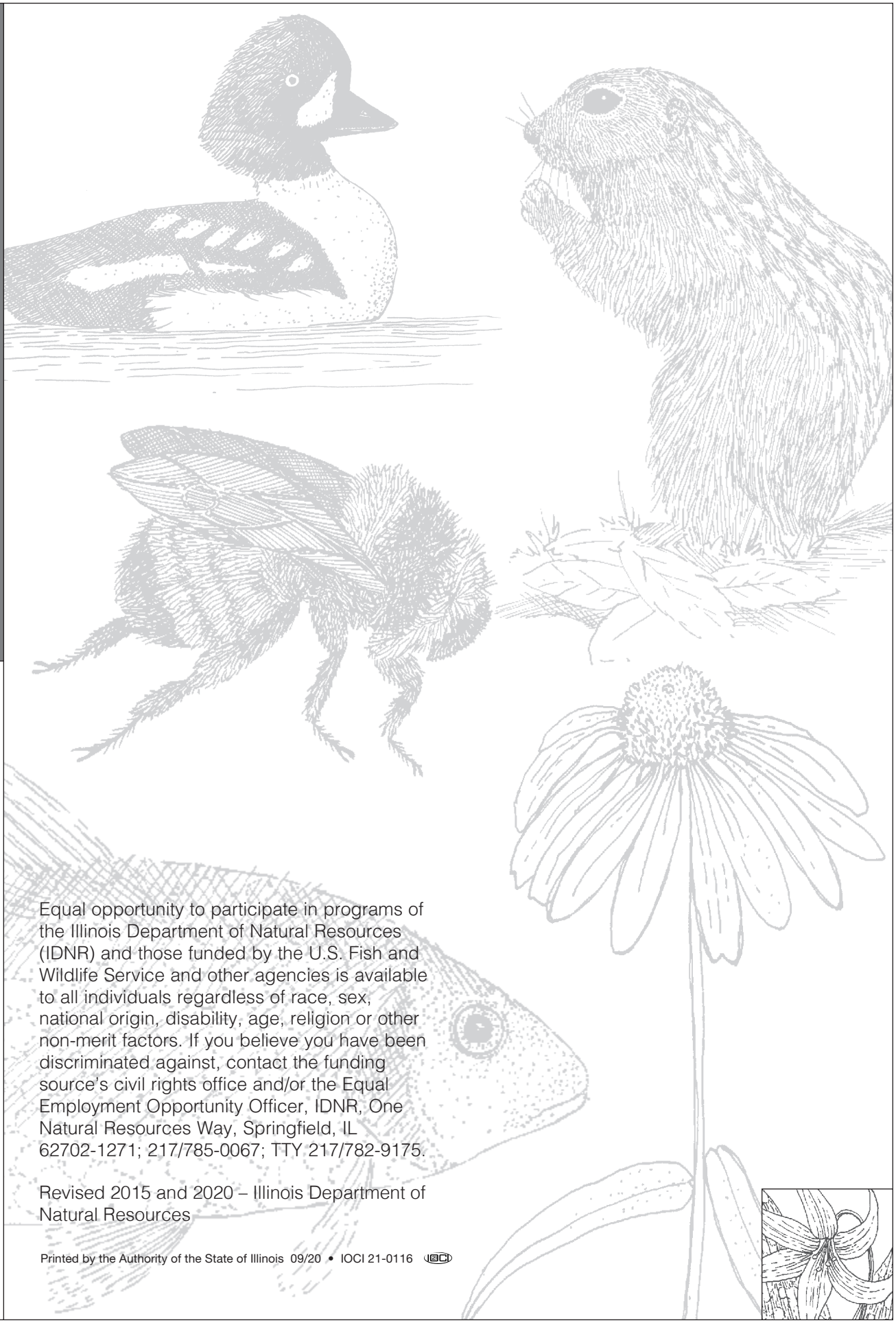
State of Illinois
Illinois Department of Natural Resources

Biodiversity of Illinois Video:
Supplemental Activities

ILLINOIS
DEPARTMENT OF
NATURAL
RESOURCES

BIODIVERSITY OF ILLINOIS



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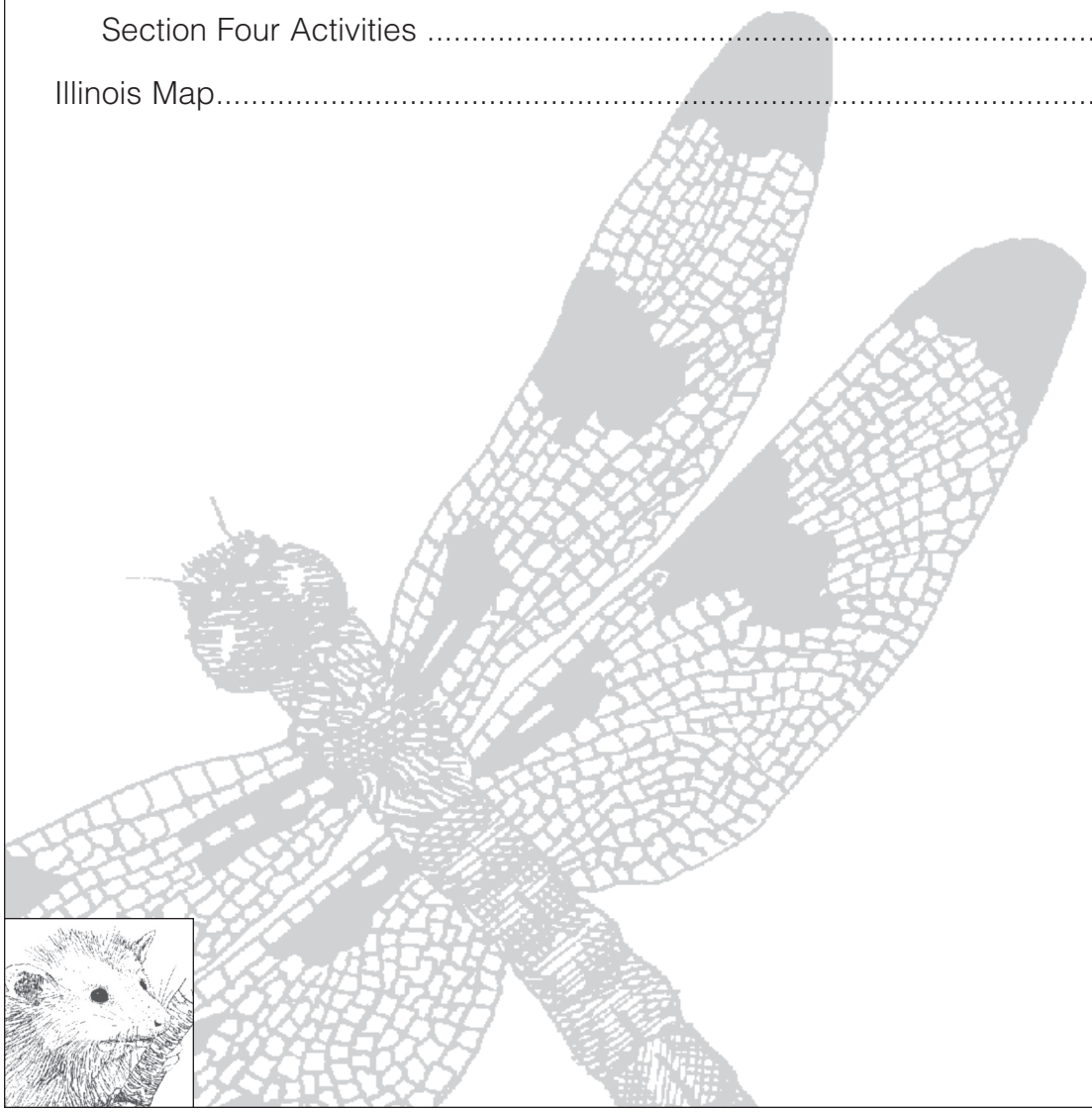


Biodiversity of Illinois Video

Suggested Activities/Viewing Guide

The *Biodiversity of Illinois* video (recommended for grades six through eight) provides the viewer with a general introduction to biodiversity as well as an introduction to biodiversity in Illinois. The types of biodiversity are discussed, and each is illustrated with Illinois-specific images. The video contains descriptions of the 14 natural divisions present in Illinois and the three main habitat types in the state. Comparisons of the amount of acreage of each habitat type pre-European settlement and today are graphically illustrated. The video concludes with information about why biodiversity is important and what can be done to save it.

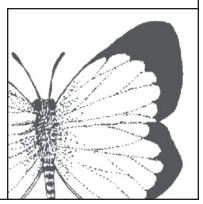
The *Biodiversity of Illinois* video may be logically divided into four sections. The first time you play it you may want students to watch it from beginning to end without pausing, which is a good introductory action. The accompanying pre- and post-viewing test may be utilized in conjunction with the viewing. Because there is so much information in the video that may be new to students, you may want to show one section of the video at a time, discuss it and do the related activities before moving on. Attached you will find the video script which has been separated into the four sections. At the end of each section you will find suggested discussion questions and activities that students can participate in. A vocabulary word list and suggested vocabulary activities are included, too. Specific evaluation/assessment actions are not listed for each activity. However, when completed as written here, most of the activities require students to become involved in a project or to produce an item that could in itself be considered an assessment.

The following items from the Illinois Department of Natural Resources' (IDNR) Division of Education may be used to support and reinforce concepts developed in the video. For more information, contact:

IDNR Division of Education
One Natural Resources Way
Springfield, IL 62702-1271
217-524-4126
dnr.teachkids@illinois.gov

Illinois' Natural Divisions is a two-sided poster that contains detailed information about each of Illinois' 14 natural divisions and the organisms found in them. The natural divisions are illustrated with maps and images. Connections between the natural divisions and biodiversity are explained. Order at https://dnr2.illinois.gov/teachkids/.

The ***Biodiversity of Illinois*** species and habitats pages may be used to supplement the information in the video. Species and habitats are presented in a field guide format. More than 1,000 Illinois species are represented, and more species pages are added regularly. Images for each species and habitat are included. Visit https://www2.illinois.gov/dnr/education/Pages/Biodiversity-of-Illinois.aspx to access the information.



Biodiversity of Illinois Video

An Introduction to the Biodiversity of Illinois

Student Page: Pre- and Post-Viewing Test (recommended for grades six through eight)

Name_____

1. What is biodiversity?

2. What are the three types of biodiversity?

a.

b.

c.

3. How many species can be found in Illinois (excluding bacteria)?

4. What makes every living thing unique?

5. Illinois includes the edge of five major ecological regions. Name them.

a.

b.

c.

d.

e.

6. How many natural divisions can be found in Illinois?

7. Name five of the natural divisions in Illinois.

a.

b.

c.

d.

e.

8. In which natural division do you live?

9. What are the three major habitat types in Illinois? Underline the one that is least commonly found in Illinois today.

a.

b.

c.

10. What group of organisms has had the greatest impact on the landscape, and therefore the biodiversity, in Illinois?

11. What group of organisms provides the greatest hope for preserving biodiversity?

Biodiversity of Illinois Video

An Introduction to the Biodiversity of Illinois

Teacher Page: These questions can be used as a pre-viewing introduction and a post-viewing evaluation of *Biodiversity of Illinois*.

1. What is biodiversity?

Biodiversity is the variety of life. It is also the genes that make organisms unique, the habitats that they live in and the connections between them.

2. What are the three types of biodiversity?

species diversity, genetic diversity, habitat diversity

3. How many species can be found in Illinois (excluding bacteria)?

More than 54,000 species are known to exist in Illinois. Many species are still waiting to be discovered. This number does not include the bacteria and relatives. There are unknown numbers of species of monerans, probably millions of species.

4. What makes every living thing unique?

The genes on the chromosomes make every living thing unique.

5. Illinois includes the edge of five major ecological regions. Name them.

eastern deciduous forest, tallgrass prairie, southern coastal plain, Ozark uplift, northern boreal forest

6. How many natural divisions can be found in Illinois?

14

7. Name five of the natural divisions in Illinois.

Coastal Plain Division
Grand Prairie Division
Illinois River and Mississippi River Sand Areas Division
Middle Mississippi River Border Division
Mississippi River Bottomlands Division
Northeastern Morainal Division
Ozark Division
Rock River Hill Country Division
Shawnee Hills Division
Southern Till Plain Division
Upper Mississippi River and Illinois River Bottomlands Division
Wabash Border Division
Western-Forest Prairie Division
Wisconsin Driftless Division

8. In which natural division do you live?

Answers will vary.

9. What are the three major habitat types in Illinois? Underline the one that is least commonly found in Illinois today.

prairie, forest and wetland

10. What group of organisms has had the greatest impact on the landscape, and therefore the biodiversity, in Illinois?

humans

11. What group of organisms provides the greatest hope for preserving biodiversity?

humans

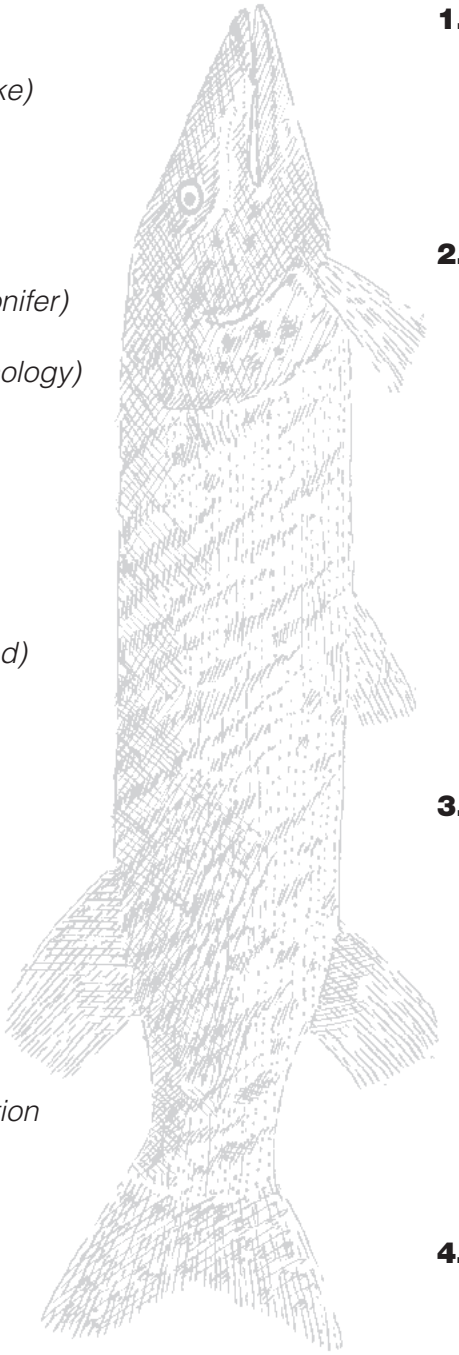
Biodiversity of Illinois Video

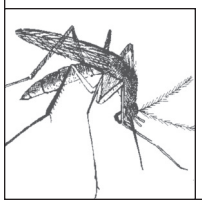
An Introduction to the Biodiversity of Illinois

Vocabulary Words:

The following 33 words are mentioned in the video script and may need further explanation for students. Suggested activities are listed to the right. You may need to use Internet resources or a dictionary to define some of the terms.

acidic
algific (slope)
backwater (lake)
bedrock
biodiversity
bottomland
chromosome
clay
coniferous (conifer)
deciduous
ecological (ecology)
ecosystem
endangered
extinct
forest
fragmentation
gene
habitat
inbred (inbreed)
limestone
loam
nutrient
oxbow (lake)
peat
prairie
sandstone
shale
silt
sinkhole
swamp
threatened
water purification
wetland





Activities:

English language arts
Reading Standards for Literacy in Science and Technical Subjects 6-12

Craft and Structure – Grades 6-8: 4

Integration of Knowledge and Ideas – Grades 6-8: 7

1. Have the students define each word. Students should also note the origin of each word and how it relates to the present definition. The word should then be used correctly in a complete sentence.

2. Write each vocabulary word on a separate slip of paper. Place the slips of paper into a container which is large enough for students to reach into. Allow students to work in pairs. One member of each pair will select a slip from the container. Each pair should keep their word to themselves and not tell the other students. The pair should define the term and develop a way to act out their term. Let the students play a game of “charades” with these vocabulary words. The students in the audience should guess which vocabulary word from the list is being acted out.

3. Ask each student to select five words from the list of vocabulary words. After defining each term, instruct the students to write a paragraph using the terms. In the paragraph, the student should describe each term and explain the relationship of the term to the other four terms chosen and to biodiversity in Illinois. The student should compose the paragraph using computer technology, including graphics/images when possible to supplement the text.

4. After completing Activity 1, let each student design a review game that could be played using the vocabulary words. Try several of the games with the class.

Biodiversity of Illinois
Video Script

Section One: *Section One includes information on the three types of biodiversity: species, genetic and habitat.*

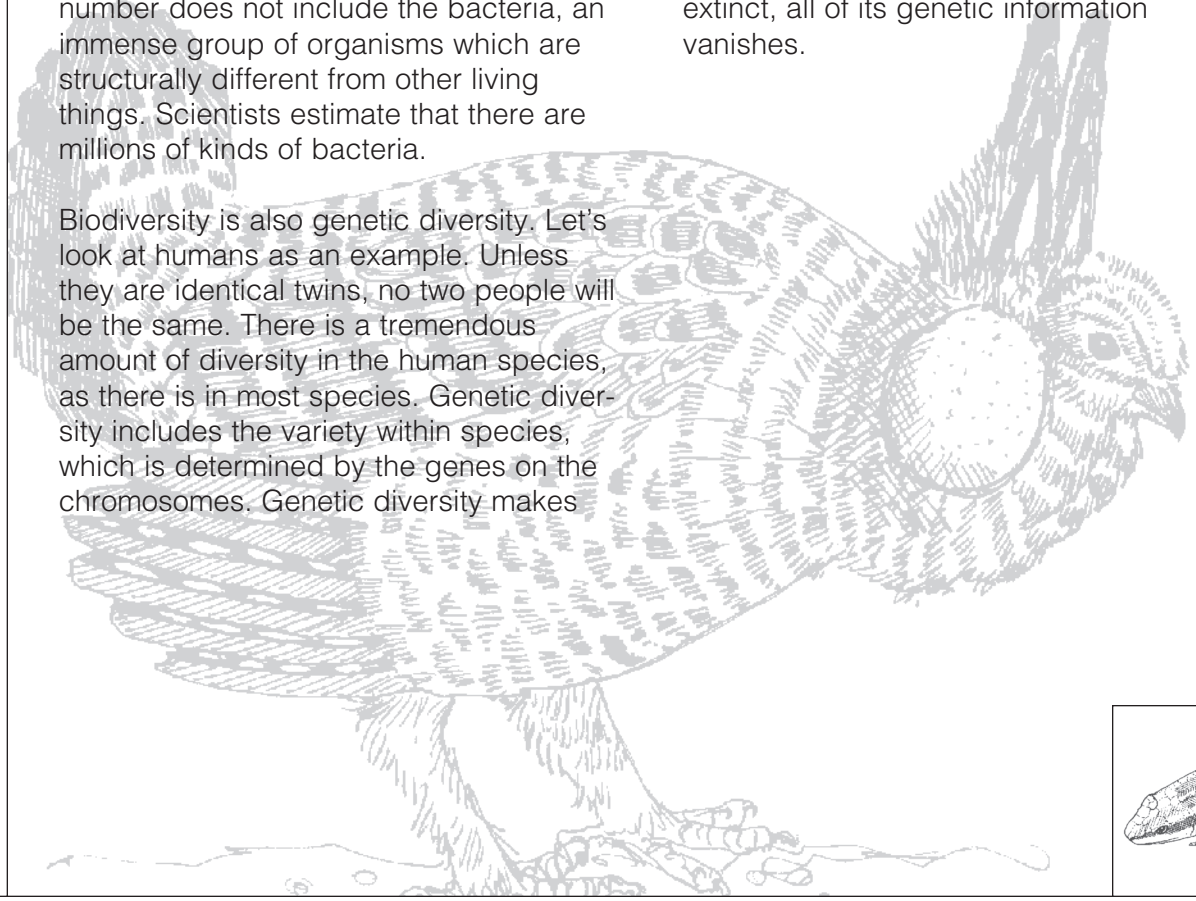
Biodiversity. You are a part of the biodiversity on earth.

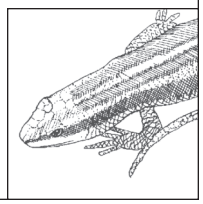
What is biodiversity? "Bio" means life and "diversity" refers to variety. So biodiversity is the "variety of life."

But there are really several types of biodiversity. Biodiversity is species diversity. Species diversity includes all of the different types of living things: from microscopic bacteria to the large white-tailed deer and white oak. Some people believe that Illinois is a state with little more biodiversity than corn and soybeans, but Illinois actually has a great variety of species. Nearly 54,000 species have been identified in Illinois so far, with many more to be discovered. This number does not include the bacteria, an immense group of organisms which are structurally different from other living things. Scientists estimate that there are millions of kinds of bacteria.

Biodiversity is also genetic diversity. Let's look at humans as an example. Unless they are identical twins, no two people will be the same. There is a tremendous amount of diversity in the human species, as there is in most species. Genetic diversity includes the variety within species, which is determined by the genes on the chromosomes. Genetic diversity makes every living thing unique. Coded messages in the genes are passed from one generation to the next. The results of the code are sometimes visible but more likely to be unseen within the cells.

Genetic diversity is a safeguard against future problems like disease and natural disasters. The more genetic diversity present, the more likely the individual will be able to adapt successfully to changes and survive. Populations must be large and have access to suitable habitats to maintain genetic diversity. When numbers of individuals decline, genes are eliminated from the population, decreasing genetic diversity. Losing genetic diversity may lead to extinction. When a species becomes extinct, all of its genetic information vanishes.

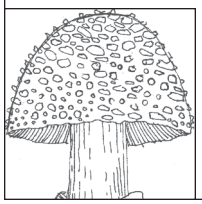




In Illinois, the greater prairie-chicken provides an example of loss of genetic diversity. In the 1860s, millions of prairie-chickens were found in the native grasslands of the state. By the early 1990s, only about 50 prairie-chickens were living in Illinois, in Jasper and Marion counties. Conversion of prairie to agricultural land resulted in an enormous loss of habitat for the birds. With no place to live and no food to eat, the birds died. The surviving birds had such a small population size that they lost some of their genetic information. The loss of genetic diversity affected the ability of these birds to survive because their eggs were not successfully hatching.

The Illinois Department of Natural Resources began a program in 1992 to introduce prairie-chickens from other states into the Illinois prairie-chicken populations. By breeding with these new birds, it was hoped that the Illinois birds could improve their genetic diversity. Approximately 500 prairie-chickens were trapped in Minnesota, Nebraska and Kansas over a seven-year period and flown by airplane to Illinois for release at the Prairie Ridge State Natural Area. Overall egg quality and hatching ability did improve. Today, the population has increased and seems to be maintaining itself well.

Biodiversity is also the habitats of all living things. The more good-quality habitat types that are available, the greater the number of species that can occupy them. Illinois includes the edge of five major ecological regions in the United States: the eastern deciduous forest, the tallgrass prairie, the southern coastal plain, the Ozark uplift and the northern boreal forest. Each of these areas has smaller, more specialized habitats within them, the natural divisions. The unusually rich diversity of life in our state is due to the variety of habitats in the 14 natural divisions. Let's take a quick tour of each of the natural divisions.



Discussion/Writing Questions:

1. **What is biodiversity?**
   Biodiversity is the "variety of life" on earth.

2. **What are the three types of biodiversity?**
   species diversity, genetic diversity, habitat diversity

3. **If a species becomes extinct, how is the biodiversity affected? Does the loss of one species affect other species? If so, how?**
   If a species becomes extinct, species diversity and genetic diversity are decreased. All of the genetic information for this species vanishes. The loss of a single species does affect other species. The organisms that it depended upon for food, those that depended upon it for food, other organisms that used this species as their habitat or in some way were affected by it (for instance, seed dispersal) all are impacted. This species was part of an interconnected web of species. When one part is removed, all the others are affected in some way.

4. **What do you think about attempts to save species from extinction in Illinois, such as those being undertaken for the greater prairie-chicken? What is good about it? What is bad about it?**
   Answers will vary. Attempts to save species from extinction are acting to preserve the gene pool of the species and to allow the species a chance to survive. However, there may not be sufficient habitat nor the correct quality of habitat left for some species, so survival chances may not be favorable unless habitats can be permanently preserved, too. The population may already be so small that unless import of individuals of the same species is allowed from other locations (if possible), the gene pool may have declined to a point that survival may not be possible.

5. **How does habitat diversity affect species diversity and genetic diversity?**
   Species diversity and habitat diversity are directly related. As good quality habitat diversity increases, so does species diversity. With plenty of good quality habitats, genetic diversity will be maintained by the thriving populations of species.

Activities:

English language arts
Writing Standards for Literacy in History/Social Studies, Science and Technical Subjects 6-12

Research to Build and Present Knowledge – Grades 6-8: 7, 8, 9

1. a. This activity may be completed either before or after viewing the video, although it might be more valuable to complete as an introduction before viewing the video. Give each student about two minutes to make a list of all species they have seen in the wild in Illinois. They will not be allotted enough time to write down all the species they may have seen, but they will have enough time to make a list that will help to make a point.

b. Next, write the five kingdom* names on the chalkboard. If you haven't studied the five kingdoms yet, you may want to do a brief introduction to each one.

c. Have the students label each species on their list as to the kingdom it is a part of. If a student is not sure about an organism, allow the group to assist. Count the number of members of each kingdom in the list. Rank the kingdom numbers from high to low. Each student should prepare a bar graph showing the total species that they indicated for each kingdom. Leave space between each bar for the addition of another bar.

d. More than 54,000 species are known from Illinois (excluding the bacteria). Opposite the kingdom names on the chalkboard write the following numbers and symbol (mix them up): ?; 1,400+; 20,000; 2,574+; 30,000. The numbers and symbol represent the number of species found in each of the five kingdoms in Illinois. Have the students predict which number of species/symbol goes to each kingdom. (Correct answers follow.)

- Kingdom Monera - ? (millions)
- Kingdom Protista - 1,400+
- Kingdom Fungi - 20,000
- Kingdom Plantae - 2,574+
- Kingdom Animalia - 30,000

On the bar graph have each student place a bar with the correct number of species for each kingdom in Illinois next to the amount that the student actually observed.

Why do you think the Kingdom Monera is represented by a question mark? (*No one knows how many species there are. There may be millions of species of bacteria.*) Do you expect that the actual species number for the Kingdom Monera will be large or small? (*large*) Did the results from the student species lists match those of the actual ranking by kingdom? (*usually not*) Why or why not? (*Students tend to place only large, familiar species on their own list.*) Are all species important or only those that we can see with our limited vision? (*All species are important. All species are connected.*) Have the students guess what group of animals has by far the most species. (*The Phylum Arthropoda contains about 28,000 of the 30,000 animal species found in Illinois. Arthropods are animals such as scorpions, spiders, mites, ticks, millipedes, centipedes, insects, crustaceans and others.*) Have the students write a brief report on one of the species on their list to tell about its life history, adaptations, where it lives and to show its relationships to at least three other species. You may also ask them to illustrate the report.

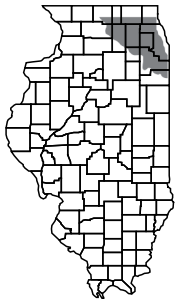
** The number of kingdoms changes as more information is available to taxonomists. Your textbook may use other numbers of kingdoms.*

Biodiversity of Illinois
Video Script

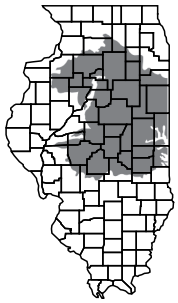
Section Two: *The second section of the video is a tour of the 14 natural divisions that are found in Illinois. Each natural division has unique features that harbor unique organisms.*

The **Wisconsin Driftless Division** is part of a larger region that extends into Wisconsin, Iowa and Minnesota. It has rugged terrain because it has not been covered by glaciers. The rolling hills and wooded ridges include the highest elevation in Illinois at 1,257 feet above sea level. With the coldest climate in the state, many of the organisms that live here are typical of areas found further north in the United States. An unusual feature of this natural division is the algific slopes. They exist on north-facing, rocky slopes that retain ice under ground for most of the year. When the air temperature is 90 degrees Fahrenheit, the surface temperature of an algific slope may be 42 degrees.

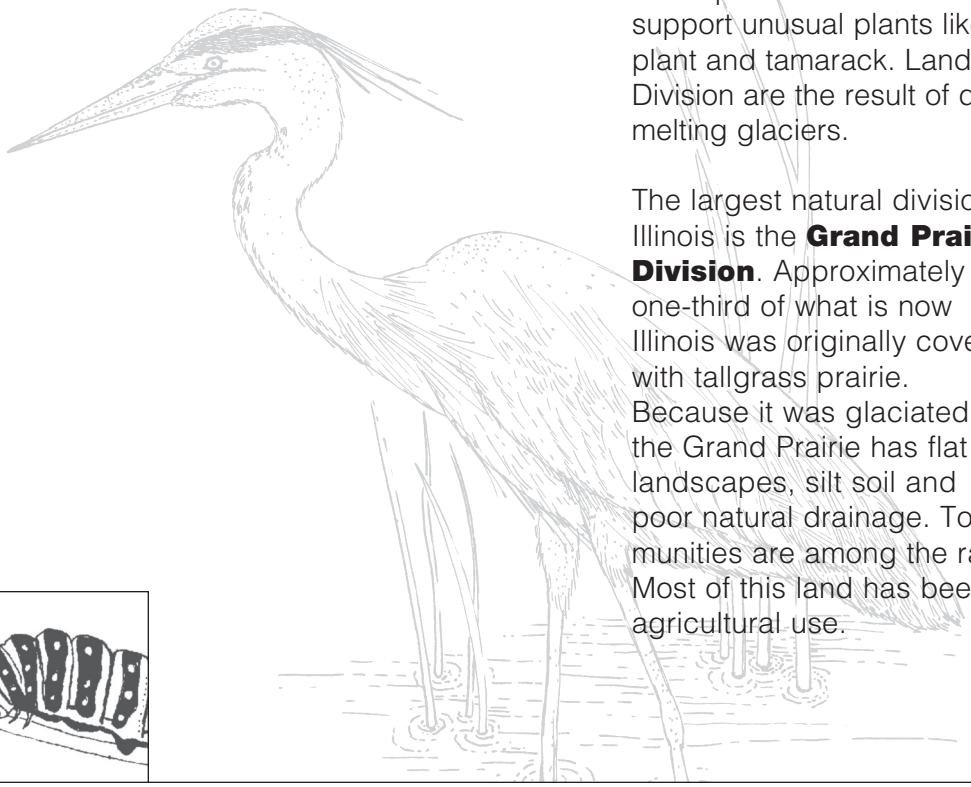
The **Rock River Hill Country Division** includes the Rock River watershed in northwestern Illinois. Its low hills once supported prairies on the uplands and woodlands along the streams. Sandstone outcrops along the Rock River provide habitat for distinctive plant species. This area was covered by glaciers.

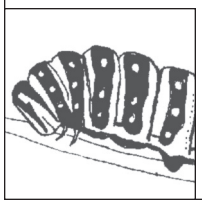


The **Northeastern Morainal Division**, near Lake Michigan, includes beach sands, dunes, sedge marshes and peatlands. Peatlands have acidic conditions created by lack of drainage and buildup of layers of peat. These wetlands support unusual plants like the pitcher-plant and tamarack. Land forms in this Division are the result of debris left by melting glaciers.



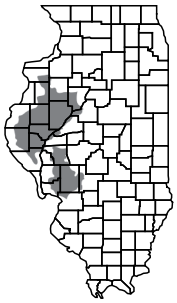
The largest natural division in Illinois is the **Grand Prairie Division**. Approximately one-third of what is now Illinois was originally covered with tallgrass prairie. Because it was glaciated, the Grand Prairie has flat landscapes, silt soil and poor natural drainage. Today, prairie communities are among the rarest in Illinois. Most of this land has been converted to agricultural use.





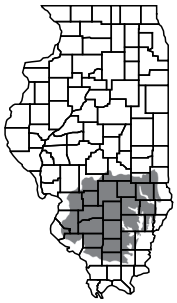
Rivers, bottomlands and backwater lakes of much of the Mississippi and the Illinois rivers are included in the **Upper Mississippi River and Illinois River Bottomlands Division**. The broad floodplains and gravel terraces of this region are covered with forests, prairies, rivers, lakes and oxbow lakes. Most of the area was glaciated.

The **Illinois River and Mississippi River Sand Areas Division** consists of the sand deposits left by the runoff from melting glaciers. These areas exist along the Illinois and Mississippi rivers and the dunes on bluffs in Jo Daviess County. Dry sand prairie, dunes and scrub oak forests are the main communities. Some plants and animals found here more typically dwell in the shortgrass prairies west of Illinois.



The glacial plain of the **Western Forest-Prairie Division** historically had prairies on the flat uplands and forests elsewhere. Rock outcrops of sandstone, limestone and shale are common in some areas. This division has a good natural drainage system.

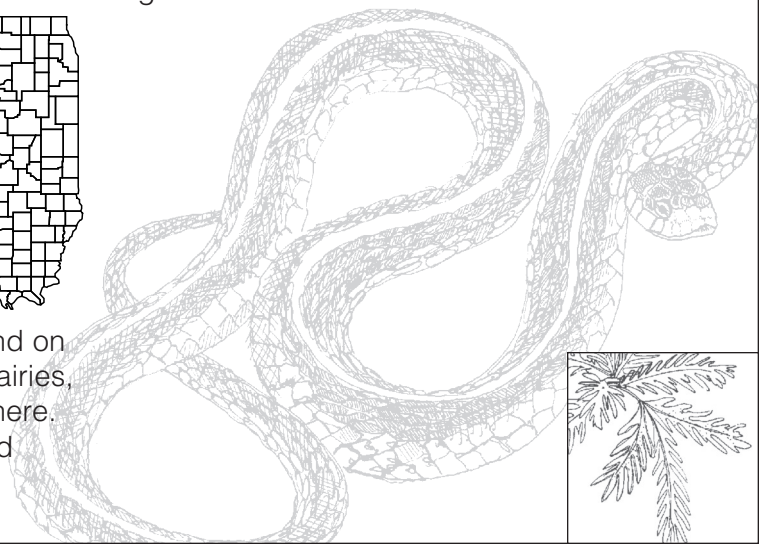
The narrow band of river bluffs, limestone cliffs and rugged terrain of the **Middle Mississippi Border Division** can be found along the floodplains of the Mississippi and lower Illinois rivers. Limestone cliffs and outcrops are common. Oak-hickory forests grow in the ravines and on north- and east-facing slopes. Hill prairies, caves and sinkholes are also found here. This area contains both glaciated and unglaciated land.



The **Southern Till Plain Division** is a large, relatively flat area in south-central Illinois. This area was covered by an ancient glacier. The streams in the area were important for draining the meltwaters of later glaciations. The clay soils support a mixture of forests and prairies.

The **Wabash Border Division** includes the bottomlands and associated upland forests of the Wabash River and its tributaries, the Vermilion and Little Vermilion rivers and Crab Apple Creek. This division has trees that are more commonly found in the forests of the eastern United States, such as the beech and tulip trees. Nearly all of this area was covered by glaciers at some time.

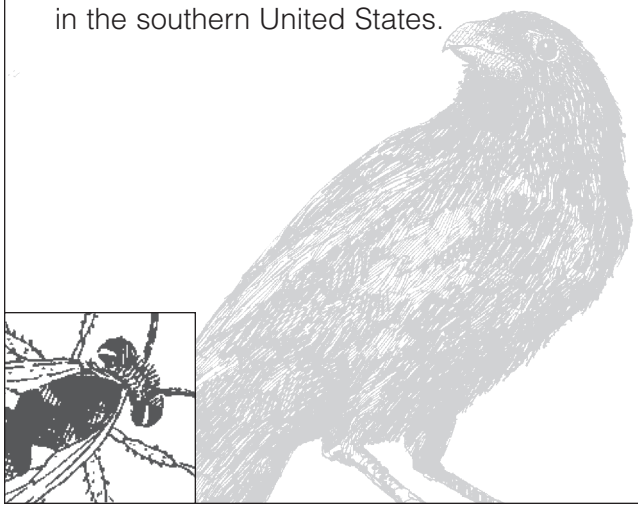
Found in southwestern Illinois, the **Ozark Division** is part of the Ozark uplift, a domelike structure of bedrock centered in the Ozark Mountains of Missouri. Hill prairies, caves, sinkholes and sandstone ravines are commonly found in the area. Many species that live here are typical of the Ozarks and are present nowhere else in Illinois. A portion of this division was glaciated.



South from Alton along the Mississippi River is the **Lower Mississippi River Bottomlands Division**. This small area of the state was generally not glaciated. Once covered with prairies, wetlands, rivers and forests, most of the land is used today for agriculture. The Mississippi River here is muddy, and its fish species include those tolerant of silt. The La Rue Swamp is a part of this division. Combined with the adjacent Pine Hills of the Ozark Division, La Rue Swamp and Pine Hills contain 43 percent of the plant species known in Illinois.

The **Shawnee Hills Division** is the unglaciated hill country at the southern tip of Illinois. It was originally forested except for small, rocky openings. It is characterized by a high, east-west ridge of sandstone cliffs and a series of lower hills.

The **Coastal Plain Division** is an unglaciated region of swampy, forested bottomlands and low hills. The uplands are composed of gravel, clay and sand hills with a covering of wind-deposited silt. The lowlands have loam and clay soils. Swamps support a great number of species which are more commonly found in the southern United States.



Discussion/Writing Questions:

1. **How were glaciers important to the diversity of habitats in Illinois?**
   Only the extreme northwestern and extreme southern parts of Illinois along with Calhoun County and parts of Pike, Jersey, Monroe and Randolph counties were not glaciated. The glaciers themselves and the waters melting from them changed the landscape. They moved land, leveling and filling many valleys. Their actions also churned up rocks and soil, which were carried great distances before being dropped when the ice in the glacier melted. The floods from melting glaciers were powerful forces that carved new waterways, deepened old ones and moved rocks and earth many miles before depositing them. In Illinois, the glacial deposits helped to create many flat land forms that would become prairies. The moraines in northeastern Illinois, Lake Michigan, the streams in many parts of the state and the sand deposits along our major rivers are also the result of glacial actions.

2. **Why does a good variety of habitats provide for a good variety of species?**
   Different habitats offer different food supplies, different amounts and qualities of shelter, different amounts of space, different amounts and availabilities of water and all four habitat components in varying combinations. Some species are generally adapted and can live almost anywhere. Other species require the specific conditions of one particular type of habitat. With increased variety in habitats, many narrowly adapted species can exist.

3. **What determines the kind of organisms that are found in an area?**
   The type of habitat and the food, water, shelter and space available in the habitat help to determine the types of organisms that live in an area.

4. **Review the characteristics of each of the natural divisions with the class.**
   See the video script (preceding) and the Illinois' Natural Divisions poster for more information about each natural division.

Activities:

English language arts
Writing Standards for Literacy in History/Social Studies, Science and Technical Subjects 6-12

Research to Build and Present Knowledge – Grades 6-8: 7, 8, 9

Next Generation Science Standards
MS-LS2-1, MS-LS2-4, MS-ESS2-2

1. Have the students research the glacial history of Illinois and document the effects of the glaciers on the landscape of the state and its associated organisms. Show the glaciation (or lack thereof) in each natural division (an Illinois map with county outlines is provided on page 23 of this supplement). Different tasks could be assigned to groups of students: research; interview scientists; prepare models; write report; prepare computer graphics of maps; prepare Power Point® presentation; make the presentation.

2. Prepare a more detailed version of the tour through the natural divisions, which in turn will be a tour of Illinois. Assign a group of two to three students to each of the natural divisions. Have them research the natural areas in the division, prominent towns/cities, the economy of the area, major problems/issues for the area, resource use in the area and unique species and their adaptations for living in the area. A map of the natural division should also be prepared (an Illinois map with county outlines is provided on page 23). Students should present a summary of their findings and submit a written report.

3. Have the students make a three-dimensional clay map of Illinois. You may want to stop the tape numerous times to assist them or let them take notes while watching this section. Additional research may also be required. Discuss why this project was or was not difficult.

Biodiversity of Illinois
Video Script

Section Three: *This section is a discussion of the three major habitats in Illinois: prairies, forests and wetlands.*

Another way to look at the biodiversity of Illinois is to examine our major habitat types: **prairie, forest and wetland**.

Prairies are communities in which the landscape is dominated by nonwoody plants, mainly grasses. The prairie in Illinois is tallgrass prairie and can be divided into six types: black soil prairie; sand prairie; hill prairie; gravel prairie; dolomite prairie; and shrub prairie.

Prairies are complex ecosystems in which plants, grazing mammals, burrowing animals, insects, fire and climate interact in balance. The prairie habitat is the most diverse in Illinois and includes more than 800 species of plants. Prairies have hot summers and cold winters and are often subject to drought. Fires are a regular feature of prairie lands. Historically, fire probably occurred often enough to burn every Illinois prairie at least once every one to five years. Without fires, prairies quickly develop into forests.

Illinois had an estimated 21.6 million acres of prairie in 1820. That equates to about 61 percent of the land in the state. All but nine Illinois counties contained some prairie habitat. By 1900, most of the prairies had been converted to agricultural or urban uses.

Illinois prairies currently cover about 6,100 acres and are small, with most less than 10 acres in size. Loss of prairie habitat and fragmentation of the remaining prairies has caused a loss in the natural biodiversity that prairies contain. The small populations of prairie organisms that exist in Illinois today are the types that tend to lose genetic diversity over time. With small numbers, the populations tend to inbreed. This process can result in organisms no longer capable of successful reproduction.

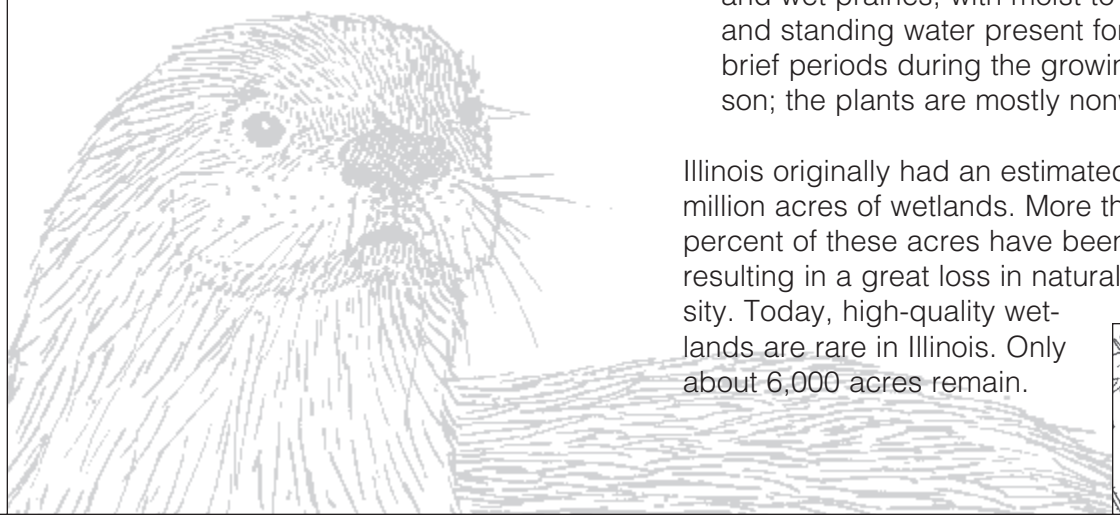
Approximately 75 percent of the wildlife habitat in Illinois is found within forests. More than half of the native plant species and more than half of the threatened and endangered species in Illinois are forest residents. Forest types in Illinois include:

- bottomland forest, also a type of wetland;
- upland deciduous forests, areas which are not subject to flooding and containing trees that lose their leaves in the fall; this type of forest is found in every county and is the most common forest type in Illinois;
- coniferous forest with cone-bearing, evergreen trees;
- and southern Illinois lowland forest with woody plants more than 20 feet tall and that are adapted to living in water.

Illinois had an estimated 13.8 million acres of forests in 1820. Today, forests cover about 4.3 million acres, approximately one-third of the original acreage. Only about 11,600 acres of the original forest remain untouched. Many native species have been lost from the reduction of forest habitat and fragmentation of the remaining forests.

Wetlands are transitional areas between land and water where the groundwater table is at or near the surface, or where the land is covered by shallow water. Wetlands are important to ecological and environmental balance. They help control the flooding of rivers and streams. They clean polluted water by acting as a filter, allowing sediments, nutrients and pesticides to settle out of the water.

Thousands of species of organisms depend on wetlands and water-related habitats. From fish, frogs and turtles to deer, river otters, beavers, bald eagles and waterfowl, wetlands provide important breeding, nesting and feeding areas. Wetlands are the habitat for many endangered and threatened species. In addition, many plants live only in aquatic habitats. They include the baldcypress tree, silver maple, rose mallow, pondweed, duckweed and cattails. The buttonbush, buttercup and American lotus are also among the many types of vegetation in wetland communities.



Several types of wetland habitats occur in Illinois. They include:

- bottomland forest, large timbered areas bordering swamps or rivers that are subject to frequent flooding;
- Lake Michigan, the third largest Great Lake and the sixth largest freshwater lake in the world;
- lakes, ponds and reservoirs, which are wetlands and deep water habitats that tend to be manmade in Illinois;
- marshes, composed mostly of non-woody plants; this productive wetland has standing water for long periods throughout the growing season;
- peatlands, acidic lakes originally formed by glaciers that fill in with plant materials;
- rivers and streams, deep water habitats contained in a channel and with flowing water;
- swamps, with standing water and plants adapted to growing in it;
- temporary water supplies, formed anywhere that water can spread from its normal channel or can be held in a depression in the landscape; these wetlands are important feeding, resting and reproduction sites for many animals;
- and wet prairies, with moist to wet soils and standing water present for only brief periods during the growing season; the plants are mostly nonwoody.

Illinois originally had an estimated eight million acres of wetlands. More than 95 percent of these acres have been drained, resulting in a great loss in natural biodiversity. Today, high-quality wetlands are rare in Illinois. Only about 6,000 acres remain.

Discussion/Writing Questions:

1. **Name some of the organisms found in each of the three habitat types: prairie; forest; and wetland.**
   Answers will vary but could include the following.

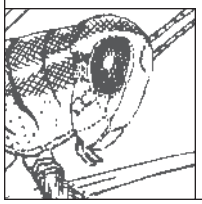
   Prairie: *pasque flower; badger; milkweed bugs; prairie dock; black-eyed Susan; prickly pear cactus; coyote; greater prairie-chicken; meadowlark; grasses; short-eared owl; wildflowers; insects; big bluestem; little bluestem; protozoans; bacteria; and many others.*

   Forest: *tufted titmouse; downy woodpecker; owls; squirrels; poison ivy; conifers; oaks; hickories; wild turkey; vines; mayapple; spring beauty; violets; insects; worms; protozoans; bacteria; and many others*

   Wetland: *cattails; frogs; turtles; river otter; bald eagle; mussels; crayfishes; raccoon; fishes; waterfowl; snakes; baldcypress; buttonbush; American lotus; dragonfly; damselfly; mosquito; bats; duckweeds, white-tailed deer; protozoans; bacteria; and many others.*

2. **Why is fire necessary for prairies to exist? How were fires started on the prairie before European settlers arrived?**
   Without fire, prairies quickly develop into forests. Fire helps to recycle the nutrients held in dead plant materials and to kill young trees. Before European settlers came to what is now Illinois, fires were started by lightning or by Native Americans.

3. **How has the biodiversity in Illinois prairies been reduced?**
   Most of the prairies in Illinois have been converted to agricultural use, particularly for the growing of row crops, or urban use. The prairies that remain tend to be small and not connected to each other (fragmented). The species that live in these remaining prairies are isolated and lose genetic diversity over time, which can lead to unsuccessful reproduction and extinction.



4. **Many wildlife species rely on the forest habitat in Illinois to survive. What does forest habitat provide for species?**
   Answers will vary. Forest habitat provides food, water, shelter and space. The different levels (ground level, understory, canopy) in the forest allow species to specialize in one part of the forest. They also allow vertical and horizontal movement. Trees provide shade which cools the temperature and decreases water loss. Trees also provide food and shelter for many species.

5. **Why is habitat fragmentation such a problem?**
   Fragmentation isolates populations of organisms, making it difficult for them to come in contact with other members of their own species. This isolation can lead to loss of genetic diversity and possible extinction. It also reduces the amount of good-quality habitat available for the species. These small plots are often too small to support an organism and its young. Fragmentation also promotes the survival of species that live in edge habitats.

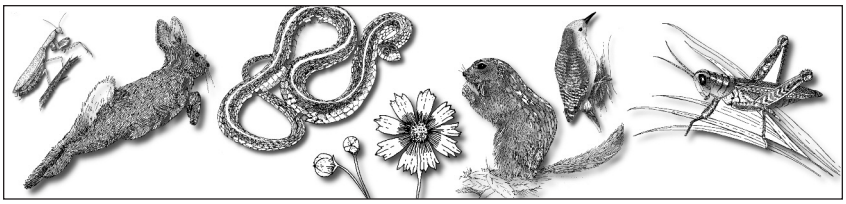
6. **Why are wetlands important?**
   Answers will vary. Wetlands help control flooding, recycle nutrients, clean the water and provide habitat for thousands of species which live in the wetlands or use the wetlands as they migrate.

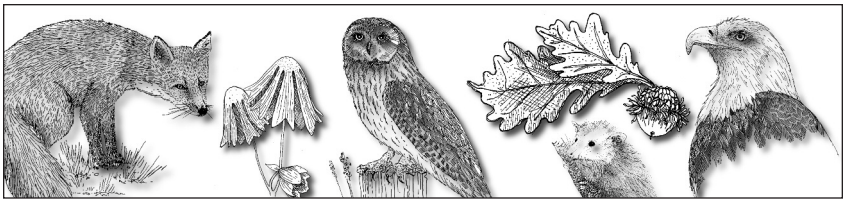
7. **What are some of the benefits provided to wildlife from wetlands?**
   Answers will vary but could include the following: breeding, nesting, resting and feeding areas; reduce silt in streams; remove pollution from the water; help to control floods.

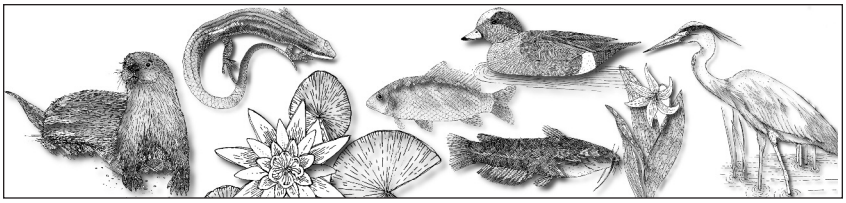
8. **Why has there been such a reduction in each of the habitat types found in Illinois from the early 1800s through today? What is the land that was once prairie, forest and wetland being used for?**
   During this time period, people of European ancestry began to settle in Illinois in ever increasing numbers. They converted much of the land to agricultural and urban uses.

Activities:

Next Generation
Science Standards
MS-LS2-2, MS-LS2-4





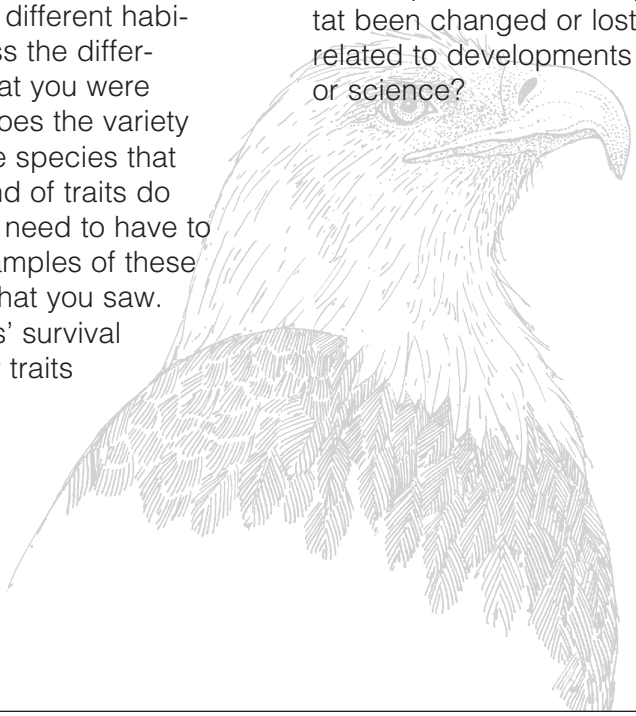


1. Produce a panorama of prairie, forest and wetland habitats. Research the species to learn about their adaptations, life cycles and interactions with other species. Construct a food web and a food pyramid for each habitat. Take the panoramas to classes of younger students and tell them about the different habitats and the species that live there.

2. Compare features of some of the organisms from each of the different habitats. What are some of the adaptations for survival in each habitat?

3. Visit wetland, forest and prairie habitats (or any combination that you have access to). At each site, instruct the students to write a letter to you describing what they feel, smell, see and hear in each of the different habitats. As a group, discuss the differences in the habitats that you were able to observe. How does the variety in the habitats affect the species that can live there? What kind of traits do species in each habitat need to have to survive? Give some examples of these traits in the organisms that you saw. Compare the organisms' survival potential based on their traits

4. Research a few of the endangered and threatened species of Illinois. Visit https://www2.illinois.gov/dnr/ESPB/Pages/default.aspx to see the complete list of Illinois endangered or threatened species. Many endan-gered and threatened species are specifically adapted to certain habitats. What special features does each species have to help it survive? Note the reason(s) that the species are endangered or threatened. Is there a link between habitat loss and the status of the species? If so, why has the habitat been changed or lost? Is the loss related to developments in technology or science?



Biodiversity of Illinois
Video Script

Section Four: *Section four includes a discussion of the importance of biodiversity as well as the effects of human activities on biodiversity.*

Early European settlers of the land that became Illinois were concerned with surviving. Resources appeared unlimited. They navigated and explored, logged, farmed, fished, hunted, scavenged and constructed. They acted without knowledge of the limit of natural resources or how fragile the land can be.

The people of Illinois are important controllers of the landscape and its diversity. Human activities have drastically reduced the diversity of habitats in Illinois and the overall biodiversity of the state. When habitats are altered, the organisms that lived there are killed, must adapt or must move to different habitats. Ecological relationships are disturbed and the area's ability to perform services like flood control, water purification and nutrient recycling are diminished.

Some of the habitats that originally occurred in our state can be found in nature preserves, state parks, conservation areas and other protected sites that shelter the state's biodiversity. Some habitats are very small and rare. Habitat loss, introduced species, pollution, population growth and over consumption are the main threats to biodiversity today. Attempts are being made to restore habitats to their original condition. Knowing how to restore a habitat is difficult, as it requires a complete understanding of what the original habitat contained.

What is biodiversity? Biodiversity is the variety of living things, the genes that make them unique and the habitats that they live in. It is also the connections between them.

According to many scientists, loss of biodiversity is one of the most urgent environmental problems facing our planet. The extinction of a species results in the loss of genetic information. The natural rate of extinction is about one species every 1,000 years. It is estimated that today, three species on earth become extinct every hour.

Degrading our natural systems threatens services like water purification and nutrient recycling. These are the services that support life on earth. For humans, this degradation may lead to the potential loss of medicines, foods, products and jobs.

Every person is able to protect biodiversity. Scientists are working together to conduct biological inventories to learn more about the diversity of life throughout the world. Scientists are also working to understand connections among living things so that we can better understand what we need to protect. Many scientists believe that the future of the earth's biodiversity will depend on a human love for other organisms and the values people place on these resources.

Human appreciation of organisms provides the greatest hope for preserving biodiversity. Because each species contains unique biological and genetic information, conservation of species may be critical to the future quality of our lives. All species are significant, many in unknown, but potentially vital ways. All living things depend upon other living things. We must value biodiversity for its own sake and try to preserve it.

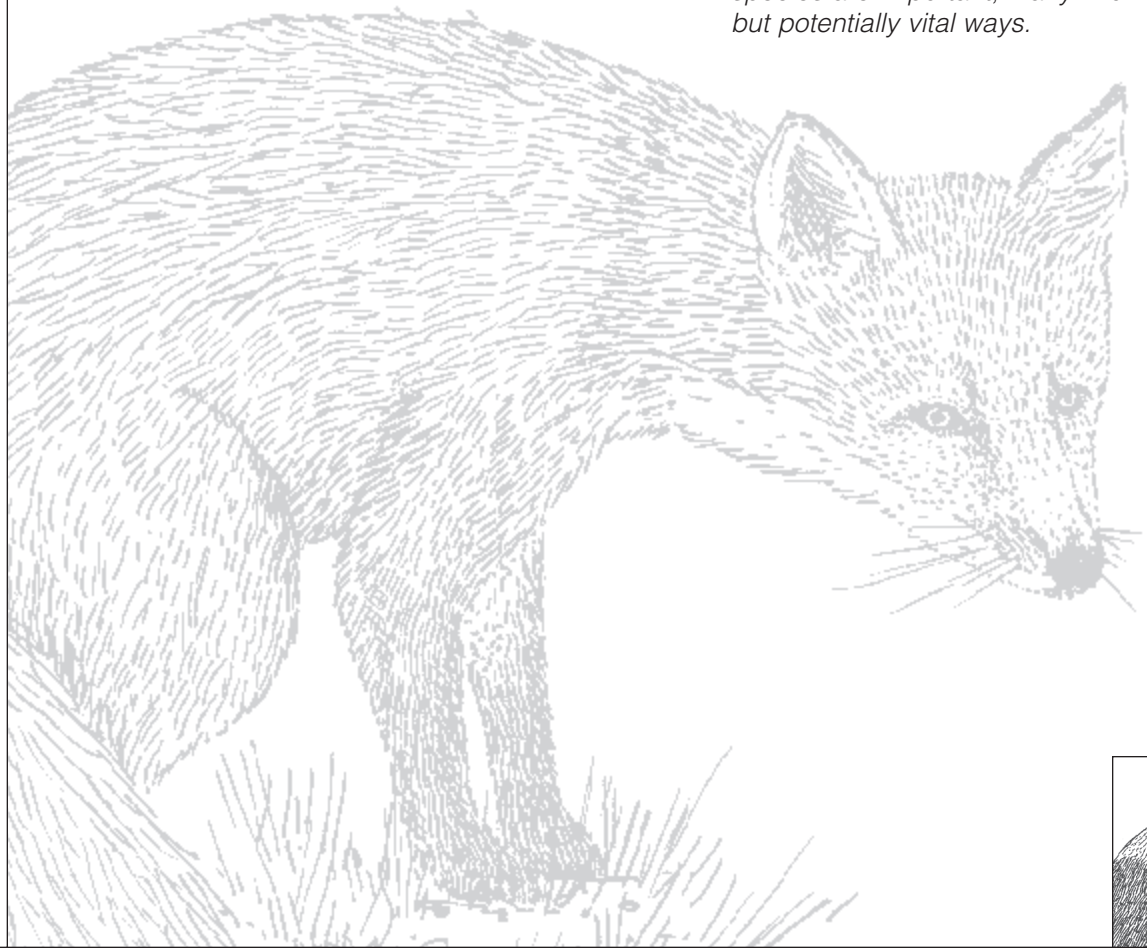
Discussion/Writing Questions:

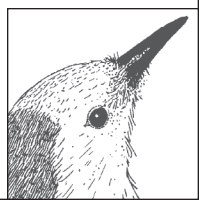
1. **What are some of the ways that European settlers changed the environment in Illinois?**
   They logged, farmed, fished, hunted, mined, drained wetlands and constructed without restrictions (for many years) or much concern about the effects on the environment.

2. **How do the choices that humans make, both personally and as a society, affect the environment, and therefore, the organisms living in it?**
   Any choice that affects the environment affects everything that lives in the environment. Every person has the ability and opportunity every day to help protect the environment. Human appreciation of organisms and the understanding that all things are connected is vital to protecting environments.

3. **How do improvements in technology and increased knowledge affect the environment?**
   Answers will vary. They can have both positive and negative outcomes. Improvements can lead to increased communication, better methods of monitoring species and habitats, more knowledge of organisms and habitats and better application of that knowledge. Increased technology can also lead to improved methods of harvesting, crop production and medical procedures. These processes can extend life for humans, which does take a toll on the environment through supporting a larger population that lives longer than ever before. Humans, though, have the ability to understand what their actions will result in and can offer hope through change.

4. **Why is biodiversity important?**
   All living things depend upon other living things. Each species contains unique biological and genetic information. Conservation of species may be critical to the future quality of life on earth. All species are important, many in unknown but potentially vital ways.





Activities:

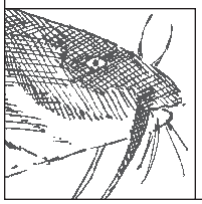
English language arts
Writing Standards for Literacy in History/Social Studies, Science and Technical Subjects 6-12

Research to Build and Present Knowledge – Grades 6-8: 7, 8, 9

Next Generation Science Standards
MS-LS2-1, MS-LS2-4, MS-LS2-5, MS-ESS2-2

1. Do a research project on the history of land use in your community over the past 200 years. Prepare maps for land use/land cover in your area in 1800, 1900 and 2000. Compare the land usage. What were the major changes? Why did they occur? Are they related to advancements in technology in any way? Are they related to the geography of the area? What are some problems that have developed regarding land use in your community? Select one of the problems and research it thoroughly. Compose a paper with recommendations for improvements. If possible, present the findings at a community meeting involving the issue or hold a debate with students representing each side of the issue.

2. Habitat loss is a major problem affecting the biodiversity of Illinois. Restoring habitats that have been destroyed or altered is sometimes attempted. However, restoring habitats to their original condition is extremely difficult because most of the time no one knows exactly what the habitat components were, their arrangement or the connections between them. If even one part of the habitat is missing or is in the wrong proportion, the entire project can be a failure. The following activity is adapted with permission from *One Bird - Two Habitats*, a middle school curriculum about migratory birds developed by the Wisconsin Department of Natural Resources, 1994.



a. Collect several old clocks and/or watches. The activity best achieves its objective if the items actually work. Inexpensive watches may be found for purchase in discount stores or resale shops. Students might also be able to find some at home. Be sure that they know that the item will not be returned, however. Other items can be used, but they should contain numerous parts and pose no danger to students.

b. Divide the class into groups. Group size will be determined by how many items you obtain. In each group assign the jobs of Labeler (to label the parts), Recorder (to keep track of each part's function), Disassembler (to take the clock/watch apart) and Assembler (to put it back together).

c. Give each group one clock or watch. Tell them to disassemble the item into as many parts as possible within 10 minutes. The Labeler and Recorder should note the name and function of each part. If they aren't sure what something is or what it does, just record a "?" for that part.

d. At the end of the 10 minutes, the students should take all parts which were recorded with a "?" and throw them away. Now have the Assembler put the remaining parts back together the way they were originally arranged. Students will find that the task is nearly impossible.

e. Have the students answer the following questions: How does the clock/watch compare to an ecosystem? Would the ecosystem have more or fewer parts than the clock/watch? How could we find out what an ecosystem contained? Why is it important to save all of the parts of an ecosystem, even those we don't think have an obvious purpose? What if parts of the ecosystem are already gone? If you

had removed only one part of the clock/watch, would it have still functioned properly? Would an ecosystem still function properly with one part missing? Why is conserving biodiversity important? Is conserving biodiversity only important for humans? Should large areas be set aside just to conserve biodiversity? How might this option cause problems?

3. The following activity is adapted with permission from "All the World's a Web," pages 74-79, *Windows on the Wild: Biodiversity Basics*, published by the World Wildlife Fund, ©1999.

a. Write each of the following Key Words on a separate note card and place them in a container: earth; animals; plants; people; bacteria; Illinois.

b. Write each of these Web Words on a chalkboard or sheet of flip chart paper: technology; natural habitats, crops; trash; shopping; soil; solutions, pollution; pesticides; food; oceans; Lake Michigan; rivers; money; water; human population growth; school; cars; endangered species; organic farming; atmosphere; future generations; air; medicine; groundwater; protists; fungi.

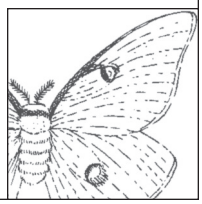
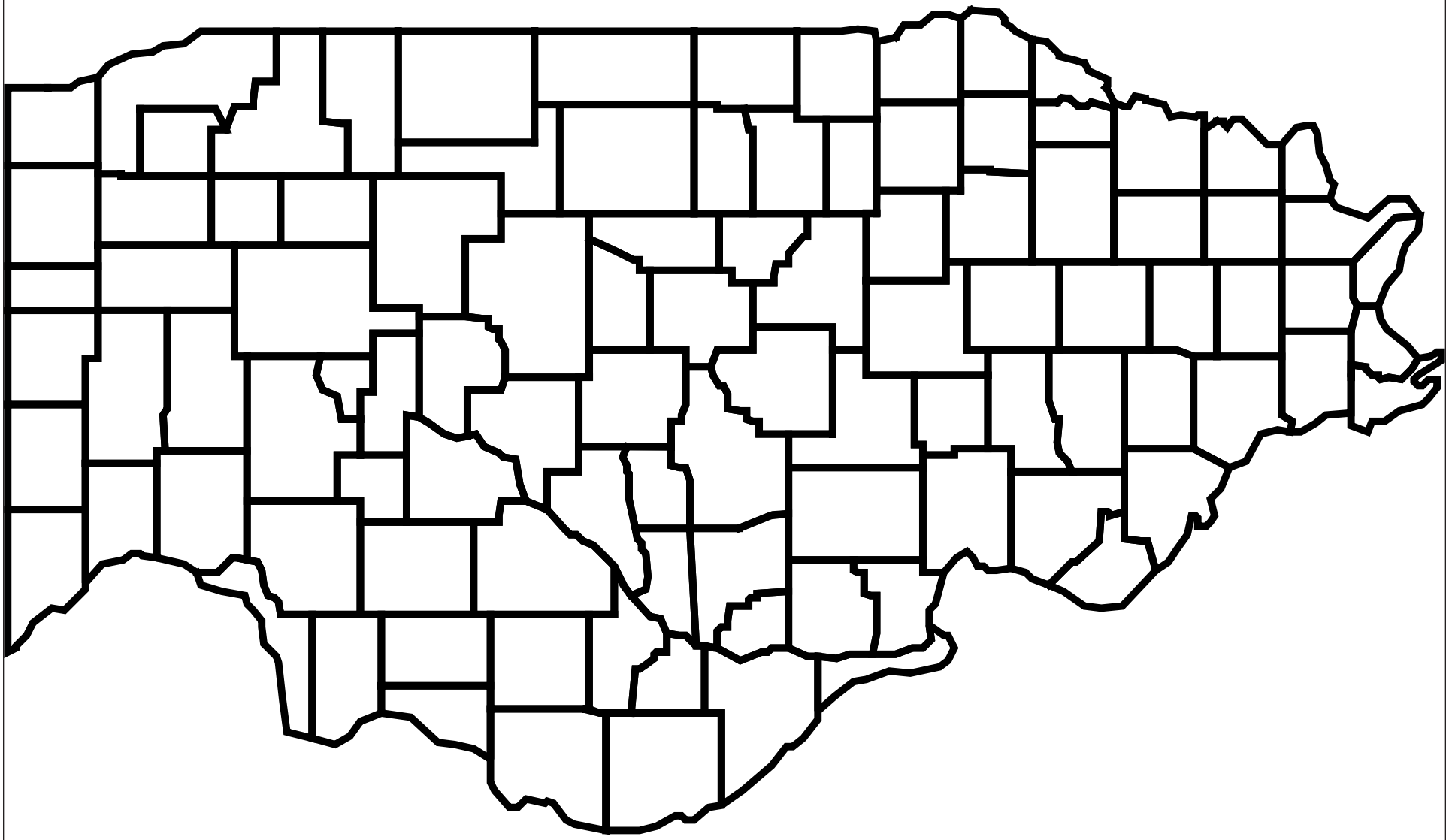
c. Separate the class into six groups. Have one person from each group draw one of the Key Words from the container. Each group should write the Key Word in the center of a piece of paper. Next, tell the students to create a web using as many of the Web Words as possible. They should use words to describe the connections they are making. For example, "**earth** is surrounded by an **atmosphere** that is affected by **oceans** which can be threatened by **pollution**," and so on. Students should consult resource books if they encounter unfamiliar words.

d. Each group should present the results to the class, explaining the connections that they have indicated between the words. Have the students look for similarities and differences in the webs and discuss them at the conclusion of the presentations.

e. Biodiversity is the ultimate web. Have the students create a new web of words using biodiversity as the Key Word. You may want to allow them to add words to the Web Word list before proceeding.

f. As an assessment, have each student write a two paragraph report. In the first paragraph, he/she should explain how a music group or orchestra would function if it lost one of its members. In the second paragraph the student should explain what a music group/orchestra has in common with biodiversity and how biodiversity is affected when one or more parts are permanently removed.

4. Have the students list some advantages and disadvantages of natural resource conservation and management programs. Instruct each student to select one Illinois species and speculate on what would happen if it were to become extinct. Ask each student to develop a personal plan for biodiversity in the future; in other words, what he/she would like the biodiversity on earth to be like 25 years from now and how he/she can help to achieve this goal.



ILLINOIS MAP