

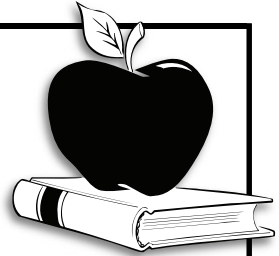
SUGGESTED GRADE LEVELS: 3 - 4

NEXT GENERATION SCIENCE STANDARDS:
3-LS4-3, 4-LS1-1

SKILLS/PROCESSES: observation, classification, prediction, interpretation

OBJECTIVE: Students will identify the various kinds of natural materials used in making a nest and evaluate the amount of effort expended.

TEACHER'S GUIDE



UNIT 2 ■ LESSON 1

House Plans

BACKGROUND

Birds spend varying amounts of time and energy constructing their nest. Some spend days or weeks building a nest, while others simply scrape a small depression in the soil or pile a few twigs together. Still others lay their eggs in the nests of other birds or take over abandoned nests. It is most common for the female to work on building the nest alone. However, sometimes the male alone or both the male and female are responsible for constructing the nest.

Birds use a variety of materials to build their nest. The **environment** in which the bird lives influences the type of materials and location of the nest. Some prairie birds use grasses for nesting material and make their nest on the ground (meadowlarks, bobolink, grasshopper sparrow). Some woodland birds make their nest of plant fibers, twigs and leaves, and locate them above the ground in the branches of bushes and trees (northern cardinal, blue jay, orioles). Other woodland birds nest on the ground (veery, ovenbird).

Some birds locate their nest inside a tree **cavity** (nuthatches, woodpeckers, eastern bluebird, eastern screech owl). Whip-poor-wills, nighthawks and killdeer lay their eggs directly on the ground. Urban birds may nest in chimneys, eaves, stop lights and business signs (chimney swift, house sparrow, European starling). Some wetland birds may construct nests on floating mats of vegetation (American coot, pied-billed grebe, rails). Some birds, like the great horned owl, do not build their own nest but use an abandoned nest of another bird (Cooper's hawk, American crow) or mammal (squirrels). Brown-headed cowbirds also do not make their own nests but **parasitize** other birds' nests.

Nesting materials may include mosses, lichens, plant seeds, hair, snake skins and feathers. Chimney swifts use their own saliva as binding material for nests. Some birds use mud to hold nesting materials together (barn swallow, American robin). Birds also use a variety of

humanmade items for nests, such as yarn, plastic strips, string, paper and aluminum foil.

Eggs are laid over a period of many days. A nest of eggs is called a **clutch**. Egg coloration and patterning can be the means of protecting eggs while the parent is away (Unit 1, Lesson 1). Most birds produce many eggs with each nesting cycle. Production of a surplus is necessary as many eggs and young do not survive to adulthood.



The time from when the last egg is laid until the last egg is hatched is called the **incubation** period. The length of time for incubation varies among species of birds from 10 days to 12 weeks.

Hatching takes several hours and may even take days. Chicks use their **egg tooth**, a bony tip on the top of their bill, to break through the shell. This period of time is called "**pipping**." They start pecking at the blunt end of the shell where the air sac is located. Chicks have a special "hatching" muscle to help them with this task, and they take many rest breaks.

types of nests



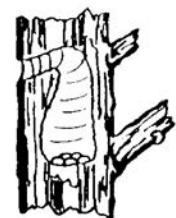
hawk



wild turkey



eastern bluebird
(inside humanmade box)



woodpecker

Care and protection of young birds is a time-consuming process. Some chicks are born fully feathered and able to see (**precocial**). They follow their parent and feed themselves soon after hatching. For example, chicks of the ring-necked pheasant and northern bobwhite are precocial (independent). Other birds are born with their eyes closed and without feathers. These birds remain in the nest to be fed by a parent. Birds such as the American robin and blue jay are **altricial** (dependent). Some birds are able to move their young, using their legs, beak or talons, if danger arises.

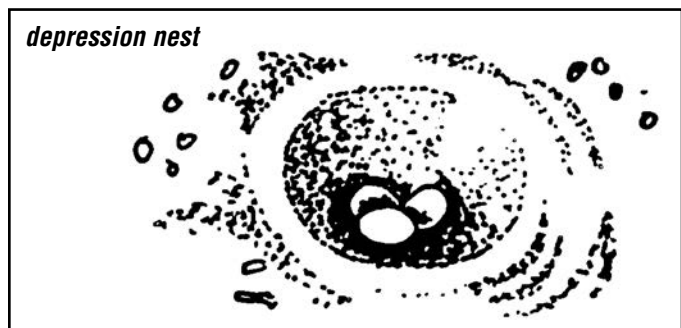


Raising chicks is an endless, daily chore for the parents, with nonstop flights to gather food and clean the nest. In order to survive, some chicks must eat half their body weight in food each day and may eat thousands of insects before leaving the nest. Some birds are able to produce several **broods** of young each year.

PROJECTS AND ACTIVITIES:

1. Build a Nest: Ask each student to collect three different kinds of materials from outdoors and bring to school the next day, keeping materials in separate bags. Give them suggestions for the types of materials (grass clippings, leaves, sticks, string, pine needles, dead weeds, dirt, fur from their dog or cat) they are looking for, but do not tell them how they will be used.

Ask each student to make a bird nest. First, students should determine the type of bird they represent and the size of their eggs in relation to the size of the nest. In class have each student build a nest using their materials. To build appreciation for the skill and craftsmanship involved with nest construction, challenge students to use only two fingers, simulating the beak of a bird. Glue may be used to bond materials. Mud nests make a good outdoor group project.



EVALUATION

1. Have each student discuss the selection and use of the materials in the nest. How is the nest held together? Where is the nest located in relationship to the ground? Study and compare various types of nests.
2. Discuss the advantage of having a nest on the ground, by the water, in a cavity or in a tree. What is the disadvantage of each? What are the advantages and disadvantages of not building a nest?

EXTENSIONS

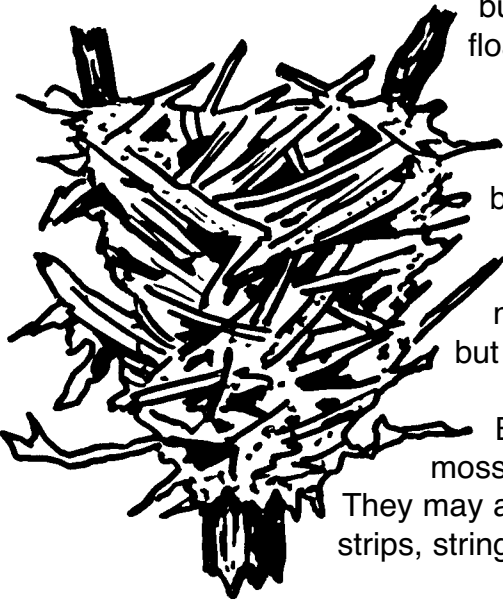
- Hatch domestic eggs (duck or chicken) in an incubator in your classroom. Work with a local farmer to obtain eggs and, as a class trip, return the hatchlings to the farm.
- Explore how **toxins** affect eggs. Soak an egg in vinegar for two days. The eggshell will dissolve. Compare this to toxins, such as DDT, that have impacted birds (Unit 3 Lesson 3).
- Locate and count but **DO NOT COLLECT OR DISTURB** the different kinds of bird nests found outside. Which bird lives in each type of nest? How is the nest made? How far off the ground is it? Try to leave the habitat undisturbed so predators cannot follow your trail.
- Have each student paint a paper egg shape to **camouflage** it for a particular type of setting (tree, gravel, field, sand, etc.) and then go to such areas to see if the camouflage works.
- Watch a bird build a nest. How many days does it take? How far does it fly to gather material? After watching the bird for a few hours, calculate the number of trips per day or per hour. Determine the total number of trips necessary to complete construction. Calculate the total distance flown.

VOCABULARY

- | | |
|------------|-------------|
| altricial | environment |
| brood | incubation |
| camouflage | parasitize |
| cavity | pipping |
| clutch | precocial |
| egg tooth | toxin |

Birds spend varying amounts of time and energy constructing their nest. Some spend days or weeks building a nest, while others simply scrape a small depression in the soil or pile a few twigs together.

Birds use a variety of materials to build their nest. The area the bird lives in determines the type of nesting materials used and the location of the nest. Some prairie birds use grasses for nesting material and make their nest on the ground. City birds may nest in chimneys, stop lights and business signs. Some wetland birds may construct nests on floating mats of vegetation.



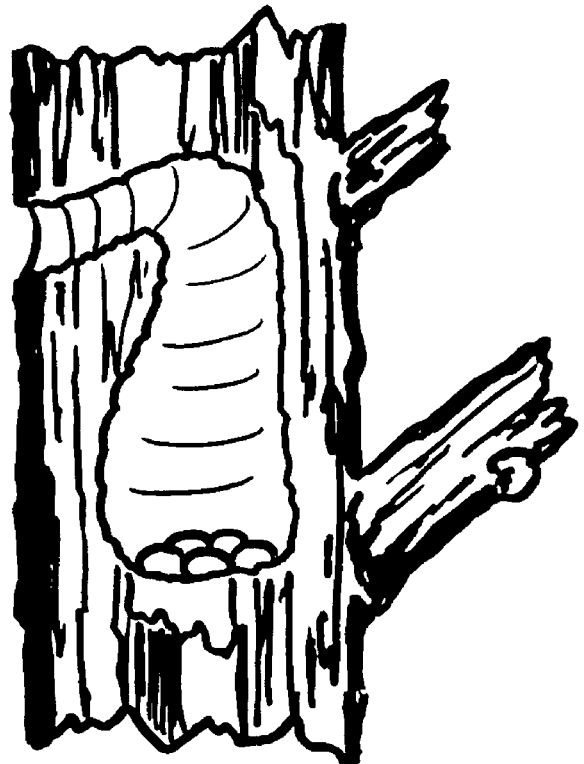
Some woodland birds make their nest of plant fibers, twigs and leaves. Some locate their nest above the ground in the branches of bushes and trees, while others nest on the ground or inside a tree cavity. Some birds, like the great horned owl, do not build their own nest but use the old nest of other animals. Brown-headed cowbirds also do not make their own nest but lay their eggs in other birds' nests.

Birds use a variety of natural materials in their nest such as mosses, mud, lichens, plant seeds, hair, snake skins and feathers. They may also use humanmade items in nests, such as yarn, plastic strips, string, paper and aluminum foil.

Eggs are laid over many days. A nest of eggs is called a clutch. The time from when the last egg is laid until the last egg is hatched is called the incubation period. Hatching may take several hours or even days.

Care and protection of young birds takes a lot of time. Some chicks are born fully feathered and able to see (precocial). Ring-necked pheasant chicks are able to follow their parent and feed themselves soon after hatching. Other birds are born with their eyes closed and without feathers (altricial). American robins remain in the nest to be fed by a parent.

Raising chicks is an endless, daily chore for the parents. Nonstop flights are made to gather food and clean the nest. To survive, some chicks must eat half their body weight in food each day. Some may eat thousands of insects before they leave the nest.




ACTIVITY PAGE

No Place Like Home

Birds build nests to have a place to lay their eggs and raise young while protecting them from the weather, predators and other hazards. Match the birds to the right kind of nest. Think about the many dangers in a bird's daily life. Write a newspaper ad to describe how habitat damage affects birds.




Home Wanted



A home is needed for a local member of our community. This fellow's residence was condemned and has fallen under the bulldozer. He's very quick and is not bothered by noisy chatter. Will only need residence half of the year. Please reply to:
 C. Swift
 PO Box S.O.S.
 Hometown, Illinois

Local Bird Dies

Passing away this Tuesday was a great blue heron. She had been observed earlier that day walking slowly through some local shallows. Nearby residents noticed some sort of toxic substance in the water. Upon discovering the deceased heron officials were contacted to determine the source of the pollutant. Contributions to the Audubon Society or The Nature Conservancy to purchase and preserve the area would be appreciated.



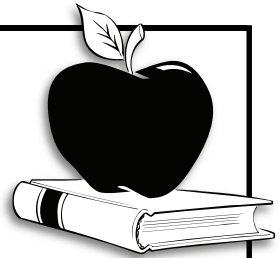
SUGGESTED GRADE LEVEL: 4

NEXT GENERATION SCIENCE STANDARDS:
4-LS1-2

SKILLS/PROCESSES: mapping, observation, communication, data collection

OBJECTIVE: Students will recognize some bird **songs** of common Illinois species and the importance and differences between songs and **calls**.

TEACHER'S GUIDE

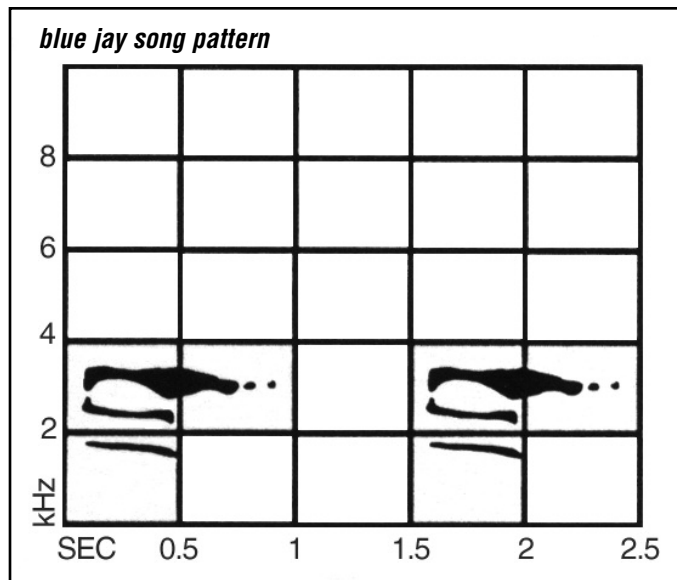


UNIT 2 ■ LESSON 2

Bird Banter

BACKGROUND

Communication is important to birds, especially in habitats where vegetation impedes vision, such as forests, grasslands and wetlands. Birds communicate by vocalizations, such as songs and calls, other noises, like tapping and **drumming**, and behaviors such as courtship flights and dances.



Songs are specific patterns of notes repeated with few variations. They are used to attract mates and mark the territory necessary for production and rearing of young. Birds use the peaceful "war of words" to settle boundary disputes, instead of the dangerous "war of weapons" people sometimes use.

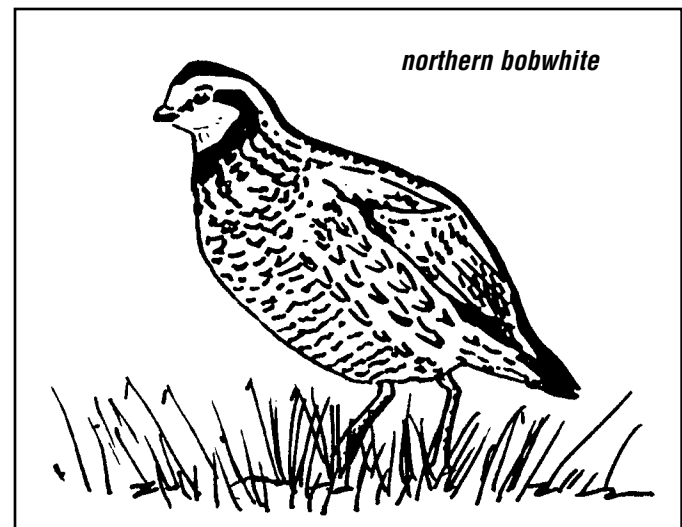
Each species has its own specific song or songs. Some birds have over a dozen calls and songs (northern cardinal). Some birds are able to mimic the songs of other birds (gray catbird, northern mockingbird), humans and our products (European starlings can imitate a car alarm). Just like humans, bird songs have regional dialects. Some birds are born knowing how to sing.

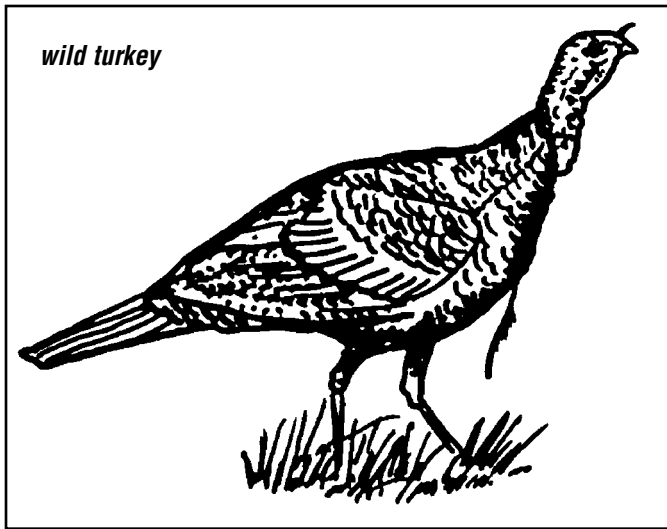
Others must listen to calls of adult birds of their kind and practice the calls before perfecting them.

When alerting others of danger, birds call. Calls are also made when feeding or **migrating**. **Precocial** (independent) young communicate with their parents through a location call. When a **covey** of northern bobwhite is split up, they locate each other and rejoin the group through a gathering call.

Birds do not have vocal cords. To produce sounds, vibrations are sent across the **syrix** (voice box) of a bird. The more muscles a bird has attached to the syrix, the more vocalizations it can make. For instance, northern mockingbirds have many muscles and can produce a variety of sounds, while rock pigeons' singular pair of muscles results in only the single "coo" sound.

A variety of other types of communications are used by birds. Hungry nestlings peck at their parents' beak or open their mouth widely to beg for food. Male ruffed grouse "drum" and greater prairie-chickens "**boom**" to attract a mate. Sandhill cranes and American woodcocks have elaborate mating dances and flights. A male



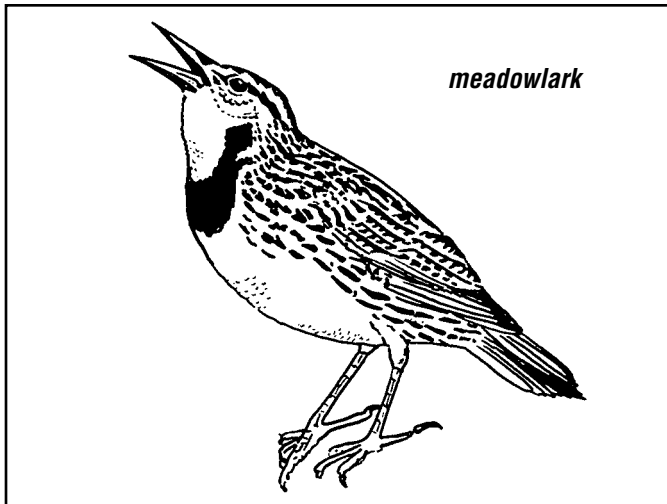


wild turkey will spread its tail and drop and "rattle" its wings to attract a mate.

Communication is very important to birds. Without communication, many birds would starve, lose their way during migration or be unable to defend a territory or find a mate.

PROJECTS AND ACTIVITIES

1. Learn to attract birds with sound. One of the easiest sounds you can make is to suck on the back of your hand, which will attract chickadees.



2. Listen to the audio CD-ROMs in the *Illinois Birds Resources Trunk* from the Illinois Department of Natural Resources or borrow or purchase audio CD-ROMs that contain bird songs and calls.

EVALUATION

1. After listening to bird call tapes, take students outdoors and identify bird songs and calls. Have a class bird sounds contest, seeing who can call like a robin or caw like a crow.
2. Test the students to see if they can recognize the calls of species you've studied. For hearing-impaired students, describe the calls in words.

EXTENSIONS

- Bring a duck/goose call from home and have children share examples of the sounds they can make. Sanitize the call, if shared.
- Visit a nature center where a naturalist can escort you on a bird walk and point out birds and calls. Featured birds may include chickadees, northern cardinals, European starlings, meadowlarks, ducks and geese.

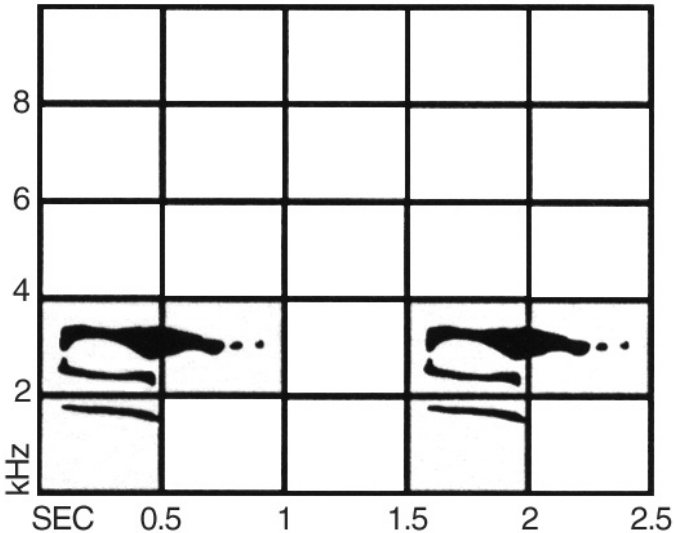
VOCABULARY

booming	migration
call	precocial
covey	song
drumming	syrinx

Bird Banter

STUDENT'S GUIDE

blue jay song pattern



Birds communicate by songs and calls or other noises, like tapping and drumming. Courtship flights and dances are other ways birds communicate.

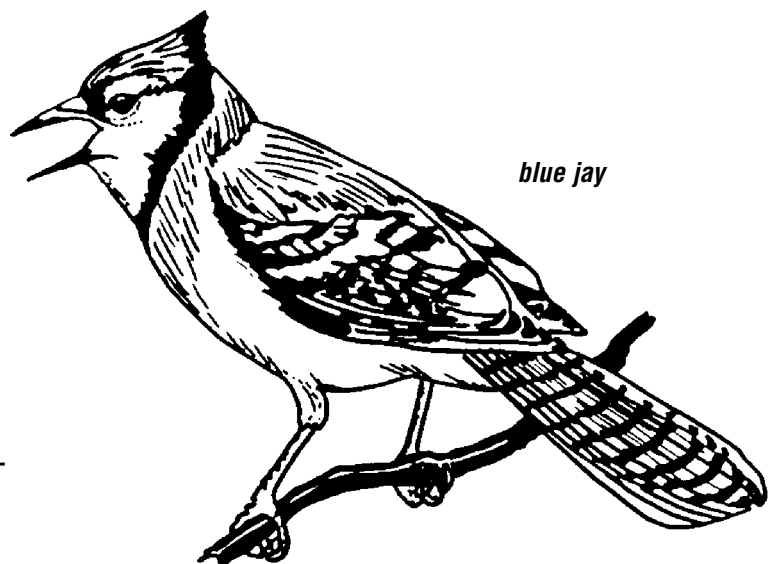
Songs are specific patterns of notes repeated with few variations. Songs are used to attract mates and mark the territory necessary to raise young. Each species has its own specific song or songs. Some birds have over a dozen calls and songs (northern cardinal). Some birds are able to mimic the songs of other birds (gray catbird, northern mockingbird), humans and car alarms (European starling). Some birds are born knowing how to sing. Others must listen to calls of adult birds of their kind and practice the calls before perfecting them.

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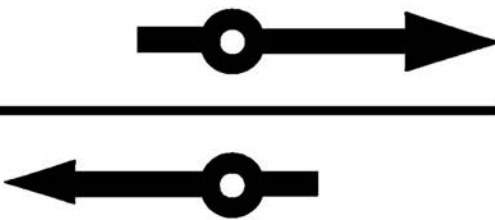
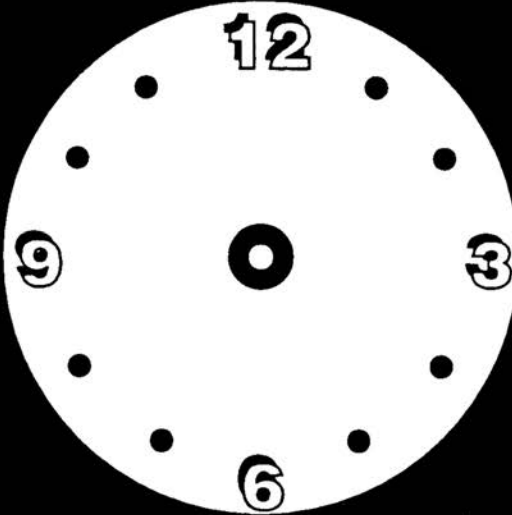
Communication is very important to birds. Without communication, many birds would starve, lose their way during migration or be unable to defend a territory or find a mate.



ACTIVITY PAGE

Bird Banter

If you were a bird and wanted to defend your territory or attract a mate, you might break out in song. Birds call out to alert others of danger. Read the following instructions to play this bird song game.

<p>WHITE-THROATED SPARROW "poor Sam Peabody-Peabody-Peabody" (4 a.m.)</p>	<p>Cut out cards and clock parts. Assemble clock and distribute cards. Each player should sing at the indicated time and then quiet down around noon. Singing can also continue during evening hours.</p>	<p>BLACK-CAPPED CHICKADEE "chick-a-dee-dee-dee" or "fee-bee" (6 a.m.)</p>
<p>CHESTNUT-SIDED WARBLER "pleased-pleased-pleased to meet you" (6 a.m.)</p>		<p>RED-EYED VIREO "going up – coming down" (6 a.m.)</p>
<p>OVENBIRD "teacher-teacher-teacher" (4 a.m.)</p>		<p>YELLOW WARBLER "sweet sweet sweet I'm so sweet" (6 a.m.)</p>
<p>AMERICAN ROBIN "cheerio cheery me cheery me" (4 a.m.)</p>		<p>AMERICAN GOLDFINCH "potato chip – potato chip" (7 a.m.)</p>
<p>EASTERN MEADOWLARK "sweet spring is here" (5 a.m.)</p>		<p>RED-WINGED BLACKBIRD "konk-la-ree" (5 a.m.)</p>
<p>EASTERN WOOD-PEWEE "pee-a-wee" (5 a.m.)</p>	<p>COMMON YELLOWTHROAT "witchity-witchity-witchity" (6 a.m.)</p>	<p>WHITE-BREASTED NUTHATCH "yank-yank" (7 a.m.)</p>

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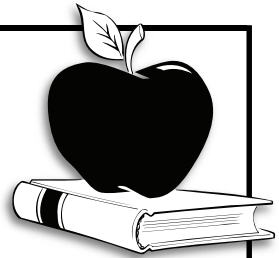
SUGGESTED GRADE LEVEL: 4

NEXT GENERATION SCIENCE STANDARDS:
4-LS1-2

SKILLS/PROCESSES: grouping, communications, problem-solving, decision-making, role-playing, reasoning, observation, classification, inference

OBJECTIVE: Students will describe the function of bird **courtship** and recognize that courtship and mating consume a great amount of time and energy.

TEACHER'S GUIDE



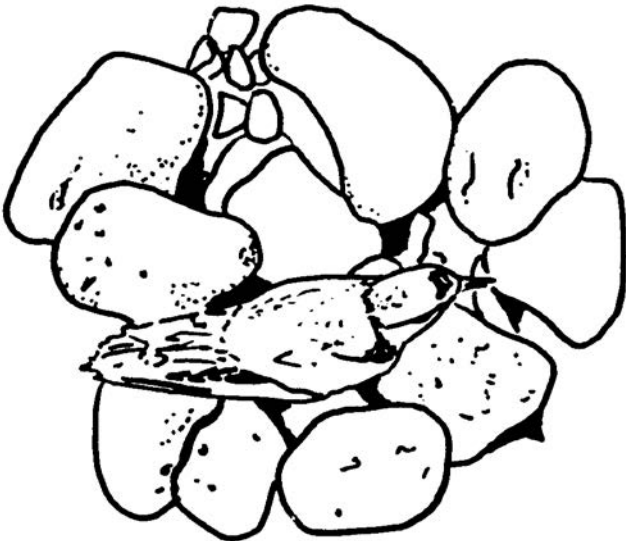
UNIT 2 ■ LESSON 3

Hello, Mate

BACKGROUND

Most birds are **passerines** (perching or songbirds). These small birds migrate great distances each year. Passerines have a short life span and seek a new mate each year; thus, song is very important in attracting a **mate**. The beautiful songs and colorful feathers of males are used to establish and protect **territory** and attract and **compete** for females.

camouflage



Many females are drab in color, usually to **camouflage** them while on the nest. Some **species**, however, lack sexual **dimorphism**, meaning the males and females appear the same. Blue jays, American crows and chickadees are three bird species which lack sexual dimorphism.

In the courtship ritual, birds need to seek out their own species. Males establish a territory and call females to lure them in to mate with them. Mating is a very tiring procedure to birds in terms of **energy expense**.

Most pairs of birds remain together throughout the

breeding season. Greater prairie-chickens and ruffed grouse meet, mate and separate. Ruby-throated hummingbirds remain together only a few days, while ducks remain together until **incubation** begins. A few bird species, such as Canada geese, mate for life.

Most birds (songbirds, ducks, ring-necked pheasant) mate a year after hatching. Geese, hawks, owls and swifts mate at two years of age, with some of the large birds of prey mating for the first time at four or more years of age.

Many adults that produce several **broods** each year receive assistance in raising young from offspring of early-season nests (rails, barn swallow). Birds slow to reach maturity may help mated pairs raise young (eastern bluebird, scarlet tanager).

PROJECTS AND ACTIVITIES

Materials Needed: large feathers (made of construction paper); noisemakers (party favors, whistles, kazoos); long pieces of several types of bright and dark fabric to be used as bands of coloration; handkerchiefs; reference material about displaying behaviors of various birds; clothes pins and safety pins to attach fabric to clothing.

1. Read the "Sky Dance" from *A Sand County Almanac* by Aldo Leopold (Oxford University Press, New York, 1949, 226 pp.) to the students. It describes the **mat-ing ritual** of the American woodcock.
2. Discuss the different rituals of several types of "real" birds with your group. Another example to research would be the spring courtship of the sandhill crane, which includes pointing the beak skyward, walking in a circle, jumping, leaping, tossing grass, whooping and trumpeting. The greater prairie-chicken and common snipe are other good examples of birds with complex mating rituals that could be discussed in class.

3. Divide the class into groups of two to four. Explain to the students that each group is a subspecies of a bird known as "*Burdis humanis*," commonly known as "bird people." "Bird people" are found in different parts of the world in small, isolated colonies. Each subspecies has developed its own particular courtship ritual and display behaviors.

Each group is to design a mating ritual that represents their colony. Things for the group to consider are:

- Does the ritual involve a dance or series of movements?
- Does the ritual have one or several distinguishing traits (color, call, bands of color on any part of the bird)?
- Does the ritual involve only the male? Only the female? Both?
- What time of day does the ritual take place?

Give students time to develop their group's ritual. Then have each group perform the ritual. Have them explain where the bird lives and the reasons for its particular ritual. Challenge older students to interpret the displays of other groups in the class.

EVALUATION

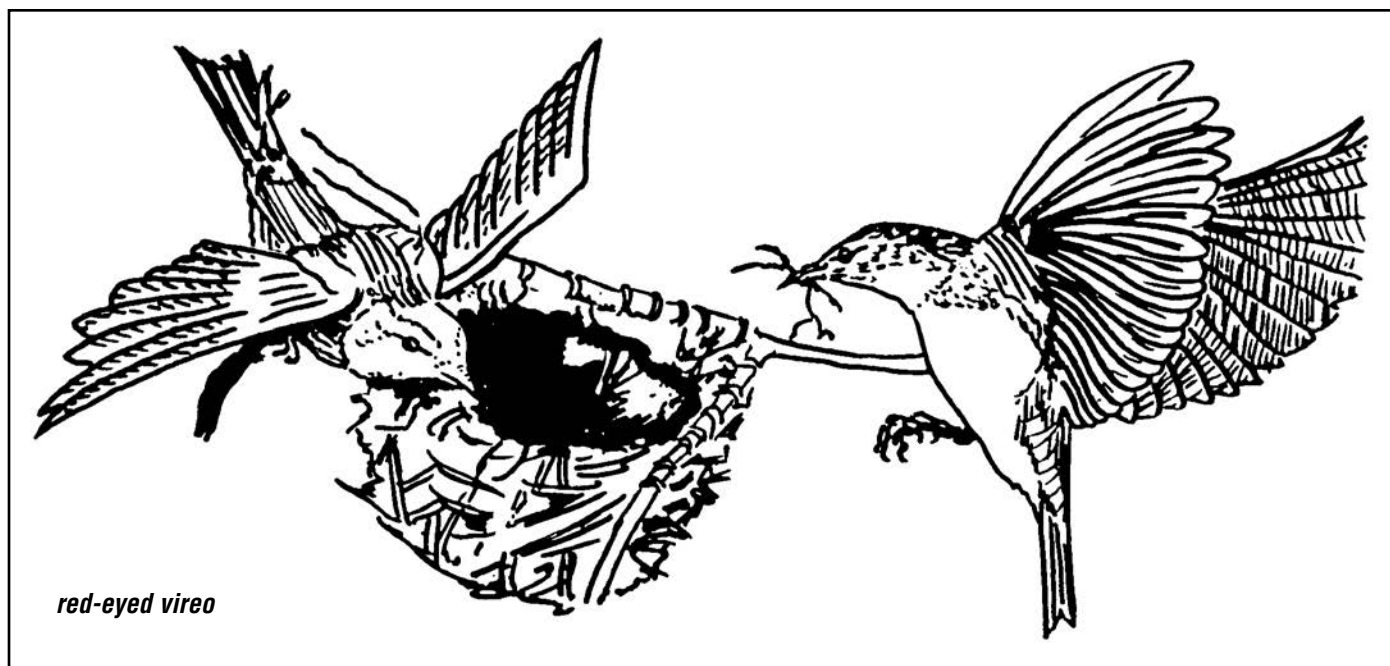
1. Have students summarize in writing the functions of bird courtship. Ask them to explain why the birds expend so much time and effort in courtship.
2. How does the male of one species recognize the female of the same species, and vice versa? (song, markings, behavior)

EXTENSIONS

- In the spring have the class watch, listen to and describe the courtship rituals of a bird.
- Research traditional cultural dances such as the Native American dance patterned after grouse.
- Demonstrate solitary and colonial nesting using students to represent the nests. Discuss advantages and disadvantages of each (food supply, warning).

VOCABULARY

brood	incubation
camouflage	mating ritual
competition	passerine
courtship	species
dimorphism	territory
energy expense	



Hello, Mate

STUDENT'S GUIDE

Song is very important in the attraction of a mate for birds that have a short life span and seek a new mate each year. The beautiful songs and colorful feathers of males are used to establish and protect territory and attract females. Many females are drab in color, usually to camouflage them while on the nest.

During courtship, birds need to seek out their own species. Males establish a territory and attract females. Mating is a very tiring procedure to the birds.

Most pairs of birds remain together throughout the breeding season. However, greater prairie-chickens meet, mate and separate. Ruby-throated hummingbirds remain together only a few days. Ducks remain together until incubation begins. Canada geese mate for life.

Most birds mate when they are one year old. Some species wait two to four years to mate (geese, bald eagles). Some birds hatch several broods each year. These parents may get help raising young from early-season offspring.



northern shovellers

ACTIVITY PAGE

Hello, Mate

Make one copy of this page. Cut out the cards and distribute one to each student. The students move around the class and compare clues until they think they've found their correct mate. Students share with the class who they think their bird match is and explain why.

Note to teacher: Consult this complete sheet for the answers. Matching cards are printed in left/right pairs. If additional clues are needed, print half of the bird name on each card of the pair.

RED-BELLIED WOODPECKER	"I live in trees and get insects out of trees with my sharp beak. My tail is stiff and serves to prop me up as I move up and down the tree."	"I love to eat insects and have a very hard bone on my forehead that keeps me from getting a headache when I get my lunch."	"I am a very small bird and make my nest in a chimney of a house."	"I have a very small house that I make with my mate and if there are no other places for our nest, we build it in part of people's houses."	CHIMNEY SWIFT
BALD EAGLE	"I am a very large bird and make an enormous nest in the top of a tree."	"I am a symbol of the United States, and my nest in a treetop can be 10 feet wide and 10 feet high!"	"I have long legs and eat fishes and other wetland species."	"Look at my lovely plumes hanging from my neck. I migrate in the spring and summer and live in wetlands."	GREAT BLUE HERON
WOOD DUCK	"I live in wetlands. I eat plants and have short legs and webbed feet."	"Check out my fabulous colors and my handsome crest! I nest in hollow trees in wetlands."	"I nest in hollow trees. I am one of the most successful species on earth, but many people don't like me because I'm noisy."	"I'm a noisy, small bird with an attractive feather coat which reflects iridescent colors. I can imitate the beautiful songs of dozens of birds."	EUROPEAN STARLING
CEDAR WAXWING	"I get my name from the red waxy tips on my wings. I am usually in a flock with others of my species."	"Large flocks of us can be seen feeding on the fruits of trees each fall."	"I have good night vision, so I hunt for my food at night."	"I can turn my head 3/4 of the way around so I can almost see behind me. I fly nightly on silent wings to catch mice and other nocturnal species."	OWL
YELLOW-BELLIED SAPSUCKER	"I am a winter resident in Illinois and peck neat horizontal rows in the bark of trees. I eat the inner bark of the tree and return later to eat the sap."	"I am a type of woodpecker. My name describes both the color of my belly and my preferred food."	"Watch me move headfirst down the tree. I find foods that other birds have missed."	"I am a cavity-nesting bird and have a different view of life than other birds."	WHITE-BREASTED NUTHATCH
BLACK-CAPPED CHICKADEE	"I eat several hundred insect eggs each day. Look for me hanging upside down."	"I call out my name. I am one of the smallest birds in the woods, but I am noisy and fun to watch as I hang upside down."	"My mate and I both have a crest on our head, but I am red. I live in Illinois year-round, and people think I look pretty against the snow."	"I am brown and have a crest on my head. I use my heavy seed-eating bill to gather food throughout the year."	NORTHERN CARDINAL
RED-WINGED BLACKBIRD	"I don't look anything like my mate. I am the male and am black with bright red shoulder patches. Look for me in wet areas."	"I am drab compared to my mate but that helps me protect my nest and young. I often build my nest in cattails."	"People call me the buffalo bird because I followed herds of buffalo to eat the ticks off their backs. Many people don't like the way I nest."	"I am a nest parasite, which means I look for nests of other birds and lay my eggs there so I don't have to care for my young."	BROWN-HEADED COWBIRD
HOUSE SPARROW	"We've only been in North America for about 150 years but have become one of the most common bird species."	"We've really made ourselves at home in this new land! Some people don't like us because we take nesting sites from some native species."	"My natural habitat was cliffs and rocky ledges, but I do very well living on the ledges of city buildings and bridges."	"I have been domesticated by man for thousands of years. I can fly more than 80 miles an hour but still like to live downtown."	ROCK PIGEON