MORE AQUATIC HABITATS

This lesson and its corresponding activities are targeted to grades 5-9 and subject areas English language arts, mathematics, science, social science and physical development and health.

Illinois contains a diversity of wetland communities. Wetland communities are lands that are often transitional between aquatic and terrestrial systems where the water table is usually at or near the surface, or the land is covered by shallow water. The values of wetlands and some of the larger, more common types of wetlands are discussed in Unit 2, Lesson 3. The following material deals with some of the rare wetland communities in Illinois: bogs, wet prairies, marshes, swamps and fens.

Bog
A bog is characterized as an area where more than 50 percent of the vegetation is herbaceous, standing water is present and the soil is acidic in pH. Restricted drainage and the presence of sphagnum moss create acid conditions. Bogs are found almost exclusively in glaciated depressions in northeastern Illinois.

Volo Bog, in northeastern Illinois, is the only Illinois example of a "quaking" bog, or one that is open at the center. This bog was formed during the Wisconsinian glacier 15,000 years ago. The glacier pushed large pieces of ice into the earth, forming kettle holes. Of the two kettle holes at Volo Bog formed by the glacier, one has filled in and the other has become considerably shallower than its original 50 foot depth. Since the original kettle holes were poorly drained, dead plant material accumulated and became peat. The development of peat resulted in water that was acidic.

The transition from open water to land, or succession, is readily evident in a bog. As additional plants die and settle to the bottom of the bog, a floating mat of vegetation forms along the edges and the amount of open water decreases. Without management, bogs eventually fill in.

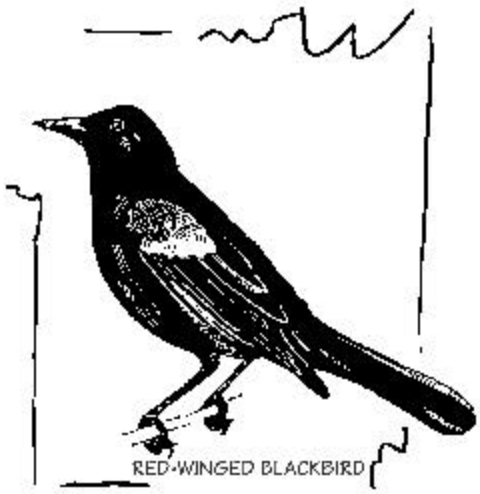
Along the edge of Volo Bog grow cattails, arrowhead and duckweed. Moving toward the center of the bog, the next distinct zone in the bog is the tall shrubs, such as poison sumac and winterberry holly. Further in toward the center of the bog are the tamarack trees. These unique conifers shed their leaves each fall. Tamaracks grow where the floating mat has become thick enough to support their weight. A low shrub zone area follows, which contains many young trees and shrubs growing amid cattails, orchids, bog buckbean and sphagnum moss.

The vegetation close to the open water area is a mat of herbs. This mat is very thin and cannot support much weight. Many of the same herbaceous plants from the previous zones grow here. The final zone is open water, which is all that remains of the original glacial lake.

Bogs are home to unique plants. With only one open bog remaining in Illinois, many of the plants in this habitat are rare, threatened or endangered. The pitcher plant is a carnivorous plant that consumes insects, mites, spiders and small frogs. The leaves of the plant form a tube that prey cannot escape from. Digestive enzymes dissolve the prey. Leatherleaf has thick leaves that are retained during the winter and protect the plant from excessive water loss. Orchids can live on the hummocks through a symbiotic relationship with fungi that decompose plant materials and share it with the orchids. A variety of aquatic organisms reside in Volo Bog, including dragonflies, leopard frogs, bullfrogs, snails and red-winged blackbirds.

Where to Find Bogs Today: The best example is Volo Bog State Natural Area in Lake County. A boardwalk into the center of the bog and on-site interpretive programs provide excellent opportunities to view this unique and fragile habitat. Pistakee Bog Nature Preserve can be accessed from the parking lot at Volo Bog.

Wet Prairie
A wet prairie, also commonly referred to as a wet meadow, is characterized as an area having more than 50 percent of the vegetation being herbaceous, standing water present seasonally during the growing season and neutral pH. Historically, wet prairies existed in the northern two-thirds



of Illinois and were most commonly found in the flood plains of major streams and rivers. Today, these communities remain as scattered relics throughout that range. As Illinois was settled, crossing the vast expanses of wet prairie became a chore for many pioneers. “Corduroy” roads, logs laid side-by-side, were built across many wet prairies to assist with the passage of wagons. Many pioneers crossed the prairies at night to avoid biting flies. Some wet prairies were mowed and the hay used for feed and bedding material for farm animals.

Many wet prairies were drained. Some people felt that stagnant pools of water held diseases. Others desired to drain them and convert them to agricultural fields. Large numbers of ducks inhabiting these prairies were considered a nuisance to surrounding grain fields. Landowners used a variety of techniques to drive ducks off these prairies.

Wet prairies have a lower plant diversity than other prairie communities. The most common plant in wet prairies is cord grass, or slough grass. Wetter sections of these prairies consist of hummocks created by bluejoint grass. Other typical plants include white lady’s-slipper orchid, ferns, sedges, wild blue iris, swamp milkweed, swamp rose and marsh fen.

Historically, wet prairies were havens for a variety of birds, including ducks, geese, swans, rails, prairie-chickens, sandhill cranes, warblers, red-winged blackbirds and herons. Turtles, frogs and muskrats were other common wet prairie inhabitants. With the decline in this habitat type, at least six animal species and eight plant species have been listed as Illinois endangered or threatened species.

Where to Find Wet Prairies Today: Some of the finest examples of remaining wet prairies can be found at Matanzas Prairie in Mason County, Green River State Fish and Wildlife Area in Lee County, Goose Lake Prairie in Grundy County and Chauncey Marsh in Lawrence County.

Marsh
A marsh is characterized as an area where more than 50 percent of the vegetation is herbaceous and the soil has neutral pH. Less than 30 percent of marsh vegetation is woody. With standing water present throughout the growing season, marshes are highly productive communities. Marshes occur throughout Illinois, with the most extensive communities occurring at the edges of bottomland lakes and sloughs and along the Illinois and Mississippi rivers.

The deeper the water level in a marsh, the lower the plant diversity. Marshes are dominated by tall grass plants, such as cattails, bulrushes and sedges. Other typical plants may include wild rice, white water lily, jewelweed, arrowhead and

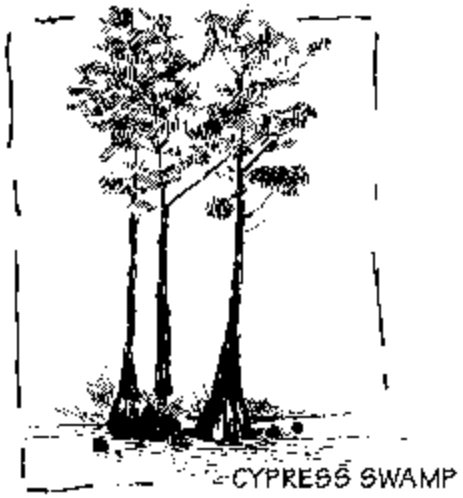
pondweed. Marshes are highly productive habitats and support hundreds of species of animals, such as frogs, toads, salamanders, turtles, muskrats, mink, swallows, ducks, herons and fishes.

Where to Find Marshes in Illinois: Chauncey Marsh Nature Preserve in Lawrence County

Swamp
A swamp is characterized as an area where more than 50 percent of the vegetation is woody, adapted to living in water and greater than 20 feet tall. Surface water is usually present in swamps. Illinois swamps are the northernmost remnants of a community that once covered most of the southern United States. Many of the plants and animals found in southern Illinois swamps are at the northern extent of their range, often resulting in a listing as threatened or endangered species.

The Cache River in southern Illinois was the ancient channel of the Ohio River. This watershed contains four overlapping physiographic regions, something which occurs in only five other areas in the United States. This overlap of northern and southern floras allows unique combinations of wildlife and vegetation to exist.

Native Americans used the Cache River valley for sustenance trapping, hunting and fishing. In 1702 a



Frenchman named Juchereaux established a mission and tannery in the area. Later settlers of European descent brought sawmills, farming and finally drainage and land clearing to the region. Lumber companies harvested large quantities of timber for lumber, veneer for manufacturing baskets and boxes, railroad ties, mine timbers and charcoal.

Cypress and tupelo swamps have a water depth of approximately two feet. Floating or submersed plants like pondweed, coontail and duckweed can be seen in the water. Bordering the swamp and adjacent forests are maples, elms and oaks.

Swamps are rich and biologically diverse habitats. For instance, the Pine Hills/La Rue Swamp area in southern Illinois contains 43 percent of all the plants species known from Illinois. The dominant tree of swamps is the bald cypress. Some individual trees may be as old as 1,000 years and have orange-tipped knees up to 10 feet high. Water tupelo is another common swamp tree.

Swamps are rich in wildlife diversity. Historically, bison, elk, black bears, cougars and wolves were found in the Cache River area. By the 1850s these species were no longer present. Today, animals typical of the area include herons, waterfowl, black vulture, red-shouldered hawk, barred owl, flycatchers, warblers, squirrels, bats, foxes, mink, muskrat, beaver and cottontail and swamp rabbits. On rare occasions, signs of bobcat and river otter may be found. A wide variety of frogs, turtles and snakes live in swamps.

Where to Find Swamps in Illinois: La Rue Swamp Nature Preserve in Union County. Heron Pond-Little Black Slough

Nature Preserve in Johnson County has a floating boardwalk that leads visitors into the pond.

Fens

A fen is a type of wet meadow that is fed by an alkaline water source, such as a calcareous (having calcium carbonate) spring or seep. The presence of calcium and magnesium makes the soil alkaline. More than 50 percent of the vegetation in a fen is herbaceous. Standing water is present. Fens are most commonly found in northeastern Illinois and in isolated areas along the Illinois River valley. Twelve of the known 125 fens in the United States occur in Illinois.

Fens frequently occur on a hillside and are often called “perched bogs” or “hanging bogs.” Some fens were historically mowed.

Typical plants include pitcher plant, turtlehead, skunk cabbage, beaked spikerush, wild marsh timothy, hoary willow, rushes, dwarf birch and cotton grass. Sandhill cranes and other wetland-dependent birds nest in fens. Some plants attract insects that specialize in fens, such as the Baltimore checkerspot butterfly which feeds on turtlehead plants.

Where to Find Fens in Illinois: Turner Lake Fen in Lake County, Spring Grove Fen Nature Preserve in McHenry County, Ferson's Creek Fen Nature Preserve in Kane County.

Wetland Issues

Drainage and siltation from agricultural development and lack of periodic burning have contributed to the loss and degradation of wetlands. Alteration of groundwater, including pollution, impacts many wetlands. With the diversity of unique plants in some wetlands, plant piracy is often a problem. Exotic species, such as glossy buckthorn and purple loosestrife, threaten to destroy some wetlands.

Current Wetland Management Practices

Restoration of wetlands often requires re-establishing historic water levels, revegetation, improving water quality, controlling erosion, reducing wave action or construction of water-retaining structures. Prescribed burns, control of exotic species and brush removal encourage desired plants and slow the process of succession. Vegetation control practices can also include use of chemical and mechanical techniques and biocontrol using insects. Land acquisition programs have been undertaken to preserve many unique communities.

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See related CD-ROM components: *Illinois Aquatic Species Fact Sheets*; *Illinois Frog and Toad Calls* audio.

UNIT 2, LESSON 4
ACTIVITY 2

COLONIAL NESTING BIRDS

SUGGESTED GRADE LEVELS: 5-9
SUBJECTS: English language arts, mathematics, science, social science
SKILLS: analysis, generalization, graphing, inference, listing, public speaking, reporting, research, small group work, writing
CORRELATION TO ILLINOIS LEARNING STANDARDS: English language arts 1C, 3C, 4A, 4B, 5A, 5C; mathematics 10A; science 12B, 13B; social science 17A, 17B, 17C

OBJECTIVES
Students will: 1) become familiar with the practice of colonial nesting, its advantages and disadvantages; 2) recognize some Illinois wetland colonial nesting birds; and 3) analyze trends in a graph.

METHOD
Students prepare a short report and complete a graphing exercise.

BACKGROUND
About 13 percent of the world's birds are colonial nesters. These birds each require a nest site that is surrounded by nests of other similar birds. The place where these clustered nests are found is called a rookery. Ordinarily, colonies are made up of a single species of bird, but sometimes two or more species may be present. This is particularly true of species like herons and egrets that require similar nesting sites. Nests may be at any height, but often are placed in the tallest trees in the area. The number of nests in a colony varies greatly. For instance, great blue herons nest in colonies ranging in size from a few pairs to 1,000+ pairs. In all true colonies, each nesting bird owns and defends a small territory around its nest--a territory that usually corresponds to the reach of its owner's wings or beak.

Birds in these sites have the advantage of cooperative defense against predators. As a general rule, the larger the colony, the more successful this defense is. Large numbers of nests may lead to "predator saturation." Eggs and nestlings are a good food source for many predators, but they are present for only a short time. For example, great blue heron nestlings can stand at three weeks, walk on tree limbs at five weeks and fly at seven weeks after hatching. Predators may not have time to build or maintain populations large enough to take full advantage of the resource.

Social interactions related to foraging may be a reason for colonial nesting in species with unpredictable food supplies that are patchy but locally abundant. Some birds, however, nest colonially and forage alone. Herons, for instance, use stealth to hunt food and forage alone. Herons seem to learn a great deal about how productive remote feeding sites are from other birds in their breeding colonies. This gathering of information seems to aid young birds greatly.

In Illinois, great blue herons, great egrets, snowy egrets, little blue herons, cattle egrets, black-crowned night herons and double-crested cormorants are all colonial nesting birds. They are not the only colonial nesting birds in our state, but they are large, easy to identify and their population trends have been tracked to some extent. They are also wetland birds. The number of individuals of each of these species in Illinois has varied over time. Natural predators include crows, raptors and raccoons. Human actions like deforestation, draining wetlands and applying pesticides have been devastating. Humans can also create wetlands, preserve natural wetlands, apply pesticides with caution and follow other good conservation practices that will benefit the birds.

MATERIALS
colored pencils or crayons; graph paper; copies of the "Colonial Nesting Birds Graphing Exercise;" writing materials; bird field guides and research/reference materials

PROCEDURE
1. Discuss colonial nesting birds with the students. Introduce the terms "colonial nesting birds" and "rookery." Be sure that students are familiar with the meaning of these terms.

2. Talk about some of the wetland colonial nesting species that may be found in Illinois (great blue heron, great egret, snowy egret, little blue heron, cattle egret, black-crowned night heron, double-crested cormorant). Show the students pictures of these species. Use bird field guides, the *Biodiversity of Illinois* CD-ROMs and other references to find illustrations.

3. In small groups, have students briefly research each of these species and make a report to the class. Include food habits, migration habits and other information about life history in the report. Include historical information that the students may find about the species (particularly, human use of feathers). A good resource to use for life history information is the Illinois Natural History Survey's Web page at http://www.inhs.uiuc.edu/chf/pub/ifwis/birds/.

4. Assign the graphing activity that follows. Students may work in small groups or as individuals. Review basic graphing information with them.

5. Discuss results with students. Have them explain any obvious trends.

EXTENSIONS

1. Have students write a short story describing life in a rookery. Each student should pretend to be a nestling or adult in the rookery and write from the point of view of that bird. Be sure to include how the place looks, smells, feels and sounds. Tell about your food and where it comes from. Remember, chances are you are in the top of the tallest trees. Other points to consider: waste disposal; weather; predators; insects; sturdiness of nest.
2. Some rookeries contain thousands of nests. Propose ways that individual birds may find their own nests.
3. Compare a rookery to an apartment complex. How are they alike? How are they different?
4. Research other colonial nesting birds found in the world. Compare/contrast to the seven species studied here.
5. Report on Harriet Hemenway (1858-1960) and Minna Hall (1859-1951) who started the Massachusetts Audubon Society over a bird hat protest movement. Read the book *She's wearing a dead bird on her head!* by Kathryn Lasky from Hyperion Books for Children, New York (1995), which offers a tale about these two ladies and their efforts.

EVALUATIONS

1. Most rookeries are found in bottomland forests along rivers. Why do you suppose this statement is true?
2. What are two advantages and two disadvantages of living in colonies?
3. Students should successfully complete and submit their graphing exercise.
4. A rookery that has been present at a single site for many years may be completely gone the next year. List three reasons that a rookery might disappear.
5. Students will be evaluated on their report/presentation.
6. Students should be able to identify the seven birds discussed when shown photographs or illustrations of them.

REFERENCES

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COLONIAL NESTING BIRDS
GRAPHING EXERCISE

Name(s)_____

Since 1983, surveys have been taken by the Illinois Department of Natural Resources to determine the size and composition of colonial waterbird rookeries in Illinois.

The number of nests in a rookery is determined by aerial estimates and/or ground counts. Aerial estimates are taken by flying in a twin-engine airplane past the rookery once or twice about 500 feet above tree-top level. The observer counts nests and records numbers and types of birds present. During these brief flights it is difficult to tell which nests are active and which are inactive. It is also hard to see nests that are below the tree canopy. Ground counts are more accurate than aerial counts, since the observer can stand under the trees, watch the birds and count the nests for a long period of time. Both methods, however, are treated as estimates since errors do occur. Using the same methods year after year does allow comparison of data.

1. Use the following information to prepare two graphs.
   Title the first graph "Rookeries." Label the x-axis (horizontal line) "Years." Label the y-axis (vertical line) "Number of Rookeries." Look at the data that you will graph, then divide each axis into the appropriate units of measure.
   Title the second graph "Nests." Label the x-axis (horizontal line) "Years." Label the y-axis (vertical line) "Number of Nests." Look at the data that you will graph, then divide each axis into the appropriate units of measure.
2. Graph the following data. Use this color scheme.
   great blue heron (GBH) = blue
   great egret (GE) = yellow
   snowy egret (SE) = green
   little blue heron (LBH) = purple
   cattle egret (CE) = orange
   black-crowned night heron (BNH) = black
   double-crested cormorant (DCC) = red

GRAPH 1--Number of Rookeries

	1983	1985	1987	1992	1993	1994	1995	1996
GBH	29	33	35	48	58	50	55	59
GE	15	18	24	22	25	19	21	25
SE	1	1	0	1	1	1	NA	NA
LBH	2	3	1	2	2	2	1	1
CE	3	4	2	2	5	3	2	4
BNH	6	6	8	9	8	6	8	8
DCC	0	0	2	5	5	4	6	8

GRAPH 2--Number of Nests

	1983	1985	1987	1992	1993	1994	1995	1996
GBH	2494	3460	5340	8970	9121	11636	10070	10129
GE	295	450	630	1424	1605	1793	1895	2108
SE	5	10	0	5	5	5	NA	NA
LBH	258	125	250	115	10	10	5	10
CE	237	180	265	3	287	6	10	157
BNH	887	1460	1900	1342	852	140	761	1200
DCC	0	0	21	343	386	355	719	475

3. Which species had the greatest number of rookeries in Illinois each year? Is the number of rookeries increasing or decreasing over time?

_____

4. Which species had the greatest number of nests in Illinois each year? Is the number of nests increasing or decreasing over time?

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5. Which species had the second highest total for number of rookeries each year? Is the number of rookeries for this species increasing or decreasing over time?

_____

6. The species with the second highest total for number of rookeries did not always have the second highest total for number of nests.

A. Which species had more nests than the species named in question 5 for 1983, 1985 and 1987 but fewer nests in the rest of the years?

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B. How could increasing numbers of nests of one species lead to decreasing numbers of nests of another species? Give at least two reasons.

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_____

C. Do you think that there is any relationship to the idea in question 6B and the results from question 6A? If so, how? If not, why not?

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7. The average size (height) of these seven birds is as follows: great blue heron 42-52"; great egret 38"; snowy egret 20-27"; little blue heron 24"; cattle egret 20"; black-crowned night heron 23-28"; double-crested cormorant 33." (Peterson, R. T. 1980. *A field guide to the birds east of the Rockies*. Houghton Mifflin Company, Boston. 384 pp.)

A. Do you find any relationship between the size of the birds and the number of rookeries? If so, what is the relationship?

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B. The survey results first listed double-crested cormorants nesting in Illinois in 1987. Using the size relationship above where should they rank in terms of number of rookeries? Does the graph show this trend?

_____

C. Why would the size of the bird have anything to do with the number of rookeries built?

_____

D. What besides size of the bird could affect the number of rookeries constructed?

_____

8. Looking at the graphs you see that over this time period, snowy egrets, little blue herons, cattle egrets, black-crowned night herons and double-crested cormorants have remained relatively steady or shown slow declines in number of rookeries and nests. Why do you think these species have not shown the same steady increase in number of rookeries and nests that has been observed in the great blue heron? Give at least two reasons.

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9. What are some problems with the survey methods described above? List at least two. Could there be more rookeries that may not be recorded? What could be done to improve the survey methods and obtain more accurate data?

10. The cattle egret is a recent immigrant to Illinois. Using your graphs, describe how the cattle egret's presence has affected the other species represented.