Activity 3-2
The Case of the Greater Prairie-chicken

AT A GLANCE
Work in small groups to discover how the greater prairie-chicken's decline is tied to the major causes of biodiversity loss in Illinois and discuss what people are doing to help protect the greater prairie-chicken.

OBJECTIVES
Describe how habitat loss, introduced species, pollution, population growth and over-consumption are threatening the greater prairie-chicken and biodiversity in general. Discuss ways people are trying to protect the greater prairie-chicken.

SUBJECTS
English language arts, science

SKILLS
gathering (reading comprehension), analyzing (comparing and contrasting, discussing), applying (proposing solutions)

LINKS TO *ILLINOIS BIODIVERSITY BASICS* CONCEPTUAL FRAMEWORK
endangered, threatened and extinct; the five major causes of biodiversity decline

VOCABULARY
endangered species, habitat loss, introduced species, over-consumption

TIME
two class periods

MATERIALS
one copy of the "Prairie-chicken Problem" and one set of "Prairie-chicken Cards" for each group; one copy of "Prairie-chicken Solutions" for each student; five index cards or pieces of paper per student (for Assessment #1)

CORRELATION TO COMMON CORE STANDARDS AND NEXT GENERATION SCIENCE STANDARDS.
English language arts: Writing Standards for Literacy in Science, Production of Writing, 4; Research to Build and Present Knowledge, 8, 9; Range of Writing, 10
science: MS-LS1-4, MS-LS1-5, MS-LS2-1, MS-LS2-4, MS-LS4-5, MS-LS4-6, HS-LS4-4

There are less than 200 greater prairie-chickens left in the wild in Illinois, making them one of the most endangered birds in the state. Habitat loss has forced this small population into isolated groups in two counties (Jasper and Marion). In this activity, your students will learn about the threats to greater prairie-chicken survival. They will discover that prairie-chickens are beset by the same problems that threaten biodiversity around the world—something we call the HIPPO dilemma. HIPPO is an acronym for the five major problems threatening earth's biodiversity: **H**abitat loss, **I**ntroduced species, **P**ollution, **P**opulation growth and **O**ver-consumption. Students will also learn some of the ways people are trying to protect the greater prairie-chicken and to slow other kinds of biodiversity loss in Illinois.

BEFORE YOU BEGIN

For each group of four to five students, copy one "Prairie-chicken Problem" summary and make one set of "Prairie-chicken Cards." For each student, make one copy of "Prairie-chicken Solutions."

WHAT TO DO

1. **Divide the class into groups and describe the assignment.**
   You may want your students to watch *The Greater Prairie-chicken in Illinois* video podcast from the Illinois Department of Natural Resources. It can be accessed at http://www.dnr.illinois.gov/education/Pages/podcasts.aspx or on YouTube. Divide the class into groups of four or five students and explain that they're going to be learning about one of the endangered animals in Illinois—the greater prairie-chicken. Give each group a copy of the "Prairie-chicken Problem" summary and have one student in each group read the summary to the rest of the group. When the students have finished, give each group a set of "Prairie-chicken Cards." Tell the students to read each card out loud in their group. Next have them try to organize the cards into four or five major categories of threats to the prairie-chicken. Tell the students that it's OK if each group organizes the cards differently and if some categories have only one or two cards. Explain that some cards may seem to fit into more than one category. In that case, students should pick the category that seems most

appropriate to them. Then have each group make a list of the categories of threats that it developed.

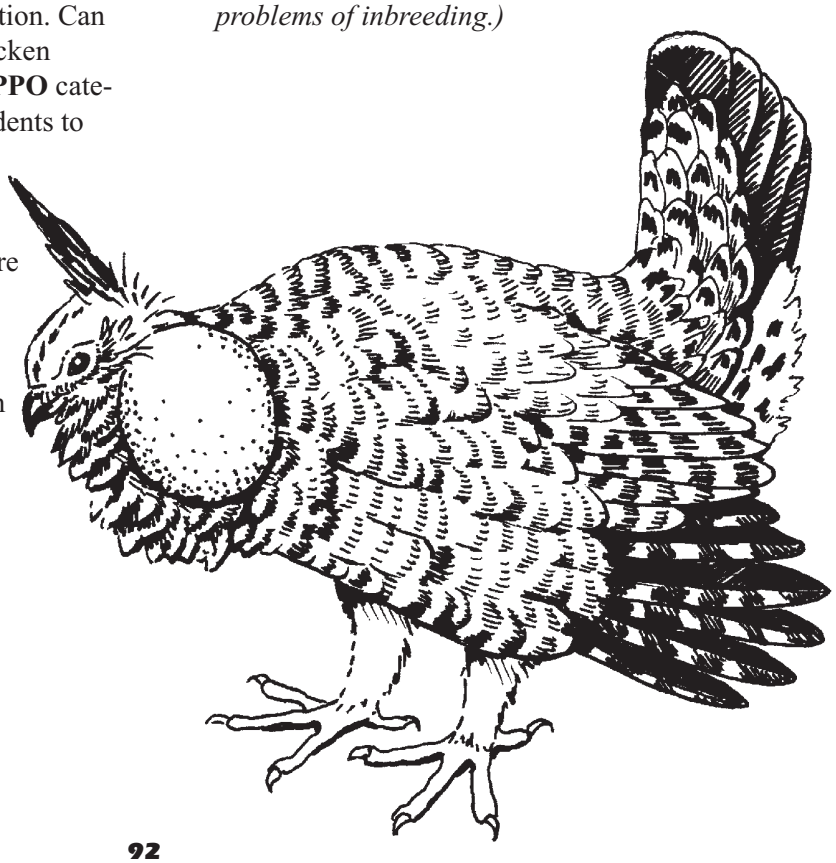
2. **Discuss as a class the threats to the greater prairie-chicken.**
Have each of the groups name the threats (categories) it came up with and the problems that fit into those threats. Record the ideas on the board. After all the groups have participated, have the students compare the categories. Are there categories that can be lumped together? (Draw lines to connect similar categories.)

3. **Explain and discuss the HIPPO dilemma.**
Explain that one way to think about the major threats to biodiversity worldwide is by creating broad categories that characterize the threats. Have the students compare their categories of threats to the greater prairie-chicken with those threats we've included, which are based on the thinking of many conservationists around the world. The categories are easy to remember by the acronym **HIPPO**. Review each of the categories with the students: **H** = habitat loss; **I** = introduced species; **P** = pollution; **P** = population growth; **O** = over-consumption. Can the students assign each of the prairie-chicken problems they read about to one of the **HIPPO** categories? (See answers below.) Ask your students to compare the HIPPO categories to the categories they came up with. How are they similar? Different? Can they think of any other endangered animals and plants that are affected by one or several of the HIPPO problems? Ask students to describe ways that one type of threat can be related to another. For example, introduced species can cause habitat loss and human population growth can increase pollution.

Answers:

Habitat loss: B, F, H, J, K, L
Introduced species: E, G, I
Pollution: D
Population growth: A
Over-consumption: C

4. **Discuss possible solutions and distribute copies of "Prairie-chicken Solutions."**
Once your students have a better understanding of the HIPPO dilemma and the threats to the greater prairie-chicken, have them brainstorm ways to protect the prairie-chicken. (Coach them a bit to draw out more concrete ideas than "increase habitat" or "stop pollution.") Write their thoughts on the board until they run out of ideas and then have them read the "Prairie-chicken Solutions" handout to discover some innovative ways people are trying to protect the prairie-chicken. When they have finished, ask them if they learned any new alternatives. Did the students find out any more about the problems faced by the prairie-chicken by reading about the ways people are trying to protect them? *(Students should point out that greater prairie-chickens are also threatened by having such a small population size and, therefore, limited genetic diversity. Review this problem with the students, making sure they understand that low numbers may mean a disease or a natural disaster could easily wipe out the population and that low numbers can lead to problems of inbreeding.)*



A Note to Educators

As your students will discover, there are many different efforts taking place that are designed to assist the survival of the greater prairie-chicken in Illinois. But it's also important to understand that protecting any endangered species and/or subspecies can be controversial and that not everyone agrees on how best to conserve those species that are in the most serious trouble–or even if we should protect them. Although the issues are complex, you might want to have students explore some of them–including the Endangered Species Act–in more detail. See the "Extensions" to this activity for ideas about getting your group to examine some of these controversies.

WRAPPING IT UP

Assessment

1. Distribute five index cards or pieces of paper to each student. On each card, have the students write the first letter of one of the following: habitat loss; introduced species; pollution; population growth; and over-consumption. You may want them to write "Pop" on one card to separate population from pollution. Then, one at a time, read each of the statements in the list below. Ask students to hold up the card that they think portrays the threat to the species or natural area described in the statement. More than one answer may be correct! You can do a quick visual assessment of the class or have your students keep track of their individual scores.
   - The eastern sand darter is on the decline in Illinois rivers because of declining water quality. **(H, P)**
   - The demand for residential and commercial property near large Illinois cities is eliminating wetlands. **(H, Pop, O)**
   - When industries use water from rivers and lakes, the water may go back into waterways at a higher temperature, killing organisms that can't tolerate warmer water. **(P)**
   - The multiflora rose, an introduced species in the United States, took away habitat from many native plants in Illinois fields. **(I)**
   - More people are moving from urban areas to the country where there is more "natural scenery." **(H, Pop, O)**
   - The main reason for the yellow mud turtle's decline is the loss of the shallow ponds it inhabits, due to drainage for agricultural use. **(H)**
   - Bison were the first large animals to be killed off following European settlement of Illinois and elk followed shortly thereafter. **(H, O)**
   - The numbers of eagles, peregrine falcons and ospreys declined steeply in the 1960s because pesticides sprayed on crops moved through the food chain and caused the birds to lay eggs with soft shells. These soft-shelled eggs broke before the young could develop and hatch. **(P)**
2. Have each student develop a brochure for the Illinois Department of Natural Resources that explains how Illinois' increasing human population is affecting the state's natural resources. Allow time for research.

Portfolio

Have the students compare and match HIPPO to the list of threats their small group identified. Have them write their comparison on a piece of paper and include it in their portfolio.

Extensions

1. Have each student research and write a short report or prepare a poster on an extinct species or one that is currently or was previously endangered or threatened because of people's activities. Students can use the following examples, or they can look for their own examples of over-exploited species.
   a. reduction of egret and tern populations for decorative plumes at the turn of the 20th century
   b. severe reduction of bison because of cultural conflicts and over-hunting for meat, hides and sport
   c. reduction of populations of American ginseng for herbal supplements and medicines
   d. extinction of the Carolina parakeet due to unregulated hunting and other factors

2. For older students, you may want to explore through a debate the controversy surrounding the greater prairie-chicken and other endangered species that live in Illinois. Although most people recognize the value of biodiversity, much controversy centers on the following issues:

Saving Species Versus Saving Habitat

In the past, many conservation programs focused on saving individual species. The current Endangered Species Act is an example of the species approach to protecting biodiversity. Under the act, species and subspecies are listed as threatened or endangered. The U.S. Fish and Wildlife Service, which oversees the act, is required to develop a recovery plan for each endangered species or subspecies. Although protecting habitat is a key component of most species recovery plans, the emphasis is on individual species and subspecies. Today, many people would like to see the Endangered Species Act include more of a focus on protecting habitat than individual species. By protecting habitat, many argue that more species will be protected in the long run. They also feel that too much time and money are being spent on individual species and subspecies—and that we need to protect larger tracts of habitat if we want to protect biodiversity. Others argue that we need to do both and that there are some key species that need special protection if they are to survive.

Saving Species Versus Subspecies

Another debate centers on the difference between species and subspecies and the importance of each. Although the Endangered Species Act currently protects species and subspecies, some people feel that subspecies are so genetically similar to their relatives (which are often not endangered) that little genetic information will be lost if a subspecies becomes extinct. Other conservationists argue that it's just as important to save a subspecies as it is to save a species. A subspecies develops when a small population is isolated from its main population and, over time, develops distinct characteristics that help it adapt. For example, many subspecies form in isolated valleys and islands where breeding with the main population can't occur. Many conservationists feel that it's important to protect as much of the world's genetic diversity as possible. They also point out that, in many cases, a subspecies is very important to an area's ecological health.

Losing Genetic Diversity

Another issue focuses on efforts to protect genetic diversity within populations. Again, using the greater prairie-chicken as an example, many scientists feared that because the population of the greater prairie-chicken in Illinois is so low, continued inbreeding weakens the small number that remain. To improve the genetic diversity of the prairie-chicken population, prairie-chickens from Kansas, Nebraska and Minnesota were released into the Illinois prairie-chicken population in the 1990s. Breeding occurred and genetic variability increased. However, the new generations may still lose traits or gain new traits that were not previously seen in prairie-chickens in Illinois. Transplanted birds were brought to Illinois in 2014 to again replenish the population which was decimated by natural disasters in 2013 and 2014.

Setting Priorities

Another controversial issue centers on how to set priorities for protecting species. Which species and subspecies are most important and why? In many cases, politicians, not scientists, decide how to spend national or state dollars. And that often means those species that have public appeal take precedence over those species that are less cute and cuddly but just as important ecologically. In the case of the greater prairie-chicken, some scientists may argue that other species are more important to protect and that all the effort expended protecting the greater prairie-chicken is not based on good science.

Saving Endangered Species and Ensuring Economic Development

Your students will find a variety of articles that examine the economic issues of species and subspecies protection. There are many differing views regarding how much money we should spend on protecting endangered species, how to resolve differences between economic growth and species protection, and other issues related to the implementation of the Endangered Species Act. To help your students explore these issues, you can have them research different aspects of the Endangered Species Act or some of the issues outlined here and make presentations to the rest of the group. Or you can stage mini-debates and have several students take different sides of an issue. If your students decide to investigate the economic or policy issues surrounding the Endangered Species Act, have them write to a number of organizations so that they will get a more balanced view of how scientists, economists and others feel about the importance of the act and the value of protecting biodiversity.

Resources

Ambrose, Dave. 1991. Plight of the prairie chicken. *Outdoor Highlights* 19 (12): 6-13.

Herkert, J. E., ed. 1992. *Endangered and threatened species of Illinois: status and distribution. Volume II: animals.* Illinois Endangered Species Protection Board, Illinois Department of Natural Resources, Springfield, Illinois. 142 pp.

Illinois Endangered Species Protection Board. 2009. *Checklist of threatened and endangered species*. Illinois Endangered Species Protection Board, Springfield, Illinois. http://www.dnr.illinois.gov/espb/Pages/default.aspx

Simpson, Scott. 2009. Illinois Department of Natural Resources, Newton, Illinois. Personal communication.

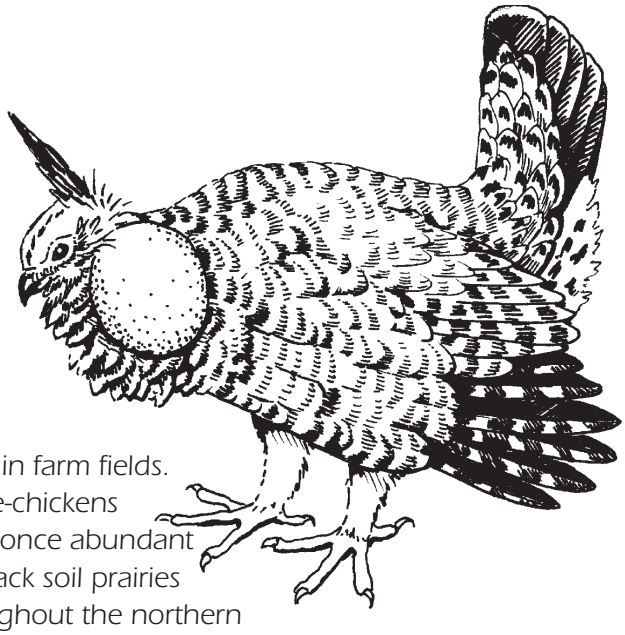
Walk, Jeffery A. 2004. *A plan for the recovery of the greater prairie-chicken in Illinois.* University of Illinois, Urbana, and the Illinois Department of Natural Resources, Springfield. 72 pp.

World Wildlife Fund. 1994. *WOW!—a biodiversity primer.* Quad/Graphics, Pewaukee, Wisconsin. 67 pp.

"In all my life, I never saw or dreamed of so beautiful a sight as the rolling prairies. Nothing can equal the surpassing beauty of the rounded swells and the sunny hollows, the brilliant green of the grass, the numberless varieties and splendid hues of the multitude of flowers. I gazed in admiration too strong for words."

—Ellen Bigelow, 1835
as quoted in Chicago Wilderness' An Atlas of Biodiversity

Student Page
Prairie-chicken Problem



Have you ever heard of prairie-chickens? What about old yellowlegs, the prairie hen or the prairie grouse? All of these names describe the same species, the greater prairie-chicken. The common name of this bird comes from its chicken-like body shape and its occurrence in grasslands. A relative of the domestic chicken, this bird occurs from Canada, south to Oklahoma and Texas in the United States. It was once common in the prairies east of the Mississippi River but is now a rare resident in Wisconsin and Illinois.

Prairie-chickens are brown with dark bars, and they have dark feathers on the sides of the throat. Their feet are feathered all the way to the toes. Male prairie-chickens have fleshy orange "eyebrows" and yellow-orange sacs on the sides of the throat. The sacs are inflated as part of their courtship display. Their body is about 16 to 18 inches long, and the wingspan is about 28 inches. Males weigh about two pounds, while females are a little smaller and usually weigh between one and one-half and two pounds.

Prairie-chicken courtship behavior is unique. On spring mornings, males move onto short-grass areas known as "booming grounds." At these sites, they go through a pattern of displays to attract females. The male raises the dark feathers on his neck, inflates his air sacs, droops his wings, spreads his tail and stomps his feet while producing sounds that have been described as "booming," "hooting" or "yodeling."

Most prairie-chickens nest in April and May. The nest is built on the ground and consists of a shallow depression lined with grasses. The female lays seven to 17 eggs, which hatch in about 25 days. Young prairie-chickens are able to leave the nest just a few hours after hatching. They can fly one to two weeks after hatching.

Food for prairie-chickens consists of insects, mostly grasshoppers, from May to October each year. At other times, they eat the fruits, shoots, leaves and seeds of various plants. They also feed on waste grain in farm fields. Prairie-chickens were once abundant on black soil prairies throughout the northern two-thirds of Illinois, reaching their estimated peak population of about 10 million birds by 1860. The population began to decline soon after this time, and prairie-chickens were considered on the brink of extinction by the early 1900s. Prairie-chickens were a game bird popular with hunters and at one time they were harvested by the ton. Loss of their prairie habitat to agriculture and development also contributed significantly to their removal from the state.

The greater prairie-chicken is an endangered species in Illinois, living only in Jasper and Marion counties. The two remaining flocks live on managed preserves instead of native prairie. Their very small population size led to loss of genetic diversity which affected their reproduction and survival ability. In 1994 the population was at 40 birds. Prairie-chickens were trapped in states where they are more prevalent and released in Illinois to add diversity and numbers. The population increased slowly until violent hail storms and drought in 2013 and 2014 reduced the population to 62 birds in 2014. A trap-and-release program to bring in greater prairie-chickens from Kansas was implemented in 2014. Nest parasitism by the ring-necked pheasant, an introduced species, has also been a problem. The hen pheasant may lay its eggs in a prairie-chicken's nest. The hen prairie-chicken then incubates her own and the pheasant eggs. The pheasant eggs hatch first, and the prairie-chicken raises them as her young, abandoning her eggs.

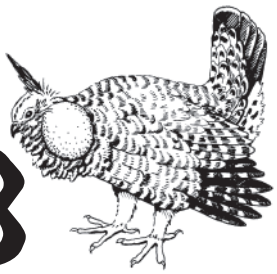
PRAIRIE-CHICKEN CARD

The human population in the state of Illinois in 1850 was 851,470. By 2005, the population had increased to 12,763,371.

A

PRAIRIE-CHICKEN CARD

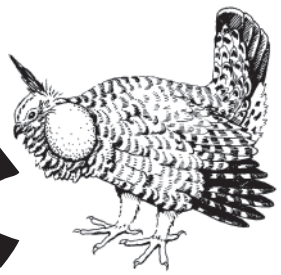
Urban sprawl and agriculture have reduced original Illinois prairie land by 99 percent since the late 1800s, leaving less than one percent of the well-drained, open ground which is critical for prairie-chicken breeding rituals.



B

PRAIRIE-CHICKEN CARD

Prairie-chickens were once harvested by the ton, or "cord," in times of unregulated hunting.



C

PRAIRIE-CHICKEN CARD

Chemicals like fertilizers, herbicides and pesticides reduce soil quality and destroy ground cover. This situation leads to less cover for the birds.

D

PRAIRIE-CHICKEN CARD

Boom-ah-boom, boom-ah-boom is the mating song of the male prairie-chicken. The sound can carry up to two miles. During the mating season, from March until early May, courtship demonstrations and formalized fighting for females take place. These rituals enhance successful reproduction. The introduced ring-necked pheasant's breeding season overlaps with that of the prairie-chicken, leading to competition and interference between the two species.

E

PRAIRIE-CHICKEN CARD

Many prairie plants that were part of the prairie-chicken's diet have been destroyed or are found in small, scattered areas.

F

PRAIRIE-CHICKEN CARD

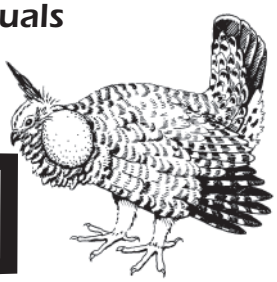
The ring-necked pheasant, an introduced game bird, may lay its eggs in prairie-chicken nests. The pheasant eggs hatch in 23 days, while the prairie-chicken eggs hatch in 25 days. The prairie-chicken is unable to recognize that the first chicks in her nest to hatch are not her own. She then leaves the nest with the pheasant chicks, abandoning the prairie-chicken chicks to die within their eggs.

G

PRAIRIE-CHICKEN CARD

In addition to the destruction of nesting sites, protective cover, such as briars, has been destroyed. Hawks, coyotes and raccoons have a better chance to prey on the prairie-chicken and its eggs. The prairie-chicken population is so small that the loss of even one or two individuals may be devastating.

H



PRAIRIE-CHICKEN CARD

The ring-necked pheasant was introduced to Illinois in the early 1890s. This species competes for the use of the same resources as the greater prairie-chicken.

I

PRAIRIE-CHICKEN CARD

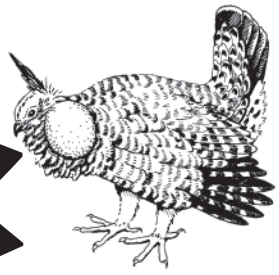
Populations of prairie-chickens in Illinois are now found on managed preserves due to the destruction of their native habitat.

J

PRAIRIE-CHICKEN CARD

With the development of the steel plow in the mid-1800s, farmers began to clear Illinois prairies at a rapid pace.

K



PRAIRIE-CHICKEN CARD

Once found in 92 Illinois counties, prairie-chickens now only live in two of them.

L

Student Page
The Case of the Greater Prairie-chicken (continued)

PRAIRIE-CHICKEN SOLUTIONS

Here are some examples of ways that people are trying to save the greater prairie-chicken.

Illinois laws are designed to keep people from killing, disturbing, injuring, harming or harassing prairie-chickens. People who violate these laws can be ordered to pay a large fine and/or serve time in jail.

Prairie-chickens have been imported twice from other states where they are more numerous to help increase genetic diversity and population numbers. Fertility rates did increase after the first time the process was carried out in the 1990s. The second program occurred in 2015 as a result of many of the remaining birds being killed by hail storms and the effects of two years of drought conditions.

Money from the Illinois Wildlife Preservation Fund has been instrumental in funding studies regarding the inbreeding problems in the native prairie-chicken population. This funding also helps pay the the costs associated with restoration efforts. Funds are donated by citizens through their Illinois state income tax returns.

The Illinois Department of Natural Resources manages the ring-necked pheasant population in areas of prairie-chicken habitat.

A management and recovery plan for the greater prairie-chicken in Illinois was developed by the cooperative work of several agencies/organizations in 2004. It was revised in 2014.

The Conservation Reserve Program, a federal farm bill, was enacted to encourage farmers to set aside marginal and highly erodible farm land as wildlife habitat.

Some land is being restored to the native prairie condition.

In the 1960s, the Prairie Chicken Foundation began buying private property in Jasper and Marion counties on which to manage populations of prairie-chickens. Later, The Nature Conservancy purchased additional property. The Illinois Department of Natural Resources' Prairie Ridge State Natural Area now consists of 4,100 acres that are managed for grassland wildlife.