your visit to the Herbert Hoover National Historic Site. Using the material before your visit will prepare you for what you will see on your prairie walk. Using the packet after your visit will reinforce what the students have learned. Some of the activities may be used during your visit to the tallgrass prairie or at another natural site.

A Splendid Resource



The prairie trails at the Herbert Hoover NHS.

"The scenery of the prairie is striking and never fails to cause an exclamation of surprise . . . the flowers are beautiful; the absence of shade and . . . profusion of light produce a gaiety which animates the beholder." -- Judge Hall, 1839.

When Hall wrote those words, he described a landscape quite different from that of today. A vast sea of waving tall grasses and wildflowers covered nearly 30 million acres of Iowa prior to settlement in the 1800s.

Grasses grew to heights of six feet or more and bore colorful names, such as Indiangrass, ripgut (cordgrass), turkey foot (big bluestem), and switch grass. Roughly 70 species of grasses and more than 200 species of wildflowers grew in the deep soils of Iowa's tallgrass prairie.

Elk, bison, and prairie chickens loitered in the open expanses of prairie, while wolves hunted nearby. Backwaters and springs created wetlands that provided cranes, waterfowl, and other birds with nesting habitat. Woodlands provided refuge for black bears, cougar, and millions of the now extinct passenger pigeons.

Fewer than 3000 acres of original prairie survive as scattered remnants amidst the landscape of Iowa. This 81 acre reconstructed prairie is a small reminder of Iowa's lost natural heritage.

How can I help?

There are many agencies and organizations trying to protect and restore native prairie in Iowa. Prairies are being reconstructed on abandoned land also. These are highly significant attempts to conserve the prairie community before it is lost.

Planting native wildflowers and grasses encourages prairie dependent wildlife to use the area. Butterflies abound. Songbirds enjoy the native seed and insects. Even small gardens of native plants serve as a reminder of the lovely, lively prairie that once existed in Iowa.

Become an informed citizen. Learn all that you can about the tallgrass prairie. There are many materials available to you. By using this packet, you will become aware of some of the issues concerning tallgrass prairie. Use the resources from **Doing Your Homework** to find experts in particular issues. After you have become informed, become involved.

How To Use Lesson Cards

This packet consists of topic based lessons to study the prairie. It can be used with any intermediate or middle school grade as a stand-alone unit or in concert with a visit to the Herbert Hoover National Historic Site.

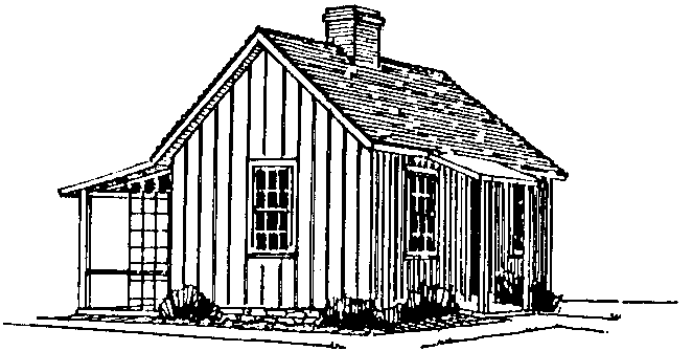
The concepts presented here are founded in science and math, flavored by social considerations, and expressed through language arts. The academic disciplines listed in the information column of each lesson relate specifically to the student activities presented at the end of the lesson. Just as finding solutions to our environmental problems is a multidisciplinary challenge, each activity uses multiple skills.

The lessons are written such that the teacher presents the background information (first and second pages of each lesson) and copies and distributes the activities (third and fourth pages). The background material is sufficient to completely prepare teachers for a trip to the prairie. Advanced students can use the packet as an independent study.

Materials needed for the activities are listed on the information bar at the beginning of each lesson. Notice that the materials are listed for one single copy of the project. You will need to figure quantities for your class.

Time required for each activity will vary by group, but the average time is listed on the information bar. Grade level recommendations relate to the student activities. Activities can be modified for other grade levels and abilities. Some activities can be done as demonstrations by the teacher for younger students.

Thoroughly review this packet before your visit to the prairie. The background material will prepare you for the visit and many of the activities can be done on site. Use *Take A Walk On The Wild Side* lesson during your visit.



Lesson Description

Take A Walk On The Wild Side

Walk along the Short Trail and interpret what you see. Signs and the supplemental material in this lesson will start you along the path of learning.

Read the text in this lesson along the trail. Each student will fill out the questions and checklist on the activity pages. Discussion is encouraged during the one hour investigation of the prairie.

Land Of Meadows

Learn about formation of the eastern Iowa landscape. Discover how climate and erosion became powerful forces etching the prairie landforms.

This lesson describes the formation of the Southern Iowa Drift Plain. Students make their own mini-drift plain using the power of water to cut rills and channels that form a familiar landscape.

The lesson can be taught in 10 minutes with the activity requiring an additional 20 minutes. Diagrams and a time line illustrate the geology of the Southern Iowa Drift Plain.

A Case For Diversity

Learn the importance of biological diversity. When we lose biological diversity, we lose genetic potential that may impact human economic potential or even survival.

Perform a simple matching activity in preparation for the diversity study and trip to the prairie. Quantify plant diversity in a natural setting and on the school athletic field using a dominance-diversity curve. Spend two half-hour sessions comparing community richness and dominance between two study plots.

Beautiful Land

The word "Iowa" possibly comes from a Native American Indian word meaning "beautiful land." Discover the richness of eastern Iowa's biological communities and some of the problems they face. Examine the impact of habitat loss and degradation on a biological community. Learn about the healing effects of wetlands.

The teacher may build a demonstration wetland, or students may build individual models to show the values of wetlands. Students will use a homework project to evaluate the number of toxic and hazardous substances used in their home. Tips on proper disposal of hazardous chemicals are included in this lesson.

Trailblazers: Conservation Heroes

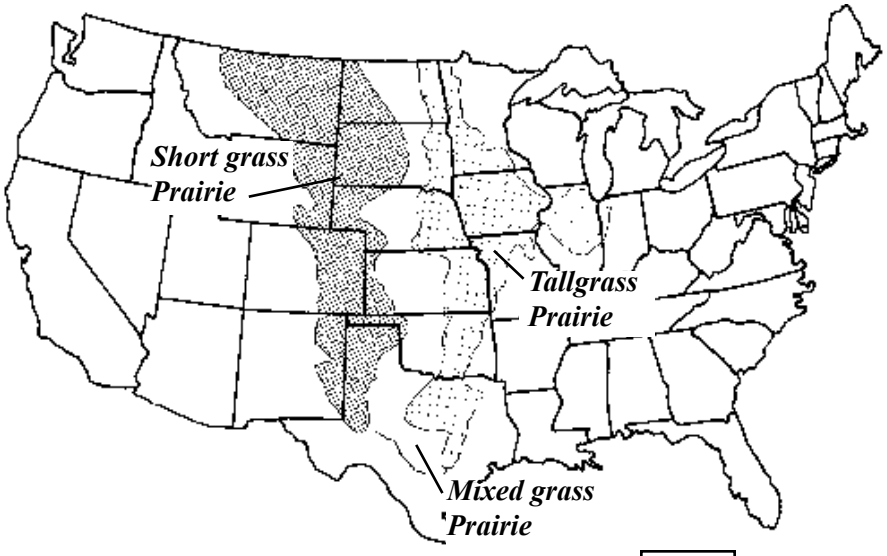
Discover the "age of conservation" and a few of the Iowans who influenced this period. Read brief synopses of contributions by Ada Hayden, William Hornaday, Aldo Leopold, Thomas Macbride, Althea Sherman, and Bohumil Shimek.

Take 15 to 20 minutes to complete a crossword puzzle that reinforces biographical information and general conservation concepts. Get "up close and personal" with feathered visitors in your own dooryard laboratory.

Prairie Management

Much of today's remnant prairie must be rigorously managed to be maintained. Learn how both public and private organizations manage, protect and restore the tallgrass prairie.

Read a recipe for a tallgrass prairie. Construct a Project WILD School Site. Student teams assess their neighborhood wildlife habitat by surveying areas during three 30 minute time periods.



Doing Your Homework

There is a wealth of information available. Ask for it! Step-by-step instructions teach students to research a topic and then ask properly for helpful materials.

The lesson includes a source list with the names, addresses, and telephone numbers of agencies.

General References

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67 Ways To Save The Animals. A. Sequoia. Harper Perennial. 1990.

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The Audubon Society Nature Guides - Wetlands and Prairies. 1987.

Creating Your Own Water Garden. C.B. Thomas. Storey Pub. Bull. A-124, Storey Communications. 1988.

Creating A Wildflower Meadow. H.W. Art. Gardenway Pub. Bull. A-102, Gardenway Pub. 1988.

The Green Consumer. Elkington, Hailes, & Makower. Penguin Books. 1990.

Hands on Nature: Information and Activities for Exploring the Environment With Children. J. Lingelbach. Vermont Institute of Natural Science. 1986.

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Iowa Association of Naturalists Biological Communities Series. Iowa State University Extension Service. (no year given)
Iowa's Biological Communities (IAN-201)
Iowa Prairies (IAN-203)
Iowa Waterways (IAN-205)
Iowa Wetlands (IAN-204)
Iowa Woodlands (IAN-202)

Iowa Association of Naturalists Environmental Issues Series. Iowa State University Extension Service. (no year given).
Iowa's Agricultural Problems and the Environment (IAN-101)
Iowa's Surface Water Pollution (IAN-102)
Habitat Loss in Iowa (IAN-105)
Endangered Species in Iowa (IAN-107)
and others

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Landscaping for Wildlife. C.L. Henderson. Minnesota Dept. of Nat. Res. 1987.

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Nature Scope. [Several volumes are appropriate.] National Wildlife Federation. 1987.

Our Nation's Wetlands: An Interagency Task Force Report. Council on Environmental Quality. 1978.

Pond and Brook. M.J. Caduto. 1990.

Prairies, Forests, and Wetlands: The Restoration of Natural Landscape Communities In Iowa. J.R. Thompson. 1992.

Prairie Has An Endless Sky. J. May. Creative Education. 1972.

Prairie Primer. Nichols & Entine. Wisconsin Cooperative Extension. 1978.

Project Wild. Western Regional Environmental Education Council, Inc. 1992

Tallgrass Prairies: The Inland Sea. P. Duncan. Lowell Press. 1978.

Where the Sky Began. J. Madson. Houghton Mifflin Company. 1982.

Wildflowers Of The Tallgrass Prairie: The Upper Midwest. S.T. Runkel & D.M. Roosa. Iowa State University Press. 1989.

Woodworking for Wildlife. C.L. Henderson. Minnesota Department of Nat. Res. 1992.

Take A Walk On The Wild Side

Description

Use this lesson as a teaching aid during your walk through the reconstructed prairie.

Grade levels

4th and up;
adaptable to younger grades

Materials

copy of pages 7 and 8 for each student;
pencils;
good walking shoes;
binoculars (optional);
desire to enjoy the outdoors.

Time

1 hour on the Short Trail; additional time may be spent on other trails or doing additional on-site activities

Academics

social studies
science

Introduction -- Use this lesson during your visit to the

Herbert Hoover National Historic Site

Welcome to the Herbert Hoover National Historic Site. This is the birthplace of Herbert Hoover, his childhood home, and much, much more. This site is administered by the National Park Service, U.S. Department of the Interior.

Park personnel or Library-Museum staff will meet you in accordance with the plans that you made for your visit. Refer to the map in the introduction to this packet (called *Tallgrass Prairie*). The prairie trail begins along the Gravesite Walk which starts across the road from the Library-Museum. Three trails wind through the prairie. The Short Trail has interpretive signs along the route and is .5 miles long. You will need about one hour to walk this trail and discuss the interpretive signs and features along the way. The Short Trail is recommended for student groups.

If you plan to do activities from this packet on site, please inform the park rangers and they will tell you where you may go off trail. Otherwise, please

- √ Stop to smell the fragrant flowers and enjoy their colors
- √ Read out loud the interpretive signs for the whole class to hear and use your questions and checklist on pages 7 and 8
- √ Take only photographs and memories when you leave the prairie
- √ Tread lightly and stay on the mowed trail
- √ Become interested in your natural heritage

". . . the fauna and flora of a country will be thought part of the national heritage as important as its art [and] language." -- E. O. Wilson, Biologist

Your Walk

Do we recognize the native prairie and all its inhabitants as a part of our national heritage? Or do we take our natural heritage for granted?

After reading each of the interpretive signs please read the additional information that follows. Remember to use your questions and checklist, also.

1. **Prairie Trail**
   Start your walk at this sign.
2. **Land Of Meadows**
   Close your eyes. Imagine the mighty mammoth, giant sloth, and reindeer roaming a frigid land. It appears bleak and barren. The cold winds seem to blow forever, carrying with them bits of soil and dust. The blast of icy bits tears at your face and reddens your skin.

Now the air feels warmer. The sun breaks through the cold. Instead of seeing wooly mammoths, the scene contains large trees on the horizon. At first the trees are the deep blue-green of spruce and fir. As the air warms more, the trees become the soft green of oaks and elms. The earth around you continues to warm and to dry.

The warming continues until you feel thirsty. The trees die, except near the streams and in protected areas. Something new grows in place of the trees. Tall grass spans the countryside. Among the grasses is a kaleidoscope of brilliant colors. Wildflowers bloom and dance in the wind. Hear the sounds of the prairie and block out the modern noises. [*pause*]

Suddenly, tongues of red and orange envelop the prairie leaving a char of black. Soon, black is replaced by bright green as tender plants emerge from roots buried in the soil.

A cloud comes over and you realize that the air is cooler now as a rain shower dampens your skin. The forests that were restricted to the stream banks force their way back out into the prairie. A zigzag line forms where forest and prairie meet. Sometimes it seems that forest will take over the land, but then the prairie holds tight to its position.

Open your eyes. This is a 12,500 year history of eastern Iowa.

3. Isaac Miles Farm

Hunting, fishing, harvesting . . . these are activities in which boys of West Branch participated. The hunting and fishing were ancient arts shared by Native American Indian children that were schooled here. Although these children's culture included successful farming techniques, they were not the techniques of the 1800s settlers.

Agriculture in Iowa changed with the invention of the moldboard plow. Family farms replaced the prairie. Later large farms bought out family farms. Within 150 years, the culture of Iowa evolved from that of hunter-gatherer-farmer to the row crop farmer.

4. Beautiful Land

Over 12,000 years ago, nomadic *Paleo* (old) Indians carrying spears and *atlatl* (spear thrower) followed the large ice-age animals across the plains. As the climate warmed their prey changed from the disappearing mammoth and sloth to bison, deer, and elk. The people became less nomadic as they entered into the *Archaic Period* of North American civilization. Archaic natives processed bison, made wickery, and collected seeds for garden plots of squash and grain.

Further life style changes ushered in the golden age of the *Woodland Period*. Native American Indians established trade routes that crossed the continent. They engaged in complex religious practises. The Effigy Mound people were part of the *Hopewell culture* of hunters, gatherers, craft specialists, and artisans of this period.

In Iowa, the *Oneota* carried out raids against their more settled, farming neighbors. These people gave rise to the historic tribes of *Souian languages* in the north. Along the Mississippi River, Sauk and Fox, "yellow earth people," emerged from their *Algonquin* origins. The *Ioway* people lived throughout eastern Iowa until the immigration of settlers in the 1800s.

5. Wildfire

"The prairies burning form some of the most beautiful scenes that are to be witnessed in this country, and also some of the most sublime. Over the elevated lands and prairie bluffs, where the grass is thin and short, the fire slowly creeps with a feeble flame, which one can easily step over . . . But there is yet another character of burning prairies . . . Where the grass is seven or eight feet high . . . the fire in these travels at an immense and frightful rate." -- George Catlin, 1841. Letters and Notes on the Manners, Customs, and Condition of the North American Indians, Vol. 2.

6. A New Era

Imagine crossing this prairie in a Conestoga wagon with your family. You would never have seen anything like this wide expanse of sky and unbroken horizon. What would you have thought about this land? Was it barren or was it bountiful?

7. Prairie Management

The native plants and animals of the prairies have evolved in the presence of fire and are well adapted to periodic burning. The main growing part of most prairie grasses is protected below the ground.

Fire burns the dead plant material on the ground. Too much dead material can lower the soil temperature, slowing normal bacterial activity and slowing plant growth. It also keeps rainfall away from plant roots. Fire is important to the health of the prairie.

8. Heritage Lost

Please complete the questions and checklist on pages 7 and 8 cooperatively.

Activity: Prairie Tour Questions and Checklist

What do you see?

This checklist is intended for use on the prairie tour. Middle school students should find the items listed on the checklist (back of page) and the answers to the following questions during their visit. This checklist may be modified for other grade levels. Teachers must be attentive to the students' observations, because answers to the questions may differ according to season or time of day. Not all checklist items will be located on each visit, but many or most should be observed by the students.

1. What is the predominant color on the prairie?

   What makes that color predominant?

   Would your answer be different in six months?

2. How tall is the tallgrass prairie? If it is not summer, use the height of standing old growth to estimate the height.

3. Give real or descriptive names to three different plants that you encounter.

4. What type of special school was located in West Branch? (see interpretive signs)

5. What natural element maintains the tallgrass prairie? How does it work? (see interpretive signs)

6. Are there any woody plants (bushes or trees) located on the prairie? Where are they?

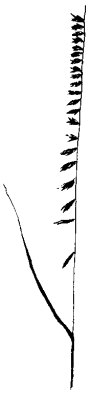
7. Where is the prairie the most lush or greenest? Why is it lush there?

8. What are the major *climate* factors that shape what lives on the prairie?

Student Checklist

ITEM TO LOCATE	X
A grass seed stem that looks like oats. (Side-oats grama)	
A bird sound that sounds like a long trill. (Grasshopper sparrow)	
A yellow flower: enter the number of petals it has in the check-off box.	
A grass with a blue or purple stem. (Big bluestem)	
A sign indicating that pets are allowed on the prairie only if they are leashed.	
A drainage area where rain water runs between two hills. (Rill)	
A bird with a light colored topside and dark underside. (Bobolink)	
Buzzing and musical trills from the ground. (Crickets and grasshoppers)	
A seed that relies on wind for dispersal.	
A seed that relies on an animal for dispersal.	
A primary producer. Can you give its common name?	
A low order (primary) consumer or evidence that one has visited the prairie (tracks, manure, bite marks.) Guess its name.	
A predator or evidence that one has visited the prairie. Name it.	
A piece of litter.	

Big bluestem or "turkey's foot"



Side-oats grama grass

Black-eyed Susan

Purple coneflower

Land Of Meadows

Description

The geologic history of this area shaped the tallgrass prairie.

Grade levels

7th through 12th;
Activity 1 is an excellent demonstration for younger students when made by the teacher or aid

Materials

diatomaceous earth (available at pool & garden supply stores);
1 pan (9" X 13" X 6");
1 large cup; soil;
blue food coloring;
spray bottle; and
bendable juice-box straws

Time

30 minutes

Academics

science
social studies

Introduction

The soils of east-central Iowa developed during glacial periods. The underlying bed of glacial till dates back to Pre-Illinoian time. While other sections of Iowa and areas to the north lay beneath glaciers, this area lay exposed to deposition and weathering. Layers of *loess* (windblown silt) formed the surface of the cold tundra. During interglacial periods, water gouged the surface of the land and left behind *alluvium* (stream carried debris).

The retreat of the last glaciers from Iowa, about 12,500 years ago, heralded the end of an ice age and the beginning of a new period of climatic change. Iowa's climate became warmer and drier. Some wildlife, such as the mammoth, giant sloth, llama, musk ox, and reindeer, disappeared from the region.

Forests of oak and elm replaced the ice-age forests of spruce and fir about 10,000 years ago. The warming and drying continued. The forest yielded to a community of plants better adapted to the climate. Eventually, stands of grass replaced groves of oak. The Iowa prairie was born.

A Typical Landscape

The visitor to the Herbert Hoover National Historic Site sees the typical Iowa landscape. Travelers observe this landscape along most of Interstate 80 in Iowa. Rolling hills with rills between them characterize this land. Water eroded the loess cutting the rills into the plain. The rills and ravines form a water drainage pattern that makes the distinguishing feature of the Southern Iowa Drift Plain.

The Southern Iowa Drift Plain

In order to understand what we see on the prairie, we must understand what lies beneath the prairie. Erosion gives us the key to the geology of this landscape.

Glaciers last visited this land during the Pre-Illinoian time, over 500,000 years ago. While other parts of Iowa and the northern plains were occasionally capped by a two mile thick layer of ice, this prairie lay exposed to episodes of erosion, weathering, and loess deposition.

The cold climate made this land an ice-free tundra throughout the latter glacial periods. Persistent winds, driven by the temperature contrasts between ice-covered and ice-free areas, brought layer upon layer of loess and fine sand to cover the landscape. Weathering and erosion removed and redeposited the landscape giving us the base for the landforms that we see today.

Rivers and streams placed the finishing touches on the landscape by carving through the layers of loess and glacial drift to form deep ravines. As streams changed course or disappeared, they left their own telltale trails of *alluvium* (stream carried debris). The water erosion over the millennia have given us a land surface that always slopes toward a drainage, leaving ridges of hills.

The birth of a prairie

The retreat of the last glaciers from the Midwest, about 12,500 years ago, heralded the end of the *Pleistocene Epoch* (ice age). The climatic factors that melted the glaciers worked upon the land. Iowa's climate became warmer and drier.

Climate changes impacted the plant and wildlife species inhabiting the land. *Paleo-Indians* (early nomadic people that crossed the Bering Strait) left their record on the land starting 11,500 years ago. Some wildlife, such as the mammoth, giant sloth, llama, musk ox, and caribou, disappeared from the region. Ice-age forests of spruce and fir gave way to forests of oak and elm. Eventually, stands of grass replaced groves of oak. The Iowa prairie was born.

The tallgrass prairie dominated Iowa's landscape from almost 8,000 years ago until it was broken by the plow. Iowa saw some change in climate about 3,000 years ago as temperatures cooled slightly and conditions became wetter. These changes resulted in the climate that we have today.

The cycle of seasons

Prairie plants conditioned and shaped their environment, just as their environment determined which plants survived the prairie. The constant cycle of seasons, accompanied by plant growth, death or dormancy, and wildfire, built rich top soil. Each summer, plants extracted minerals from ancient loess soil and used abundant sunshine to build their tissues. Plant tops died back each autumn. Fire, animals, and microorganisms facilitated the mixing of this organic material into the top soil. This cycle of growth, death, and decomposition resulted in deep, rich, *loamy* (mix of silt and organic material) soil. The quality of the continually amended soils helped grasses and *forbs* (non-woody wildflowers) maintain preeminence in the prairie landscape.

Our current climate conditions favor growth of forest. However, reforestation in Iowa was held in check by another powerful force -- **wildfire**.

Geology And Today

Our geological setting influences our native plant and animal community. Likewise, the geological history of this land has influenced people's use of it. The early people of this land discovered flint in bedrock ledges that had been carved away by rivers. They traveled the waterways and buried their dead overlooking the water. The Native American Indians hunted bison and elk that roamed the tallgrass prairie. The rivers along Iowa's borders served as roadways along which settlers penetrated the interior of this country.

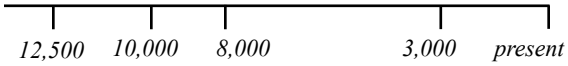
The Iowa Territory was established in 1838 and the land opened to immigration. Some pioneers saw the land as a series of obstacles. Marshlands, river crossings, steep hills, rock fields, and little shelter slowed these pioneers in the travel west. Other pioneers stopped here. At first, farmers cleared the woodlands to farm. Later they recognized that the soils and climate that produced the tallgrass prairie would also produce grain.

A rich heritage preserved

The Iowa state government established a Geological Survey in 1882. This agency's commission included surveying and reporting the geology of Iowa. These reports, published in an annual report series, contained not only information on the geology of Iowa, but extensive botanical notes on prairie and forest flora, wildlife sitings, meteorological records, and information on archaeological remains. It is from these well written documents that we have a picture of Iowa's natural heritage.

The Geological Survey is now a bureau within the Iowa Department of Natural Resources. Within the Department of Natural Resources are many other bureaus and divisions responsible for the conservation of Iowa's fish, wildlife, plant, forest, outdoor recreation, and scenic resources.

Development Of The Prairie



Years Ago

12,500 years ago - end of the ice age; climate begins a slow warming trend.

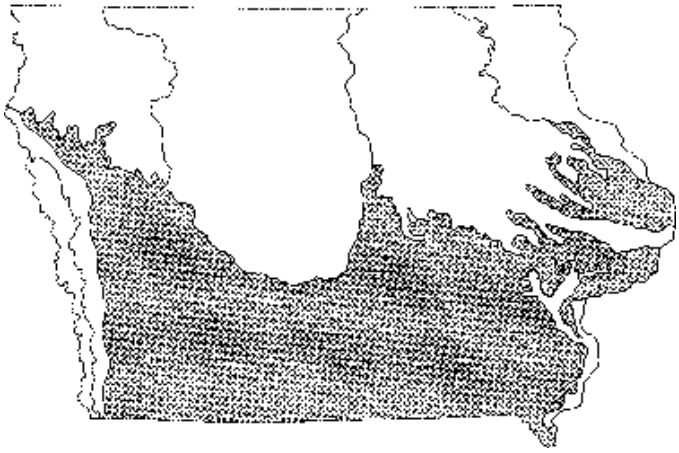
10,000 years ago - oak and elm replace spruce and fir forests as climate continues to warm; other ice age plants and animals give way to temperate species.

8,000 years ago - grasslands dominate; climate is warm and dry promoting growth of grasses and wildflowers while suppressing trees.

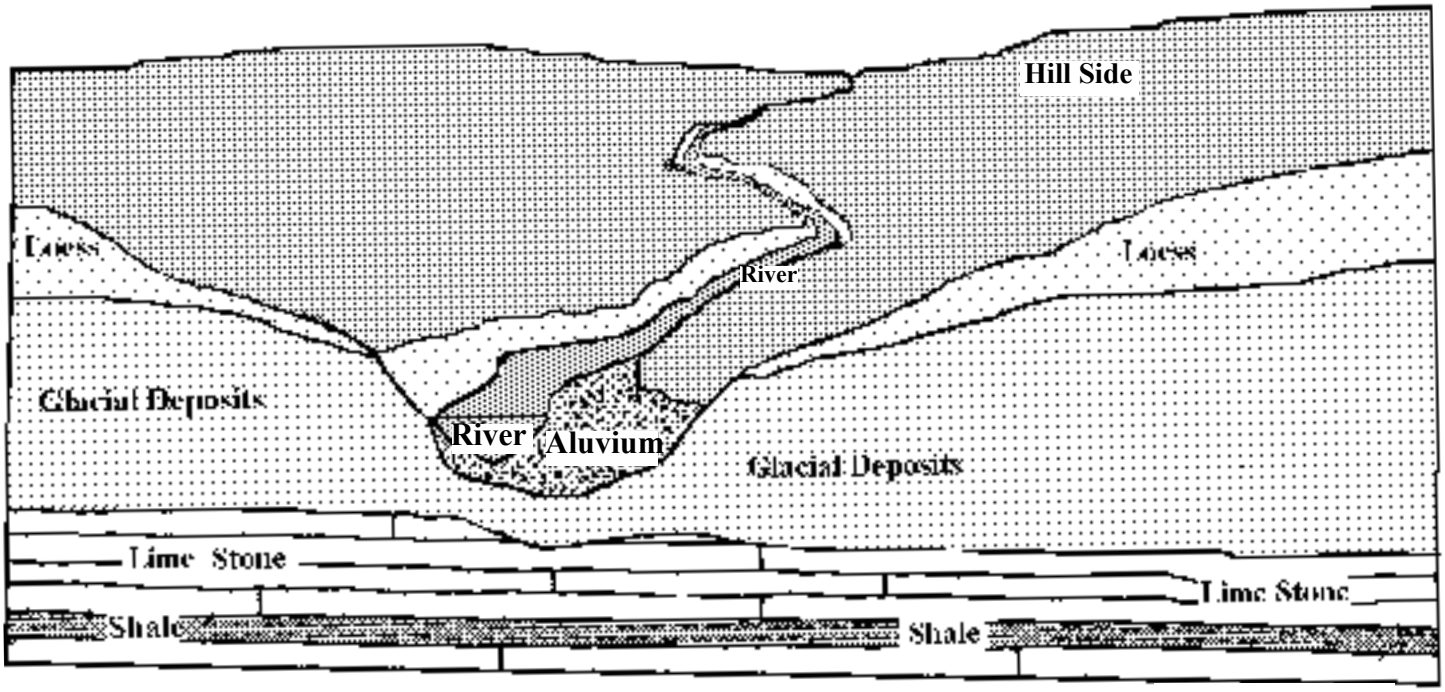
3,000 years ago - climate cools slightly, some forest vegetation returns; tallgrass prairie dominates the landscape because of a powerful element -- **WILDFIRE.**

The Southern Iowa Drift Plain

The Southern Iowa Drift Plain runs the extent of southern Iowa and sends fingerlike projections into eastern Iowa. Deeply cut rills and rolling hills characterize this ancient weathered landscape.



A Cross-sectional View Of The Southern Iowa Drift Plain



S.A. Middlemis-Brown,1996

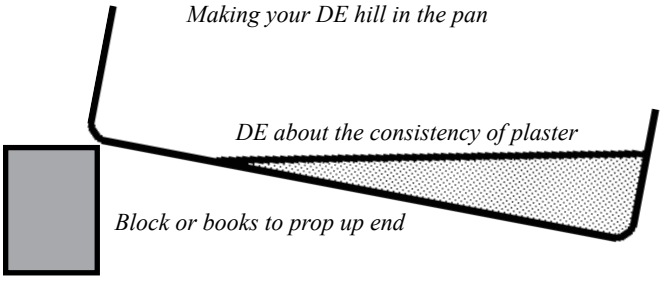
Activity 1: Carving Hills!

Complete the following activity to see how water can carve a landscape. You need the following materials:

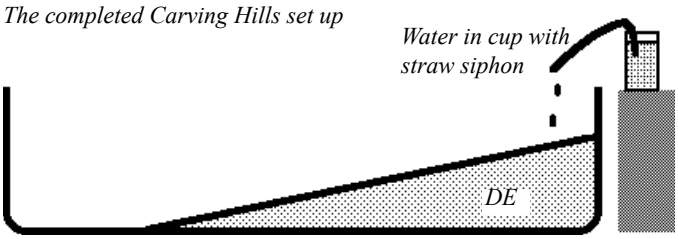
diatomaceous earth (available at pool supply stores);
1 pan (approximately 9" X 13" X 6");
1 large cup;
blue food coloring;
bendable juice box straws; and
spray bottle.

1. Mix equal parts of diatomaceous earth (DE - a sand-like material used in gardening and in pool filters) and water to half fill the pan (DE is messy, but nontoxic). Mix will be the consistency of plaster of Paris. Varying the amount of water results in different erosion patterns (dry mixes erode more slowly). Adjust quantities for the size pan you use.

2. Prop up one end of the pan about 6 to 9 inches. Push and jiggle the DE to the lower end to make a sloped surface within the pan. Part of the pan will be bare. Let set a few minutes at an angle.



Lower the pan to a flat position. The mix should hold the slope. (If it does not hold the slope, it is too wet.



Try to pour out excess water or mix in more DE.)

3. Fill the cup with blue-tinted water. Put the cup on a block next to the pan, so that its top is several inches above the pan's top. Create a siphon tube with the small bendable juice-pack straw. Start the siphon. Filling the straw with water, holding both tips shut, positioning the short end into the cup of water, and releasing both tips should give you a good siphon. Remember that the drain end of the siphon must be lower than the siphon end. Bubbles in the siphon will stop its function. Adjust the water flow rate by tipping the straw so that water drips out (2-3 drops per second). A bent paper clip will hold the siphon in place. Add water to the cup as needed.

4. Let the water run its course. You will see it form a pond, then flow into one or more rivers. Depending on the landscape, you may have waterfalls, rapids, underground rivers, and deltas. Alter the rate of water flow.

5. Use the spray bottle and vigorously spray the landscape. How does your rainstorm contribute to the landforms?

6. At certain time intervals, stop the siphon and draw your landscape. Move the siphon and restart it. A new river should result. This new river may meet the old river. Do you start to see rounded hills form divided by swales, rills, and ravines? This is how the hills of the Southern Iowa Drift Plain formed.

7. The DE can be cleaned and reused. Pour off the water and air dry the DE. Drips of DE may be easily swept up once they are dry. A small amount of DE can go down the drain.

Activity 1: follow-up

This experiment is never the same twice. Try it again using a different consistency of DE, or add small stones on the land. Observe the variety of patterns the water can shape.

What happened when you altered the rate of flow for the water? How does water erode the earth and carry it downstream?

What happened when you added rocks onto the land? What would happen if you mixed a layer of pebbles into the model? Would that mimic the effect of the glacial till that underlies the loess? How? Be prepared to explain the diagram of the cross-section of the Southern Iowa Drift Plain and how your model dynamically illustrates the forces that created this landform.

Relate the model to the land around your home and the Herbert Hoover National Historic Site. Are there similarities? How does this landscape differ from some others that you may have seen in your travels in Iowa and in other states?

A Case For Diversity

Description

Loss of an ecosystem results in loss of society's ability to tap into its natural resources.

Grade levels

Activity 1: 4th and up
Activity 2: 4th and up with an extension for 7th through 12th

Materials

measuring tape, string, 4 stakes; Hula hoop or Frisbee; pencil and paper; field guide to herbaceous plants

Time

2 - 30 minute periods

Academics

science
social studies
math

Introduction

Native prairie is an association of many interdependent plants and animals. The prairie accommodates natural changes and responds favorably as a community because of its *biological diversity.*

No creature exists in a vacuum. All living things are part of complex, delicately balanced networks called ecosystems. Ecosystems are fragile. The extinction of one plant species within an ecosystem can lead to the extinction of up to 30 other plant and animal species. Lost with those species is the biological diversity that they represent.

Each living thing contains a unique reservoir of genetic material that cannot be retrieved or duplicated if lost. Scientists have investigated a small fraction of the world's species and their benefits to people. Medical and agricultural researchers depend on the rich biological diversity of natural ecosystems to provide pharmaceuticals and foods for our future.

We are experiencing unprecedented loss of our biological heritage. We have a responsibility to future generations in maintaining ecosystems such as the prairie. We must all help to protect the remnants of our dwindling genetic resources.

Changes In Iowa

Iowa's prairies, woodlands, and wetlands are disappearing! Over the last 150 years, settlers changed the natural fabric of Iowa's landscape. Prairies suffered greater destruction than any other Iowa landscape feature for two simple reasons

- √ they covered more than 80 percent of Iowa, and
- √ they are easily converted into superb farmland.

We find prairie remnants along roadsides and railroad right-of-ways, in old cemeteries, and other precious, but forgotten locations. Concerned citizens and agencies have reconstructed some prairies, such as at the Herbert Hoover National Historic Site. Native prairie plants occasionally reclaim abandoned fields, particularly when the fields are dry and exposed to strong wind.

The extraordinary tallgrass prairie

Settlers moving west encountered the tallgrass prairie as they reached the plains. This prairie covered nearly all of Iowa and reached from Canada into Texas along the eastern Great Plains. The tall grasses often reached 12 feet in height and included

- √ big bluestem (#1),
- √ cordgrass (#2),
- √ Indian grass (#3),
- √ switchgrass (#4),
- √ side oats (#5),
- √ little bluestem,
- √ tall dropseed, and
- √ muhly grass.

Please note that the first five grasses are listed in their order of appearance in the student matching activity.

Flowers, flowers everywhere!

The tallgrass prairie is more than just grasses. Within the sea of waving grasses lives a showy array of colorful wildflowers. These flowers bloom from April until October in purples, yellows, whites, reds, and blues.

Unlike most wind pollinated grasses, many of these flowers depend on prairie insects for pollination. Birds and other prairie animals disperse their seeds. Some seeds developed sophisticated structures for wind dispersal. These flowers need the prairie with its strong winds, many insects, dry conditions, occasional fires, fertile soils, abundant wildlife, and absence of trees to survive.

Some common prairie plants include

√ black-eyed Susan (#6),
√ coneflower (#7),
√ blazingstar (#8),
√ swamp milkweed,
√ compass plant,
√ lead plant, and
√ prairie sage.

Please note that the first three wildflowers are listed in their order of appearance in the student matching activity.

All Creatures Great And Small

Prairie plants conspicuously identified this ecosystem, but the prairie community included much more than plants. Specially adapted animals lived on the prairie. Large mammals, such as bison, pronghorn, wapiti (called elk), and wolves, once roamed Iowa. Now only the whitetail deer and coyote remain.

Pocket gophers, ground squirrels, mice, and even badgers take advantage of underground shelter. These animals adapted to the changes on the prairie and found homes along road sides, in peoples yards, and in pastures. Secretive foxes have outfoxed human destruction of the prairie and changed their lifestyle to survive.

Some of the smallest animals, such as butterflies, moths, bees, and other uniquely adapted insects, depend on the prairie. In fact, insects are more numerous in prairies than in any other North American ecosystem. Sometimes, an insect species depends on a specific host plant for survival. These small creatures are the cornerstone of the prairie food chain.

Insects and seeds provide food for prairie birds. Meadowlarks, bluebirds, bobolinks, dickcissels, and grasshopper sparrows enjoy the abundanceof food. Kestrels, northern harriers, and redtail hawks fly the open skies above the waving grasses in search of prey.

Many prairie animals vanished as prairie vanished. Some of them, such as the bison and the wolf, were exterminated through market hunting and predator control. A few of these species have been reintroduced from places where remnant populations survived. Some have not been so lucky. The plains wolf, a lean, lanky cousin of the timber wolf, is extinct; destroyed by myths, guns, poisons, and traps. It will never again roam the open prairie.

Habitat fragmentation

Many prairie animals will never again wander freely in Iowa, nor will they survive in isolated prairie remnants without human help. Human intrusion fragmented prairie habitat on which these animals depend. Fences, cities, and roads cut tracts of land. Acres of residential and farm land separate prairie remnants.

Large mammal species require vast, continuous prairie where they can move freely to feed. Insects and some plant species depend on recolonizing from neighboring areas. Without contiguous prairie, these strategies for survival cannot work.

Saving the prairie

Although Iowa lost most of its prairie, we can regain part of this natural heritage. The U.S. Department of Agriculture and U.S. Department of Interior offer several programs that encourage landowners to return part of their land to a natural state.

The Endangered Species Act (ESA) protects rare species in danger of extinction. It ensures that federally funded activities will not destroy their habitat. The ESA has been called "landmark conservation legislation" and has played a role in numerous endangered species recoveries.

A commitment from citizens is the most important factor for prairie restoration. If every landowner devoted a part of his or her land to native plants, and if every community designated a natural area, it would result in prairie habitat corridors. Reducing pesticide use, protecting water resources, and curbing urban sprawl contribute to conserving the natural landscape.

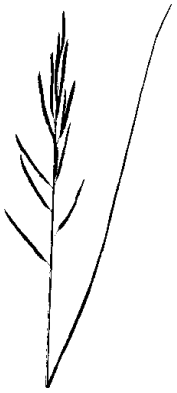
A prairie is truly a field of dreams where, "If you build it, they will come." A field of beautiful native prairie plants will encourage prairie wildlife to set up housekeeping. When visitors exclaim about our native tallgrass prairie, "Is this heaven?" we can reply, "No, it's Iowa!"

Activity 1: Match the Thatch

Choose the name of the prairie plant from the list provided and write it on the line.
(Answers are listed on pages 1 and 2 of the lesson.)

1. _____

Named for its long purplish-blue stem, also called turkey's foot.



2. _____

Its long whip-like blades supposedly cut bellies of livestock.

3. _____

It was named for the early inhabitants of the plains.

4. _____

This grass slapped pioneers' legs with tiny spikes, making them sore.

5. _____

This grass has tiny oat-like seeds and is an excellent hay for livestock.

6. _____

This flower looks like the dark eye in a lovely girl's face.

7. _____

The shape of these flowers resembles the cone of a rocket.

8. _____

The top two-thirds of this plant is a blazing spike of rose-purple flowers.

Grasses:
switch grass
cord grass (ripgut)
big bluestem
side oats grama grass
Indian grass

Flowers:
coneflower
blazingstar
black-eyed Susan

An extra challenge: Look up each of these plants in a field guide or botany book. Find one use or interesting fact for each plant and be able to describe the plant from memory.

Fun Facts

√ Scientists estimate that nearly 80,000 species of edible plants exist. Only 20 of those plants produce 90 percent of the world's food. Plant collectors look for wild strains of common crops to create sturdy new hybrids that resist disease and pests. An example is a wild prairie maize gene which produced a corn hybrid that increased farm income by an estimated $1.6 million.

√ The extinction of one plant species can cause the extinction of up to 30 other plant and animal species.

Activity 2: Diversity Plots

Compare plant diversity on two sites. One site should be your school play or athletic field. The other site should be natural, such as a plot at the Herbert Hoover National Historic Site prairie.

You will need:

a Hula hoop (1) OR Frisbee, tape measure, 4 stakes, and 4 meters of string (2);
paper and pencil;
field guide to prairie plants (optional).

Establish your sites in one of two ways:

(1) If you have a Hula hoop, stand at the edge of your study area and toss the Hula hoop into the area. The ground within the Hula hoop is your study plot. OR

(2) Toss a Frisbee into the study area. Measure out a one square meter plot around the Frisbee with the Frisbee in the center. That way you aren't choosing a spot that looks "good" to you. Stake out your meter square plot and run the string along the perimeter tying it from stake to stake.

Get down on hands and knees to examine your plot. Count the **number of distinctly different plant types** on the plot. Identify plants if you can or give them your own descriptive names. Draw pictures of some plants, particularly those you have not identified. Keep a tally of the **number of individuals of each plant type**.

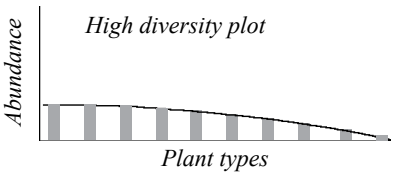
Repeat the process on the other study site and compare the results. One method of comparing diversity of study sites is by using a dominance-diversity curve. For each plot, go through the following process:

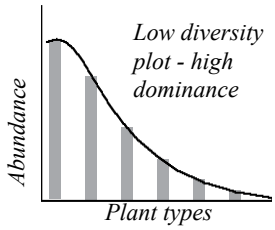
1. Count the number of plants of each type. Put the number of each type in a table with the plant's name.
2. Order the plants from the most to least abundant.
3. Make a bar chart. Put the name of each plant on the horizontal line in the order of most to least. On the vertical line, put plant abundance.

Prairie Plot	
little bluestem	*22*
fuzzy spoon leaf	*15*
yellow little sunflower	*7*
red clover	*5*
etc.	

4. Draw and color the bars on the chart. Draw a curve connecting the tops of the bars.

The charts show *richness* and *species dominance*. For example, the more plant names listed, the *richer* the community. The curve drawn on top of the bars is flat. In contrast, a community with a great abundance of one plant type has a *dominance* of that plant. The curve resulting from connecting the bars on the chart will look like a steep hill.





This community structure lacks richness.

A community with *high richness* (lots of different plants) and *low dominance* (not one or two "boss" plants) has high *biological diversity*. A community with low richness and high dominance has low diversity.

Which community is more stable, high diversity or low diversity? Why? Which community adjusts to change? Why?

Higher grade extension

Calculate the relative abundance of each plant type instead of actual abundance. Use the equation

$$\frac{\textbf{number of individuals of one type}}{\textbf{total number of plants}} \times 100 = \textbf{\% relative abundance of each plant type}$$

For example, you find 14 dandelions in a total of 200 plants. Therefore, 14 individuals divided by 200 total plants, multiplied by 100, equals 7% relative abundance.

Now do this for all plant types within the plot. Make your bar chart and order the plants from greatest relative abundance to least relative abundance. Continue by charting relative abundances for each plant type. This is the best quantitative method to compare two sites.

Which plant community supports a more diverse animal community? Which plant community supports a larger *biomass* (amount of living tissue) of animals? Think carefully about this last question and remember that the animal community includes insects, annelids, nematodes, rodents, reptiles, amphibians, etc.

BEAUTIFUL LAND

Description

The face of a beautiful land has changed due to human influence.

Grade levels

Activity 1: 5th grade & up OR teacher demonstration for younger students.
Activity 2: 4th grade & up

Materials

Activity 1: 9" X 13" pan, 2 lb. plasticine clay, odds and ends to create a landscape, water, sponge (9" X 3");
Activity 2: colored circle stickers (red, orange, blue and green);

Time

Activity 1: 30 minutes to build model.
Activity 2: homework assignment of 30 minutes.

Academics

science

Introduction

The word "Iowa" possibly comes from a Native American word meaning "beautiful land." Some of this beauty has been lost with the change in landscape and the degradation of plant and wildlife habitat. Some beauty has been lost with the extinction of species, draining of wetlands, and cutting of ancient forests.

It is unfair to say that people should not impact the environment. Every species impacts its environment. The problem is that society is exacting change on the environment at an unprecedented rate. As human populations expand and intensify their use of the land, species of wild things and their habitats disappear. With them go not only the beauty and variety of life created over millions of years, but also environmental stability and untold potential for supplying human needs.

A New Force

Many forces work to shape the face of Earth. They include

- √ plate tectonics lifting 14 billion tons of rock per year
- √ volcanoes raising 30 billion tons of terrain annually
- √ rivers carrying 14 billion tons of sediment
- √ grazing animals trampling soils, creating wallows, and causing erosion
- √ countless insects churning, chewing, and chiseling through soil.

Human forces

Now there is a new force in town. It is called *anthropogenic* (human caused) *geomorphology* (geological shaping). Roger L. Hooke of the University of Minnesota estimates that humans move 40 billion tons of dirt and stone each year [Science News, Vol.146, p. 432]. This rate outstrips natural geologic processes that sculpted the Earth during the prior 4.5 billion years.

Bert's fishing hole

Many visitors to the Hoover birthplace cottage hear how young Bert learned to fish in the west branch of the Wapsinonoc River. Some of those visitors look at the little stream incredulously and question where the fish are today. Many assume that there must have been more rain in the 1880s than now.

The west branch of the Wapsinonoc is a typical example of the effects of anthropogenic geomorphology. Stream flow measurements on major rivers in the 1870s and 1880s were similar to the values today. There was a period of drought in the early 1900s when stream flow declined. During the low stream flow years, people laid claim to many areas that once belonged to rivers.

Many streams of eastern Iowa have been *channelized* (forced into straight, narrow channels). The meanders were filled and dams or levees built to contain the stream. Flood control structures forced streams into unnatural paths. Towns, industry, and farm fields pressed against the banks of the rivers. Natural vegetation made way for human development and expansion.

Wetlands once dotted the landscape. Settlers replaced wetlands with croplands,

roads, towns, and flood control structures. Even before the prairie sod was broken by the steel moldboard plow, wetland and *riparian* (next to water) forests were cut for lumber and to make room for people and crops.

Change in land use and alteration of stream beds have resulted in erosion and subsequent siltation in Iowa's rivers. Draining wetlands and removing meanders and vegetation has reduced water retention capability in the soil. The loss of water retention capability has caused streams to be flashy -- a mere trickle most of the time, but a torrent after large rain storms. Removal of riparian forests has reduced the cover in the streams, the hiding places for animals, and an important food source for fish.

The west branch of the Wapsinonoc River is a very different stream than it was in the 1880s when Bert fished it. The complex stream community is gone and water quality is deteriorated.

A hard lesson to learn

In recent years, scientists have come to realize that streams meander and wetlands exist for a reason. The natural forces pull waters through a path of least resistance. Water will always seek this natural path. Humans have never successfully engineered a new path of least resistance that is superior to the natural one.

Wetlands are valuable flood control structures along streams. They act as mighty sponges holding back flood waters and slowly releasing them during dry periods. Wetlands filter the water that enters them, releasing cleaner water to the stream or to ground water.

Wetlands are one of the most biologically productive habitats on Earth. They are nursery areas for amphibians, fish, birds, particularly waterfowl, and mammals. Once about 7.6 million acres of prairie-marsh habitat existed in northcentral and northwestern Iowa. Now only 26,000 acres remain. Eastern Iowa has seen similar reduction in riparian forested wetland habitat.

On The Edge

Eastern Iowa was a patchwork of prairie and forest cut by ribbons of water. Forests were an important component of the landscape here. The landscape diversity within this region contributed to habitat diversity. It was an area where the eco-regions met in our country, or in other words, where east met west.

A rich environment

Trees such as cottonwood, sycamore, silver maple, and black willow line the stream banks that intrude into the prairie like fingers of a hand. Duckweed and water cress grow at the water's surface. Fish, aquatic insects, and algae grow within the water.

An ecotone is a rich environment where inhabitants of more than one community overlap their living space. Ecotones develop where biological communities meet. More *niches* (community roles) occur in an ecotone. Predators may choose from a larger smorgasbord of prey. For instance, the hungry fox may choose from meadow voles, grasshoppers, crayfish, minnows, ground nesting birds, muskrats, etc. This creates a more stable food web and more biologically diverse communities.

A dangerous home

"Virtually all Iowa water is affected to some degree by nutrient runoff . . . Iowa spreads more pesticides on its land than any other state in the nation . . . the DNR found pesticide impact in 94 percent of Iowa's streams and rivers. . . . nearly three-quarters of all Iowans consume low levels of pesticides in their drinking water," according to the Iowa Association of Naturalists (*Iowa's Agricultural Practices and the Environment*, pages 7 and 8).

As water quality is degraded, the quality of life is degraded for wildlife and for humans. We are inextricably connected to our environment just as the song bird, the duck, or the deer.

Farmers are concerned about the environment, too. They are trained and licensed to use pesticides. Many of these pesticides breakdown naturally in the soil, and if weather conditions are correct, never make it into the waterways.

Concern and improvement in fertilizer and pesticide use has not been shared by private home owners. There are over 80 million households in the United States and each one impacts the environment. Chemical fertilizers and pesticides are dumped on lawns, often whether they are needed or not. Household cleaners, solvents, lubricants, and other toxic chemicals are often misused and disposed of improperly.

Every Iowan has a responsibility to the environment. When we point our finger at industry or agriculture for its share in our pollution problems, we point three more fingers right back at ourselves!

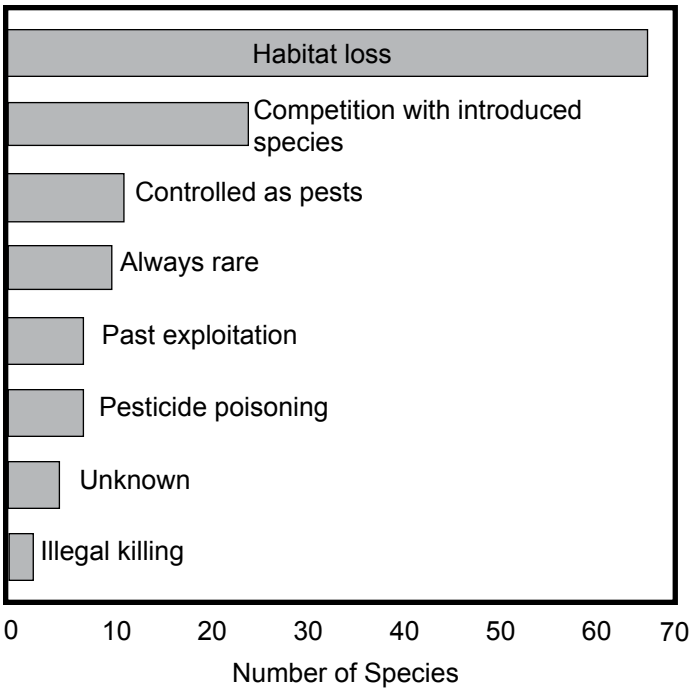
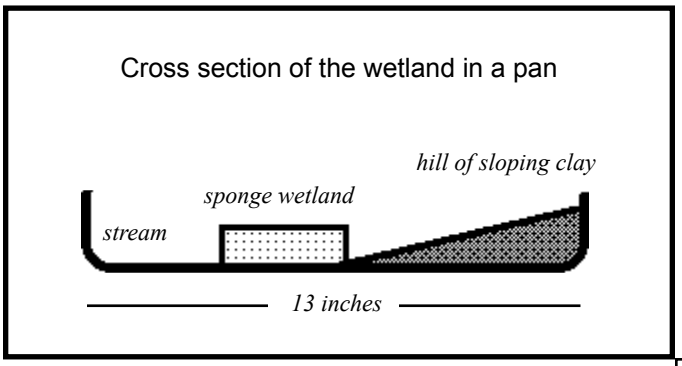


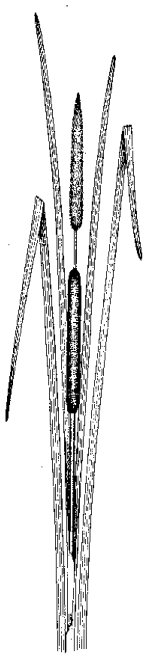
Figure 1: An analysis of 100 wildlife species and the reasons they were designated threatened or endangered. These data show typical reasons for wildlife population decline. Regulated sport hunting never resulted in an endangered or threatened species listing under the provisions of the Endangered Species Act.

Activity 1: A Wetland In A Pan

1. In a 9" x 13" pan or similar container, spread plasticine clay sloping it from near the pan's top edge to the half way point in the pan to form a "hill". You may embed a piece of styrofoam or other spacer to reduce the amount of clay needed. Smooth the clay along the edges to make a seal with the pan.
2. Cut a 9" x 3" piece of sponge to fit snugly in bottom of pan. This is your "wetland" or *riparian* (next to water) strip. Lay the sponge at the bottom of the sloped clay, tight against the foot of your hill. Make sure that the sponge fits snugly against the clay and the pan sides. The open quarter of the pan is the "stream."



3. Now, demonstrate the values of your wetland.
   a. What will happen to rainwater falling on the slope (1) with the wetland in place, and (2) without the wetland in place? Sprinkle about a half cup of water on the model hill. Now remove the wetland and repeat the "rainfall." Did the rate of water flow into the stream change when the wetland was removed? Why? What happens downstream when wetlands are destroyed?



   b. Clear the excess water from the model and squeeze the wetland. Place the wetland at the bottom of the slope. Sprinkle a little potting soil onto the slope and let the "rain" fall. What happened to the soil? Is the stream still clean? Remove the excess soil and water. Remove the wetland. Sprinkle soil onto the slope and let the "rain" fall again. Where is the soil now? Is the stream still clean? What happens to bare soil when it rains on open fields? Again, pour out the excess water and soil. Clean all of the soil out of the model and wetland.

   The wetland in your model should act much as a real wetland by slowing the rate of storm water runoff into a waterway. It should also filter suspended soil particles out of the water. These soil particles, or suspended solids, are the result of water erosion, and they carry with them chemicals and excess nutrients. Solids settle out of the water and smother plants and animals that live on the stream bottom.

   Now you are ready to customize your wetland model. Using moss, twigs, pine needles, pine cones, model animals, "Monopoly" houses, and other props, decorate your model in a realistic way. The model plants and animals show that wetlands are important habitat.

   You are ready to take your model on the road! Show friends, neighbors, and parents how important wetlands are to people and the welfare of Iowa's streams and rivers.

DANGER! There's a Toxic Dump Under the Sink!

Examples of hazardous substances:

Kitchen	cleaners for oven, drain, floor; lye
Bathroom	cleaners for tub and toilet; medicine, nail polish & remover, disinfectants, hair relaxers, drugs and antibiotics
Garage	used motor oil, antifreeze, car wax, battery acid, engine degreaser
Workshop	paint, thinner, varnish, glue, rust remover, stripper
Garden	pesticide, weed killer, fertilizer, rat poison
Other	furniture polish, batteries, ionizing smoke detectors, mercury, flea powder, rug cleaner, chlorine bleach, moth balls, shoe dye, shampoo for head lice

Use chemical products wisely

Avoid using toxic chemicals. These chemicals pose a significant risk to fish, wildlife, and humans. If you must use them, follow these guidelines:

- √ Use the least hazardous product available. Buy only what you need.
- √ Read the label. Know what you are buying, how to use it, and its potential hazards.
- √ Store products in original containers so you can refer to the label for directions and warnings.
- √ Use rechargeable batteries to reduce toxic waste disposal and to save money.

Dispose of waste carefully

- √ Never pour hazardous wastes down the drain, on the ground, or into gutters and ditches.
- √ Used motor oil contains lethal lead and zinc. Take your used oil to a local garage with an oil recycling program. The oil from one engine can make an eight acre oil slick on water!
- √ The best way to dispose of your household toxins is at a hazardous household waste collection site.
- √ Call your solid waste management office or municipality for advice on how to dispose of specific toxins.

Activity 2: Toxic Chemicals In Your Home

Use colored stickers and label the red stickers as "hazardous," the orange stickers as "toxic," the blue stickers as "safe," and the green stickers as "friendly."

At home, go through all of your household chemicals and read the ingredient labels and warnings. Place the appropriate sticker on each container. Note that the red and orange sticker containers require special handling. Any product listing **strong warnings** against contact with skin or inhalation must be labeled with a red sticker. Any product with warnings against contact with eyes or about use near pets, children, or streams should receive an orange sticker. The blue sticker, "safe" materials, are safely used if you follow the instructions and dilution renders them nontoxic. "Safe" materials may have warnings about eating or drinking the product, but should not contain skin contact warnings. "Friendly" materials are readily degraded, carry no warnings, and require no special handling or safety precautions.

Return to school with an account of how many stickers, of which type you used. List some of the products that fell into each category. Discuss the results.

TRAILBLAZERS: CONSERVATION HEROES

Description

Iowa has produced many native conservationists. A few blazed a trail for others to follow during the "age of conservation."

Grade levels

Activity 1: 4th and up
Activity 2: 3rd through 7th

Materials

Activity 1: pencil; copies of pages 23 for each student;

Activity 2: straw bale, 2 similar old overcoats, 2 similar brimmed hats, pair of old pants, old pillow case, old lawn chair, odds and ends of rope, black-oil sunflower seed, bird feeder, and bird feeding station.

Time

Activity 1: 15 minutes
Activity 2: long term

Academics

social studies
science

Introduction

The "age of conservation" began in the late 1800s and ended around 1930. It was a time of realization that the natural resources of our nation were finite. Several very talented Iowans were among the early conservationists to call for the protection and wise use of our natural resources.

Ada Hayden (1884 - 1950) "Matriarch of Iowa Preserves"

Born on a farm near Ames, Iowa, Hayden gained her love for the prairie in a small patch that her parents left wild for her enjoyment. She became the first woman to earn a doctorate from Iowa State College in Ames. She joined the college faculty and became a renowned curator of the herbarium.

Hayden documented Iowa's rapidly vanishing prairie remnants through photographs, maps, original drawings, and scholarly articles. In the mid-1940s, serving as a member of the Iowa Academy of Science conservation committee, she surveyed all of the known prairie remnants in the state and made recommendations for preservation of specific sites. This survey and Hayden's later publications and lectures laid the groundwork for the preservation and management of remnant prairie tracts.

More than 60 prairie sites have been preserved in the state today, largely due to Hayden's work. The state's first prairie purchased for protection in Howard County was named in honor of Hayden after her death. Hayden Prairie went on to be designated a registered national landmark in 1966 and a state preserve in 1968.

"Because of our limited knowledge of soil conservation, much of the rich topsoil has slipped away while we weren't looking and now lies in considerable quantity at the bottom of Iowa lakes or is clogging once navigable streams. The priceless soil was formed through the centuries -- now it [has] washed away in a few short years. . . . Once it's destroyed, it can never be replaced by man . . ."
-- Hayden

William Temple Hornaday (1854 - 1937) "Defender Of Wildlife"

Hornaday, world renowned taxidermist, museum curator, and zoo director, was acknowledged as our nation's foremost defender of wildlife. He became the Iowa State College museum's taxidermist while a student there. Later, Hornaday developed the realistic diorama exhibit stylethat is used today which depicts animals in their natural environment.

Hornaday came to a turning point in his career where he no longer wanted to preserve specimens, but rather wished to preserve living species of wildlife. His greatest contribution to conservation was to save the North American bison from extinction. He founded the American Bison Society and purchased bison for preserves established by the federal government. After Hornaday's death, President Franklin D. Roosevelt named a mountain in Yellowstone National Park in his honor. The peak overlooks the nation's largest bison herd.

Hornaday wrote several books including *Our Vanishing Wildlife* (1913). He is remembered in Iowa for donating 125 specimens from his extensive taxidermy collection to the University of Iowa's fledgling Museum of Natural History.

Aldo Leopold (1887 - 1948)
"Father of Game Management"

Leopold was born in Burlington, Iowa. He received a master's degree in forestry before beginning his career with the U.S. Forest Service. He wrote books on fish and wildlife management and soil erosion prevention. His efforts led the Forest Service to establish the first wilderness area, Gila Wilderness.

Leopold became a professor at the University of Wisconsin and wrote several major reports on wildlife management. He became chair of our nation's first college department devoted to wildlife education. He continued his conservation advocacy and writing from "an abandoned, worn-out farm" on the Wisconsin River. It was here that he wrote his popular *A Sand County Almanac*. He and his family lived their love for the land on this farm.

His many other accomplishments were global in impact on conservation. They include founding the Wilderness Society and serving as a conservation advisor to presidents and the United Nations. His ideas spawned a holistic approach to wildlife management and ecology.

"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends to do otherwise." -- Leopold

Bohumil Shimek (1861 - 1937)
"Advocate For Conservation"

Shimek spent his boyhood exploring the forests, prairies, and streams of Johnson County, Iowa. He received a degree in engineering in 1883 and became a surveyor for the railroad and county. Shimek traveled as a surveyor. He carefully observed the native plants and animals wherever he was.

Shimek, a self-taught naturalist, became a botany instructor at the University of Iowa. He recorded Iowa's native landscape, particularly the prairie plants that grew on glacial landforms. He felt that educating people was the purpose of science and he became a resource conservationist and land preservationist. Several Iowa parks and prairie remnants owe their preservation to Shimek.

". . . The prairies as we know them in Iowa have become reminiscence, their summer splendor and winter terrors have alike disappeared. Over their broad expanse no tinted waves of a varied flora sweep before the summer breeze, for countless acres of grain now cover their surface." -- Shimek

Thomas Macbride (1848 - 1934)
"Father of Iowa Conservation"

Macbride grew up on an Iowa farm. He became a professor of natural science at the University of Iowa in 1878. Macbride recorded Iowa's native landscape while mapping glacial geology. He became one of the most influential Iowans to encourage natural resource protection during the "age of conservation."

Macbride was one of the first members of the Iowa Academy of Science. His 1895 article on county parks helped establish the state park system in Iowa. He was the primary organizer and first president of the Iowa Park and Forestry Organization, established in 1901, which became Iowa's Department of Natural Resources.

Macbride believed that education could solve most of society's problems and promoted the casting aside of disciplinary boundaries in the study of nature.

"Here nature asks for nothing but defense -- only for protection. In nature, as in social life, great things grow. We speak of parks and wildlife and summer splendor, and Iowa responds. In this interim of our advance, let us teach our people reverence for the silent power and magnificence of nature as she works incessantly for our good." -- Macbride

Althea Sherman (1853 - 1943)
"The Dooryard Scientist"

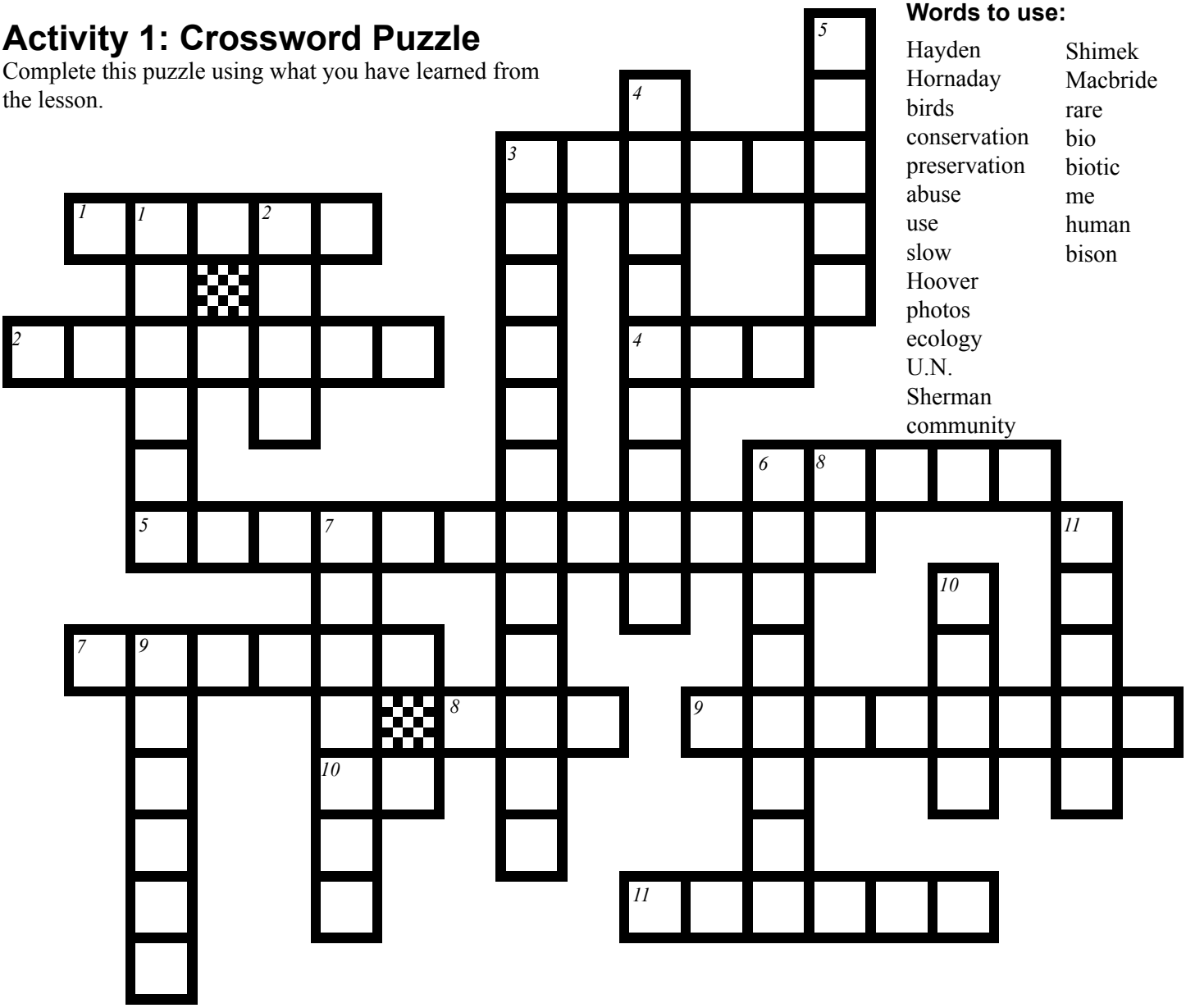
Educated in art and a teacher for 20 years, Sherman became a self-taught scientist. She studied the life history of birds in the one-acre yard of her home. Her keen artist's ability to observe detail made her an expert in ornithology, wildlife behavior, and natural history. She began her observations after the turn of the century, at the age of 50 years, and published more than 70 articles in three decades.

Sherman built specially designed nesting boxes, a wooden observation blind, and a 28 foot tower with a false chimney. The chimney encouraged nesting in the observation tower by chimney swifts. Sherman bought land parcels in her hometown of National to preserve and protect her bird sanctuary. She left all the land to an organization with the condition that it remain a sanctuary, but instead the land was sold.

"On unfenced portions of prairie, where herds of cattle grazed, and many beautiful wildflowers (now gone forever), were to be found the eggs or young of ground nesting species." -- Sherman

Activity 1: Crossword Puzzle

Complete this puzzle using what you have learned from the lesson.



Words to use:

Hayden	Shimek
Hornaday	Macbride
birds	rare
conservation	bio
preservation	biotic
abuse	me
use	human
slow	bison
Hoover	
photos	
ecology	
U.N.	
Sherman	
community	

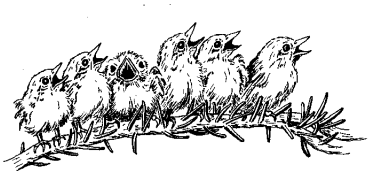
ACROSS

1. Use, don't _____!
2. The study of ecosystems.
3. Hayden used these to record the landscape.
4. Resource management is for continuing or sustainable _____.
5. Wise use of natural resources.
6. Greatest threat to natural resources.
7. He studied plants on glacial landforms.
8. A prefix meaning "life" or "living."
9. "Father of Iowa Conservation"
10. Our best hope for continued conservation.
11. "Matriarch of Iowa's Preserves"

DOWN

1. Description word referring to living things.
2. The speed at which communities adapt to change.
3. It saves without any consumptive use.
4. A group of interacting, living things.
5. Hornaday helped to save them from extinction.
6. A taxidermist turned conservationist.
7. An artist, turned scientist, using her yard as laboratory.
8. Abbreviation for the international organization concerned with conservation and other global issues.
9. President who fished and appreciated the outdoors.
10. Very few left.
11. Sherman's favorite animals to observe.

Activity 2: The Dooryard Laboratory



Althea Sherman studied birds in her one acre "dooryard." Dooryard is an old-fashioned word for backyard. Sherman's dooryard was probably much smaller than your school yard. You could study birds in your own school yard laboratory.

Sherman **attracted** the birds she studied to her dooryard. How can you attract birds to your school yard? To encourage feathered visitors, you must provide something that they like -- a part of their *habitat*. Habitat is the food, clean water, shelter, and space that an animal needs to survive.

The easiest way to have birds include your school yard in their habitat is to feed them. Place a bird feeder in a protected place near trees. A protected place has little wind and some shade. Avoid dangerous threats (cats, dogs, big picture windows). Locate the feeder close to pine trees to give better shelter to your visitors. Make sure that you can see the feeder from indoors or a hidden observation point.

Fill your feeder with seeds. Black-oil sunflower seed is best. Wait patiently for the birds to find your feeder. It may take several days or even weeks.

You can make your bird feeding site even more attractive by adding water. Put out a shallow pan of water. Place a flat rock in the center. Clean the pan and change the water every day.

In winter, offer treats such as

- ☐ grit (for digestion),
- ☐ ground egg shells (a source of calcium), and
- ☐ suet (high energy beef fat).

Count your birds!

Using a good field guide, learn to identify birds that visit your feeder. Keep a journal of your observations. An example of a journal page is at the right. Make detailed descriptions. Your teacher may ask you to make charts or graphs of the data (numbers of birds, weather conditions, etc.) that you collect.

Up close and personal

Gather together these materials:

- ☐ old lawn chair
- ☐ old pair of pants
- ☐ two similar looking old overcoats
- ☐ old pillowcase
- ☐ two similar looking brimmed hats
- ☐ a bale of straw
- ☐ pieces of rope or cord

Make a scarecrow by stuffing one set of clothing with straw. Stuff the pillowcase one quarter full. Shape it into a round head. Tuck the pillowcase ends into the overcoat to hold the head in place. Put the hat on top.

Set the scarecrow on the lawn chair next to your bird feeder. Make it look like a person sitting in a chair. Secure it so that it won't blow away. Sprinkle bird seed all over the scarecrow every day. Birds will get used to it in a few days. When birds eat the seed on the scarecrow, it is time to fool the birds!

Put the extra overcoat and hat on. Remove the scarecrow from the chair and sit down. Have someone sprinkle you with bird seed. If you are wearing gloves, put seed into your hands. Sit very quietly. Have all the observers move out of sight. The birds will think you are the scarecrow. They will come to eat seed off your coat and hat. They may eat out of your hands. Remember to stay very still.

November 3 -- 1:00 PM; 15 minute observation
Temperature - 40 degrees with a light breeze.
Partly cloudy sky. No rain or snow.

7 Dark-eyed Juncos
20 Purple Finches
8 House Sparrows

All the juncos and sparrows were eating on the ground. The purple finches ate at the feeder. All birds were near feeders at once.

I saw a new bird. It was the size of a cardinal; very sleek tan feathers on its sides and back; a head crest; a dark mask on the eyes; beak smaller than a cardinal's and black; a yellow band on tip of tail. It stood upright like a cardinal. It came and looked at the bird feeder, but left without eating or bothering other birds.

Birds left when one blue jay screamed and came to the feeder.

Looked up the new bird - it was a cedar waxwing!

Prairie Management

Description

Preservation, restoration, reconstruction, and management return prairies to the Iowa landscape.

Grade level

Activity 1: 4th
Activity 2: 5th and up

Materials

Activity 1: materials vary; please contact a Project WILD facilitator for assistance.
Activity 2: copies of worksheet; journals & pencils; wildlife and plant keys

Time

Activity 1: long-term
Activity 2: 3 - 30 min. periods

Academics

science
social studies

Introduction

Wildfires profoundly impacted prairie for eons. With fire the prairie prospered. Without fire the prairie lost its vigor and became overgrown with shrubs and trees. Resource managers recognize the importance of fire in sustaining the prairie's vitality and integrity. Managers use controlled fires, called prescribed burns, to maintain the health of the prairie and to control the invasion of woody vegetation and exotic species. Managers at the Herbert Hoover National Historic Site use prescribed burns as an important management tool.

Modern prairie management utilizes several techniques that simulate natural prairie cycles. Light grazing by cattle and carefully timed mowing mimic the effects of grazing by large herbivores that once roamed the prairie. Managers evaluate each prairie site individually to prescribe the best management techniques.

> "The prairies burning form some of the most beautiful scenes that are to be witnessed in this country . . . where the grass is thin and short, the fire slowly creeps with a feeble flame, which one can easily step over . . But there is another character of burning prairies . . . Where the grass is seven or eight feet high . . . the fire in these travels at an immense and frightful rate."
>
> *George Catlin, 1841.*

Fire!

Wildfire frequented the tallgrass prairie for thousands of years. Lightning caused fires. Native Americans started fires to drive bison for hunting or to improve grazing conditions for game.

Perennial prairie vegetation has growth tissue located below ground where soil protects it from fire. In contrast, forest vegetation produces aerial buds which are readily destroyed by fire. Following a burn, most prairie plants regenerate rapidly.

√ Fire excluded forest or woody vegetation encroaching on the prairie.

√ Fire takes the nutrients trapped in dead plant material and returns it to the soil. Herbaceous plants die back to their roots at the end of the growing season and several years accumulation of plant nutrients can remain in dead vegetation. Fire breaks herbaceous tissue into simple organic compounds that readily incorporate into the soil.

√ Fire stimulates germination of some forb seeds and prepares the seed bed for seedlings.

Lush plant growth coupled with periodic wildfire slowly built the richest black soil in the world. Deep reaching roots held soil tightly in place. The prairie flourished under a cycle of growth, dormancy, fire, and regrowth. Prairie animals adapted to this cycle. A unique biome developed.

Natural Cycles Lost

In fewer than one hundred years after settlement began in Iowa, much of the native prairie vanished. Settlers converted rich stands of grasses and *forbs* (wildflowers) into fields of corn and soybeans. This conversion started slowly as settlers busted sod acre-by-acre. In 1837 John Deere invented the steel moldboard plow and a revolution in agriculture began. Suddenly the rich soils of the prairie were torn open and scored with deep furrows. Settlers had uncovered the most productive farmland in the world.

Change Of Heart In The Heartland

Iowans recognized that agricultural productivity came at a cost. Citizens became concerned that the tallgrass prairie might be lost forever. The state secured its first prairie preserve, the Hayden Prairie, in 1946. Private organizations and public agencies in Iowa have preserved close to 5000 acres of prairie. As much as 30,000 acres of prairie exist unprotected in the state.

Various organizations conserve or preserve prairie areas in Iowa. The National Park Service has restored and reconstructed prairies. The Nature Conservancy acquires native tallgrass prairie for preservation. County conservation boards identify and preserve prairie. The U.S. Fish and Wildlife Service encourages landowner protection of prairie habitat through conservation easements and has wildlife refuges that protect the prairie ecosystem.

State and county transportation departments establish prairie plants on roadsides. These native plants reduce maintenance costs and erosion along roads. They are an attractive and useful addition to the landscape.

Restoration

Biologists restore abandoned fields to reasonable facsimiles of native prairie. Restored fields become habitat for native plants and wildlife, but are not the complex prairie community that characterized Iowa.

Restoration requires management of prairie plants that already occur on site. These management techniques simulate the natural cycles of wildfire and grazing to which prairie plants adapted.

Reconstruction

Prairie reconstruction turns a site with few or no existing prairie plants into a simplified, functioning prairie system. Reconstruction requires preparation of the site (removal of unwanted species), planting of desired grasses and forbs, nourishment of the site, and continuous management. Iowa has several successful prairie reconstruction sites. The Herbert Hoover National Historic Site prairie is a reconstruction. The U.S. Fish and Wildlife Service reconstructed the largest site, Walnut Creek National Wildlife Refuge, near Prairie City, Iowa.

Preservation

Although reconstruction and restoration of prairie appear to be successful, we can never duplicate the complex biological community that evolved over the millennia. For this reason, we must preserve remnant prairies as relics of the biological diversity inherent in this community.

We cannot permit wildfire to endanger private property, nor can we bring back bison to roam freely on the land. Therefore we must manage prairie. Management increases the longevity of natural, restored, and reconstructed prairies.

Management Techniques

Prairie management simulates natural forces that shaped the tallgrass prairie. Trained professionals assess the specific management needs of individual sites. Managers write a plan, implement it, and reassess the effectiveness of the plan. Prairie management may include *prescribed burns, light grazing*, and *mowing.*

Prescribed burns mimic natural wildfires. Grasses flourish after a spring burn. Forbs benefit from autumn burns. Some forbs rely on fire to stimulate seed germination and to prepare the seed bed.

Light grazing mimics the impact of 40 million bison that once roamed the prairie. Grazing increases plant diversity and reduces dominance by a single species. Grazing must be light, so as to not damage the prairie.

Mowing mimics nonselective grazing. Managers take care to mow after nesting season to avoid injuring ground nesting birds. Mowed grass must be removed, immediately. Midsummer haying is ideal. Only small patches of prairie should be mowed at any one time so that wildlife have safe refuge elsewhere until cover has regrown on the site. Repeated use of mowing as the sole management technique removes nutrients from the site. Mowing should be used with other techniques that enrich the soil.

Recipe For A Tallgrass Prairie

Ingredients:

25 or more grasses and 250 forbs
1 dozen species of small mammals
20 or more species of birds
hundreds of species of invertebrates
dozens of types of nematodes
herds of large, roaming herbivores
several species of large carnivores
season to taste with a variety of bacteria, mosses, fungi, lichens, and hard-to-see life

Blend all ingredients in a warm, dry climate. Add wildfire to taste and mix well. Set aside for thousands of years in bright sun, constant wind, and bone chilling winters to develop full flavor.

Activity 1: You Too Can Construct Prairie Habitat!

Project WILD School Sites

Project WILD is a conservation and environmental education program especially designed for teachers of kindergarten through high school youth. Project WILD School Sites encourages students to develop wild areas on their school grounds to serve as habitat for native plants and wildlife and as an outdoor laboratory. According to the Project WILD School Sites manual, "A WILD School Site project is any action -- small or large -- that is taken to improve habitat for wildlife and people."

Your class, club, or school can create a WILD School Site. Contact your nearest Department of Natural Resources office (listed under state government in the telephone directory). Ask them for the Project WILD facilitator in your area. The facilitator will get you started and teach you many of the skills needed to develop a WILD School Site.

Although the facilitator will help you, this is your project. Some of the steps that you will take include:

- √ Doing a site inventory (make a base map; determine dominant vegetation; find existing wildlife habitat; take aesthetics into consideration; and account for constructed features)
- √ Determining goals
- √ Involving community
- √ Developing a plan
- √ Implementing the plan
- √ Constructing the site
- √ Managing the site

WILD School Sites are as small as a butterfly garden or as grand as a multi-acre habitat. Whatever you create will be a benefit to you, your school, and your community.

Some references you may use include:

The Audubon Guide to Attracting Birds. Stephen W. Kress. 1985. Scribners.

The Backyard Naturalist. Craig Tufts. 1988. National Wildlife Federation.

Landscaping for Wildlife. Carrol L. Henderson. 1987. Minnesota Department of Natural Resources.

You must consider many questions as you develop a habitat. Study **A Case For Diversity** in this curriculum. Answer the following questions:

1. What does each wildlife species eat? How do they obtain water? Where do they nest or den?
2. Will you maintain the elements of habitat your species need year round? (food, clean water, space, shelter, clean air)
3. Are the desired species available to colonize your site?
4. What plants and structures will you add to your site? For each addition:
   a. What are you adding?
   b. What plant or animal does this benefit?
   c. How will you add this plant or structure?
   d. How and where will you place this addition?
   e. How will you maintain this addition?
   f. Does this addition meet one of your habitat goals?
5. How much time each week can you devote to your site?
6. How much money do you have for your site?
7. Are you willing to maintain this site during the seasons when wildlife depend on it? Once wildlife use a site as a breeding area, they depend on the availability of the elements of habitat that caused them to choose the site. If the site is attractive in the spring, but not maintained in the summer, it may be a death trap to the wildlife that colonize it.

Activity 2: Neighborhood Survey

Survey your neighborhoods for wildlife habitat. All types of habitat are fair game. Include assessment of trees, hedge rows, flower gardens, etc.

Break into survey teams. Assign areas of your community to survey. Make simple 8" X 10" maps of the survey sites by pencil tracing existing maps or developing your own. Carry the map or a copy of it on the survey.

Walk through your area with your team. Circle food and water sources on your map. Place an "X" at nesting sites. Mark wildlife sitings on the map. Make good notes about your sitings. Indicate wildlife *sign* (droppings or tracks) on the map. Fill out the following work sheet.

Share your surveys in class. Do wildlife live in your neighborhoods? Where are the best places? Why are they good habitat? Can they be improved? How can they be improved? Read about wildlife habitat. Learn about the plants that provide food and shelter for wildlife. Consider a habitat improvement project in your neighborhood or backyard.

Resource	Seasons Available	Wildlife or Wildlife Sign Observed
Food		
Grass, leaves, greens		
Fruits (berries, nuts, seeds, grain)		
Twigs, buds		
Insects		
Decaying plants and animals		
Garbage		
Other		
Water		
Ponds		
Puddles		
Streams		
Bird baths		
Other		
Nesting sites		
Ledges or crannies		
Tree cavities		
Trees		
Shrubs		
Abandoned fields		
Burrows		
Ponds, streams		
Other		

DOING YOUR HOMEWORK

Description

There is a wealth of information available--ask for it!

Grade levels

5th grade and up

Materials

writing materials and a subject for inquiry; copy of this entire lesson for each student

Time

45 minutes in library; 30 minutes writing time

Academics

social studies
language arts

Introduction

Students and adults should be knowledgeable citizens, but it takes work to be knowledgeable. We don't read newspapers and other periodicals like people once did . . . We just don't seem to have time. And yet there are so many current events that we must understand in order to be intelligent decision makers.

We can get the answers to our questions in many places. The library is one. Not only does the library have reference books, but most libraries receive current information in the form of newspapers, periodicals, and professional journals. Did you know that the *Congressional Quarterly* reports on the proceedings in the United States Congress? That's one way to discover what's new in legislation.

Local, state, and federal agencies willingly supply information on specific topics. With a well written letter, you can obtain information that is not in the library. Not only can you get information from public agencies, but you can provide them with information by letter or at public meetings!

Dear Sirs:
Please send me all the free information you have on the tallgrass prairie. I am doing a school report which is due next week.
Thank you,
Patty Green

The Right Stuff!

What is wrong with this request? First of all, Patty's topic is too general. She wants someone else to do her research. She assumes the agency will send the proper information and in time. Finally, she wrote her request poorly. If she had done some homework before writing, she would have a better chance of getting the information that she really wants.

Selecting a specific topic

There are hundreds of topics related to the tallgrass prairie . . . pollution, fish and wildlife habitat, wetlands, settlement. Define your topic by brainstorming a list of words associated with the tallgrass prairie. Then narrow your topic by focusing on a few of these words. Consult a textbook or encyclopedia to see if there is enough information on the topic.

Doing library research

Let's suppose Pat narrows her topic to tallgrass prairie endangered plant species, specifically the prairie fringed orchid. Next, she should check library references. Typical sources include encyclopedias, atlases, periodicals, card catalogs, field guides, and newspaper articles. She should take down bibliographic information (author, title, date, source, pages, and library). Pat should make notes of public agencies that are mentioned in the materials. She may wish to contact them directly.

Seek additional information

Pat found pages of information on the tallgrass prairie ecosystem in the library, but found little on prairie fringed orchids. Her next step is to write to an agency that has jurisdiction over that species and knowledge of the tallgrass prairie. She should not rely solely on an information request for all her research. Her request may be unclear, inappropriate to the agency, or received too late for her report.

When requesting information, follow this procedure:

(1) check with classmates to be certain that several of you aren't asking for the same materials from the same agency (It costs the agency time and tax payers money to respond to your request!);

Pat Green
123 Osprey Drive
Plainville, IA 53000
(319) 555-8739

April 3

Dear Staff:

I am a seventh grade student at Eagle Middle School in Plainville, Iowa. I chose to do a report on the prairie fringed orchid for my biology term project. I hope to complete my research by May 10.

I found general information on the tallgrass prairie in the library, but nothing on the biology of the prairie fringed orchid. Please send me any free information you have on locations of this rare plant, its listing as an endangered species, and its biology. Please send me a list of low cost publications about the prairie, also.

Thank you very much for your help.

Sincerely,
Patty Green

(2) define your subject well;
(3) give a reasonable deadline for receiving the information and mail your request early;
(4) identify the type of information needed (technical, general, charts);
(5) include your grade level and the type of class for which you are writing the report;
(6) describe what you have found in your own research;
(7) if you seek free materials, also request a list of low-cost materials;
(8) include your address and phone number;
(9) write clearly and express your gratitude for the agency's help; please use a generic salutation (*Sir/Madam, Biologist, Staff*).

A final note . . .

When you are done with your project, don't throw away the materials. Share them with your teacher, parents, and other students. Donate them to your library. Recycle this good information!

Can You Make A Difference?

We have developed new things (chemicals, etc.) that, when misused, can hurt the environment. There are more people in this country than a century ago. We all contribute to environmental problems.

Today's students are knowledgeable about the environment. Although you are not in major positions of power, you are very powerful. Remember, millions of kids and their opinions have an impact on decision makers, parents, consumers, industry, and the environment.

Respectfully share the things that you are learning with your parents and other adults. Practice the good habits that you are learning, and be a good example. Talk to adults about your concern for our environment and **your** future. Thank adults when they do something good to preserve our environment. Learn all that you can and don't be afraid to express your views.

"Campbell County High School (KY) students organize rally to protest plans for a 7-mile pipeline to discharge salty wastewater into Licking River. Up to 300 protestors join in."

"Parents' purchase decisions are swayed by environmental information they get from their children, a survey by Environmental Research Associates shows."

Quotes taken from The 1993 Information Please Environmental Almanac, compiled by World Resources Institute, Houghton Mifflin Company.

Resource Guide:

Federal agencies and bureaus:

Army Corps of Engineers
Coralville Lake
Coralville, IA 52241
(319) 338-3543

Effigy Mounds National Monument
National Park Service
151 Highway 76
Harpers Ferry, IA 52146-7519
(319) 873-3491

Extension Service I.S.U., Cedar County*
120 East Fifth Street
Tipton, IA 52772
(319) 886-6157

Extension Service I.S.U., Johnson County*
3149 Old Highway 218S
Iowa City, IA 52240
(319) 337-2145

Extension Service I.S.U., Muscatine County*
2517 Park Avenue
Muscatine, IA 52761
(319) 263-5701

Herbert Hoover National Historic Site
National Park Service
P.O. Box 607
West Branch, IA 52358
(319) 643-2541

Natural Resources Conservation Service,
Cedar County*
Department of Agriculture
1201 North Avenue
Tipton, IA 52772
(319)886-6214

Natural Resources Conservation Service,
Johnson County*
Department of Agriculture
238 Stevens Drive
Iowa City, IA 52240
(319) 337-2322

U.S. Environmental Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101
(913) 551-7581

Rock Island Field Office
U.S. Fish and Wildlife Service
4469 48th Avenue Court
Rock Island, IL 61201
(309) 793-5800 Fax: (309) 793-5804

Union Slough National Wildlife Refuge
U.S. Fish and Wildlife Service
Route 1, Box 52
Titonka, IA 50480
(515) 928-2523

Walnut Creek National Wildlife Refuge
U.S. Fish and Wildlife Service
P.O. Box 399
Prairie City, IA 50228
(515) 994-2415

State agencies and bureaus:

Soil Conservation Division
Iowa Department of Agriculture and Land Stewardship
Henry A. Wallace Building
Des Moines, IA 50319
(515) 281-6146

Iowa Department of Natural Resources
Henry A. Wallace Building
Des Moines, IA 50319-0034
(515) 281-5145

Field Office #1
Iowa Department of Natural Resources
209 N. Franklin
Manchester, IA 52057
(319) 927-2640

Field Office #2
Iowa Department of Natural Resources
2300 - 15th Street, SW
P.O. Box 1443
Mason City, IA 50401
(515) 424-4073

* *Each county has its own office. Please check your telephone directory for the office in your county.*

Field Office #3
Iowa Department of Natural Resources
1900 North Grand Avenue
Gateway North Mall
Spencer, IA 51301
(712) 262-4177

Field Office #4
Iowa Department of Natural Resources
316 Walnut
Atlantic, IA 50022
(712) 243-1934

Field Office #5
Iowa Department of Natural Resources
900 East Grand Avenue
Des Moines, IA 50319
(515) 281-8693

Field Office #6
Iowa Department of Natural Resources
1004 West Madison
Washington, IA 52353
(319) 927-3276

Southwest District Office
Iowa Department of Natural Resources
Cold Springs State Park
Lewis, IA 51544
(712) 769-2587

Fish and Wildlife Station
Iowa Department of Natural Resources
1203 North Shore Drive
Clear Lake, IA 50428
(515) 357-3517

State Forest Nursery
Iowa Department of Natural Resources
(800) 865-2477

Southeast District Office
Iowa Department of Natural Resources
Lake Darling Station
RR 1
Brighton, IA 52540
(319) 694-2430

Museum of Natural History
University of Iowa
Iowa City, IA 52242
(319) 335-0481

County

Please check the telephone directory for your county listings.

Cedar County Conservation Board
County Court House
Tipton, IA 52772
(319) 886-6930

Johnson County Conservation Board
F.W. Kent Park
2048 Highway 6 NW
Oxford, IA 52322-9211
(319) 645-2315

Muscatine County Conservation Board
2007 Saulsbury Road
Saulsbury Bridge Recreation Area
Muscatine, IA 52761
(319) 264-5922

Soil and Water Conservation District, Johnson County
238 Stevens Drive
Iowa City, IA 52240
(319) 337-2322

Soil and Water Conservation District, Cedar County
1201 North Avenue
Tipton, IA 52772
(319) 886-6214

Counties have various departments dealing with environmental issues. Please check your telephone directory for the offices in your county.

EVALUATION - TALLGRASS PRAIRIE CURRICULUM

So that we can better serve you, please complete this evaluation of the curriculum and return to:

Prairie Curriculum Evaluation
Herbert Hoover National Historic Site
P.O. Box 607
West Branch, IA 52358

Teacher: _____ **Grade:** _____

School: _____

Date of visit to Herbert Hoover National Historic Site (HHNHS) prairie: _____

Did you do any activities from the curriculum during your HHNHS visit? YES NO
(circle one)

Other than during your visit, when did you use the curriculum? (approximate date)

Which lessons have you used? (check off on table below)

Lesson Name	Used background material	Used activities
Tallgrass Prairie - Introduction to Packet		reference list
Take A Walk On The Wild Side		
Land Of Meadows		
A Case For Diversity		
Trailblazers: Iowa's Conservation Heroes		
Beautiful Land		
Prairie Management		
Doing Your Homework		

continued on back

Please grade the lessons according to the quality of background materials and the effectiveness of the activities. (A = excellent, B = good, C = satisfactory, D = unsatisfactory, E = failed)

Lesson Name	Background material quality	Understanding directions and setting up activity	Effectiveness of activity in demonstrating concept
Tallgrass Prairie - Introduction to Packet		descriptions	references
Take A Walk On The Wild Side			
Land Of Meadows			
A Case For Diversity			
Trailblazers: Iowa's Conservation Heroes			
Beautiful Land			
Prairie Management			
Doing Your Homework			

Comments:

Will you use the materials again? (circle answer) YES NO

Comments:

If you examined the curriculum before your visit and used the materials in *Tallgrass Prairie* and *Take A Walk On The Wild Side* were you prepared for your prairie visit? (circle answer) YES NO Did not read before visit

Comments:

How can we improve these materials?

Thank you for your cooperation in this evaluation.