



Hidden Hazards

Teacher - Led
ACTIVITY

How can we reduce the obstacles to birds' survival?

Learning Objectives

Students will experience and describe some of the limiting factors affecting Neotropical migratory bird populations and explain that many of these hazards are created by humans.

Background

The main problem facing *Neotropical migratory birds*—birds that breed in North America and spend their winters south of the Tropic of Cancer—is that their habitats are shrinking on their wintering grounds, migration stop-over sites, and nesting grounds. However, these birds also face other threats, ones that may not be seen so easily. This activity simulates some of the obstacles faced by Neotropical migrants during their annual life cycle.

The obstacles simulated include collisions with tower guy wires, predation by *cats*, *nest parasitism* by Brown-headed Cowbirds, collisions with windows, exposure to pesticides, and competition from *exotics* (non-native species) and *invasives* that threaten established populations. These obstacles can become *limiting factors*, or circumstances that reduce the population of a living organism. Sometimes limiting factors are natural occurrences (for example, weather, predators, and disease) and sometimes they result from human actions (such as habitat destruction and pesticide use). With some populations of Neotropical migrants already in decline, these added stresses may be enough to push them over the edge to extinction.

Getting Ready

1. Give students background information about Neotropical migrants and the obstacles they face during their annual life cycle.
2. Define limiting factors and consider how the activity's obstacles can become limiting factors for the populations of many species.
3. This is a physically involving activity. Set up the playing field as shown in the Hidden Hazards Diagram:
 - Place an equal number of nesting tokens on both sides of the far end of the playing field.
 - Place two circles (made from jump ropes) as safe zones in the nesting area.
 - Make "opening" and "window" labels using sticky notes.
 - Place the food tokens near the finish line.

OVERVIEW

Some students act as migratory birds attempting to avoid the risks faced when running into various obstacles; other students enact these obstacles.

CONTENT AREA

Physical Education, Science, Environmental Education, Math

PEOPLE POWER

Average-size class

SPACE REQUIREMENT

Large playing field (approximately 100 feet X 50 feet)

ACTIVITY TIME

One or two 45- to 60-minute class periods, plus set-up time

MATERIALS

- 3 jump ropes
- Boundary cones
- Nesting tokens (40-50 plastic eggs in four different colors)
- Food tokens (40-50 small items in at least four different colors (Tokens can be, decorative fruit, poker chips, cut-out squares of colored poster board, wooden blocks)
- Sticky notes, half labeled "window" and half "opening"
- "Cat" hat, or a similar symbol to designate that role

SPECIAL GUESTS

Contact your county extension office to find a speaker with information about integrated pest management, biological pest control, and pest resistant plant varieties.

TERMS TO KNOW

Limiting factors, exotic species, invasive species, feral cats, nest parasite, Neotropical migratory birds

ZOOM IN, ZOOM OUT!



Have students investigate the life cycle of a resident bird species (one that stays in the same area all year), such as a Blue Jay, Chickadee, Cardinal, Red-tailed Hawk, Great Horned Owl, and so forth. What limiting factors do these birds face? Compare their life cycles to those of Neotropical migrants.

The main problem facing Neotropical migratory birds is that their habitats are shrinking.

Taking Flight!

1. Designate roles for the students, and explain that all students who are not cats or towers will be migrating birds. Be sure to record the number of migrating birds that start the course.
2. The first obstacle the migrators face is tower lights and guy wires (two students swinging a jump rope). A migratory bird must get past the swinging jump rope without being touched by the rope. (They can go around under the swingers' arms, as long as they stay within the playing field—but let them figure that out for themselves.)
3. The next obstacle is a cat. Choose one student to be the non-native predator. Give the student a “cat” hat or other symbol, so the migrators know who the cat is. The cat may prowl only the area just beyond the towers and the nesting grounds. (If your group is large, you can have two students as “lasts.”)
4. As the cat catches a bird by tagging, he/she escorts his/her prey to the other side of the playing field to become part of the tall building. The cat sticks a note with the word “window” or “opening” on their backs, and has them link arms with the other captured birds to form a chain across the playing field. Having the cat escort its prey to the window area and apply the sticky note gets the cat out of the action for a short time, giving the other migrators a more realistic chance. The captured student/bird, now part of a building, does not initially know if he/she is a window or an opening and so is not able to give the migrators any hints.
5. The next phase involves nesting. In the nesting area, the birds must travel back and forth across the width of the field gathering a clutch of four eggs. One nesting token may be picked up per crossing. Each migrator must “fly” back and forth across the nesting area four times to get a clutch, simulating all the feeding flights necessary to raise young. Remember they can use the rope circles as safe areas from the cat.
6. After birds have four nesting tokens, they may proceed to the window hazard. The captured birds (now a building) face the migrators with their arms linked. The migrators must choose one of these students by tapping their shoulder and have them turn to show the sign on their back. If the sign reads “opening” the bird may proceed on its migration, past the building. If the sign reads “window” that bird has crashed and goes to the side lines.
7. The last challenge is to find food in the wintering grounds. Food tokens are spread on the ground just in front of the finish line. The migrators must find four food tokens before





they can safely finish one year in the life of a migratory bird.

8. When all the migrators have either crossed the finish line or succumbed to a hazard, record the number surviving.

9. Analyze the survivors' eggs and food. There are different colors of eggs. Choose one color to

represent cowbird eggs. This color can be changed with each round, so the migrators are not able to select against cowbird eggs. Record the number of non-cowbird young produced. Choose one color of food token to be contaminated with pesticides. Again, this color may change the next round or not, so the migrators do not know if they are selecting contaminated food. If a bird had any pesticide tokens, subtract him or her from the number of survivors. Also, assign a color to represent competition from exotic species (which in a real-life scenario might cause a shortage of food and other resources).

10. To play another round, add the number of young produced to the survivors from the first round and go again. Students for the next rounds who are not towers, cats, or migrators can help record results and return tokens to the correct areas.

11. Graph the results of play over several years (rounds). The graph can use "time" as a baseline with two bar graphs for each year: the number of migrators starting and the number of migrators finishing the year. Calculate a survival rate (percentage surviving each year) and graph these numbers through time. Which obstacle seemed to take the greatest toll on the migrating bird population?

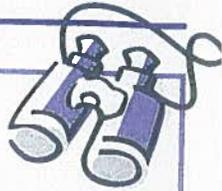
Assessment

Ask students to:

- define limiting factors;
- list two limiting factors in the life cycle of Neotropical migratory birds; and
- describe other limiting factors that were not simulated in this activity.

Adapted from "Hooks and Ladders," *Project WILD K-12 Curriculum & Activity Guide*, copyright 1996 by the Council for Environmental Education; and from *Solve the Crime: Save the Song of Spring!: Neotropical Migratory Birds Their Midwestern Connections Middle School Activity Guide*, 1998 by the Iowa Conservation Education Council, Iowa Ornithologists' Union, Partners in Flight, Resource Enhancement and Protection, and Iowa Department of Natural Resources.

ZOOM IN, ZOOM OUT!



Obtain a copy of *Cats Indoors! Cat Predation of Birds and Other Wildlife*, from the American Bird Conservancy (see Appendix B for ordering information). Ask students to read the report. Have them develop some type of public education tool to educate people about the importance of keeping their cats indoors, including posters, short public service announcements for radio or TV, articles for newspapers, magazines, newsletters, or any other appropriate media.

IN STEP WITH SCIENCE STANDARDS

STANDARD A: SCIENCE AS INQUIRY

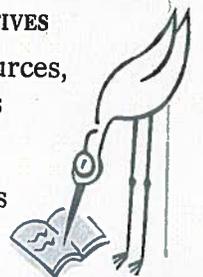
- Abilities necessary to do scientific inquiry

STANDARD C: LIFE SCIENCE

- Populations and ecosystems
- Diversity and adaptations of organisms

STANDARD F: SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

- Populations, resources, and environments
- Natural hazards
- Risks and benefits





With some populations of Neotropical migrants already in decline, these added stresses may push them closer the edge to extinction.

Collisions

Estimates of the annual number of bird deaths caused by collisions with windows vary among ornithologists. In the United States alone, the numbers are between 100 million and one billion. Reflective glass windows may be aesthetically pleasing to humans, but many birds cannot distinguish the difference between real sky and a reflection of the sky in a window. Non-reflective window coating, window screens, flash tape, awnings, or netting on the outside of a window can break up the reflection. Bird silhouette stickers on windows may scare birds away.



Many birds migrate at night. A low cloud ceiling forces birds to migrate at lower altitudes than they normally would when skies are clear. This makes birds very susceptible to flying into tall towers and their guy wires, which they cannot see in the dark. Following bad weather events during spring and fall migration, biologists often pick up hundreds of dead migratory birds under these towers. They estimate that as many as one million birds die each year from colliding with tall structures. Birds also are attracted to the bright lights on the towers. Lighthouses, spotlights, lighted bridges, and illuminated skyscrapers lure birds to their deaths. As they circle the lights, confused, they run into something or run out of precious energy. A group called FLAP (Fatal Light Awareness Program) is working with building managers to encourage them to turn off unnecessary lights at night. FLAP and the World Wildlife Fund have initiated the Bird Friendly Building Program that educates people about the dangers faced by migrating birds. Of all the problems faced by Neotropical migrants, the confusion from building lights is a preventable one.

Cowbirds

The Brown-headed Cowbird is a native, migratory bird that used to follow bison herds to eat insects they stirred up. As the bison disappeared, cowbirds adjusted to the change in scenery and began associating with domestic cattle in open pastures. The cowbird is a *nest parasite*. The females lay their eggs in other bird species' nests, then leave. The host species is left to raise baby cowbirds along with their own young. Cowbird eggs have a shorter incubation time and hatch before most of the host's eggs. Cowbird chicks are often larger than the host's chicks and out-compete them for food and space.

Grassland bird species historically associated with the cowbird do have some defenses. Some species recognize cowbird eggs, abandon that nest and start over. Others throw the cowbird eggs out of their nest. The Neotropical migratory species adapted to nesting in interior forest habitat or outside traditional grassland zones are most affected by cowbird nest parasitism. With the fragmenting of large tracts of forest, cowbirds now have access to areas where forest-interior birds (such as the Wood Thrush, American Redstart, Yellow-throated Vireo, and Ovenbirds) are attempting to nest. These birds have not developed the same defenses as the grassland and forest-edge nesting species, and end up raising large numbers of cowbirds and few of their own young.



BROWN-HEADED
COWBIRD



Cats

Americans keep an estimated 60 million cats as pets. If each one of those cats killed only one bird a year—60 million birds would die each year! Scientific studies show that each year cats do kill hundreds of millions of migratory songbirds and more than a billion small mammals.

Predation by domestic cats is not part of the natural food chain. After being domesticated by ancient Egyptians and taken throughout the world by the Romans, cats were brought to North America in the 1800s to control rats (although they have proven ineffective at consistently killing adult rats). However, it has been documented that cats do kill birds—even when well-fed, de-clawed, and wearing a bell-collar.



Besides having a devastating effect on bird populations (fledglings and ground nesting birds being the most susceptible), cats compete with native predators (hawks, owls, coyotes, foxes, and others). Some cats have the advantage of being fed at home if unsuccessful in hunting, thus the cat population is not regulated by prey numbers as are most native predators' populations. Cats also are prolific breeders, having up to three litters per year, with four to six kittens per litter. Free-roaming cats can transmit diseases (such as rabies, feline leukemia, and feline distemper). These outdoor cats usually lead short lives, being exposed to injury and disease or hit by cars. The solution to this problem is to keep all pet cats indoors for the safety of wildlife and the cat.

Exotic and Invasive Species

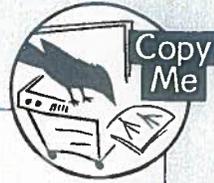
When it comes to getting resources, several species of native American birds face tough competition from "outsiders." For various reasons, people sometimes bring plant or animal species from other parts of the world and introduce them to a new habitat or a new continent where they had never appeared before. While it may sound like a nice idea at the time, these introduced exotic species often become intrusive by greatly disrupting the lives of previously existing populations, eventually causing serious threats to entire ecosystems.

One example among North American birds is the introduction of House Sparrows to the United States in the late 1800s. At that time, a small number of these little birds were brought from Europe because they were known for eating agricultural pests such as wireworms. However, the House Sparrows actually took up residence in urban spaces, where they began to compete with native bird species for what limited housing was available, such as small crevices under eaves of buildings and in backyard nesting boxes. Similar in size to native species such as bluebirds, chickadees, and swallows, the feisty house sparrows proved to be tough competitors for limited nesting spaces—often attacking and even killing their native competitors.



HOUSE SPARROW

For birdwatchers who try to offer safe nesting places to native species, the tenacious house sparrows—which now number in the millions—are a constant source of frustration. In addition, in some cases of "invasion" by exotic species, the newcomers become so prominent that they may eventually cause the extinction of native species, which in turn affects entire ecosystems.



Chemicals

Chemicals used by people to control weeds and pests can greatly impact bird populations. DDT was linked to the devastation of bird populations and has been banned from use in the U.S. since 1972. This chemical, however, is still used in several countries where Neotropical migratory birds winter. The effects of exposure can be, and often are, lethal. DDT is not the only pesticide problem for birds.

Take a close look at the labels on the chemicals found on the shelves at hardware and garden stores. Several other popular pesticides still used in the U.S. are lethal to birds. Over 40 active ingredients in pesticides used today have been linked to migratory and resident bird population die-offs, involving anywhere from one to 2,000 to 20,000 individuals. Given their proven toxicity to wildlife, six chemicals (all organophosphates or carbamates) are of particular concern to the U.S. Fish and Wildlife Service. All are used in crop production and one in particular, Diazinon, is commonly used for home lawn care. The others are Aldicarb, Azinphos-methyl, Carbofuran, Ethyl Parathion, and Phorate. All of these insecticides kill pests by damaging their central nervous systems. Unfortunately, these insecticides have the same action on non-target invertebrates, fish, and wildlife.

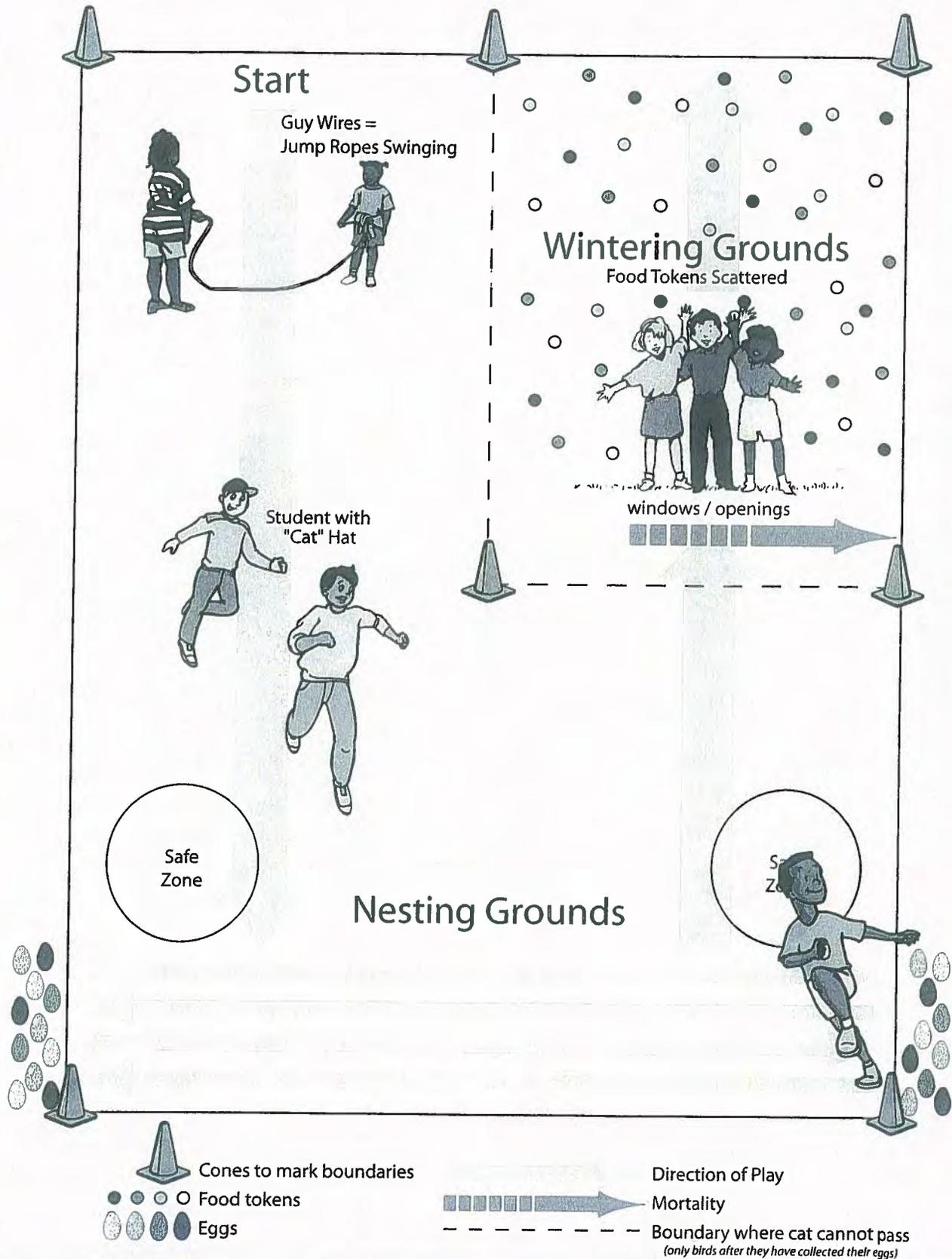
Another insecticide group that has seen increased use recently is the pyrethroids. These are synthetic formulations of naturally occurring pesticides and have low to medium toxic effects; birds and mammals can break the chemicals down and pass them through their bodies rapidly. However, pyrethroids are highly toxic to fish, which have shown a high sensitivity to this chemical.

Many pesticides may not kill birds on contact, yet they can contaminate food and water. The non-target animal may then ingest them and exhibit a sub-lethal effect that impairs the bird, preventing it from avoiding a predator, feeding its family, or finding shelter from inclement weather. The chemicals of concern can affect a bird's nervous system and can disorient it enough so it cannot find its way to its wintering ground. Pesticides also are blamed for weakening immune systems, and causing reproductive failure or birth defects in surviving offspring (such as twisted beaks or abnormal estrogen levels). Many Americans consume low levels of pesticides in their drinking water at some time each year. Health effects are unknown for these low levels of pesticide consumption, as are the effects of the interaction of different pesticides found together in water.

Care and timing in applying pesticides by land managers can greatly reduce their effects on wildlife and water quality. When using pesticides, land managers should avoid any water areas; use unsprayed buffer areas to protect wetlands; avoid applying when wind speeds are greater than 5 miles per hour; and use integrated pest management systems to apply pesticides only where and when they are needed. In addition, land managers should use the least toxic type of pesticide available for the necessary application. There also are alternatives to pesticides. Mechanical and biological control for pests can work just as well as chemicals in certain circumstances.



Hidden Hazards Diagram



Education Pathways



Great Possessions – An Awakening

By Seliesa Pembleton, Minnesota LEP Coordinator

Retyped by Lori Adams

About the Activity

In his essay, *Great Possessions*, Aldo Leopold describes the succession of bird songs he hears at the Shack on a summer morning in Wisconsin. Participants will use mnemonic sounds to imitate bird songs as they “recreate” the dawn chorus described by Aldo Leopold.

Setting the Stage

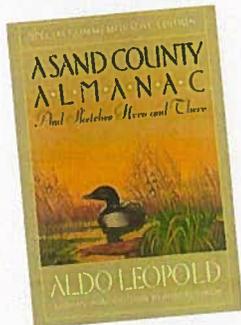
Leopold arose early to enjoy his morning coffee and make note of the “tenants” on his farm. He recorded the time and sequence of songs as each species of bird began proclaiming its territory.

“This daily ceremony contrary to what you might suppose, begins with the utmost decorum. Who originally laid down its protocols I do not know. At 3:30 a.m., with such dignity as I can muster of a July morning, I step away from my cabin door, bearing in either hand my emblems of sovereignty, a coffee pot and a notebook. I seat myself on a bench, facing the white wake of the morning star. I set the pot beside me. I extract a cup from my shirt front, hoping none will notice its informal mode of transport. I get out my watch, pour coffee and lay notebook on knee. This is the cur for the proclamation to begin”

-Aldo Leopold from a Sand County Almanac, *Great Possessions*

Objectives

This activity can be used as a 10 minute workshop “energizer” to change pace and revitalize the group when energy levels drop – or it can become a lively way to introduce students to a study of birds.



Preparation

Below is a list of birds in the order that Leopold recorded. The initial time of singing and the mnemonic sound that can be used to mimic the bird call.

Record information for each bird species on a separate index card. Prepare multiples so there are enough for each participant to receive a card.

Place pictures and identification information on the backs of the cards and laminate for repeated use.

Materials

Large clock with moveable hands or digital times on cards

Bird name cards with mnemonic information and time

Binoculars (optional)

Bird Identification guide (optional)

Sand County Almanac (optional)



Procedure

Introduce the July essay, *Great Possessions*.

Lead a general discussion about bird song. Why do birds sing? When are birds most actively singing?

Randomly distribute the bird cards. One to each participant and ask them to find others in the group with the same bird.

Ask them to read the bird name and practice simulating the bird call using the mnemonic information printed on the card. (Mnemonics are words or phrases that help us remember. In this case, they can help us remember the rhythm of a bird call. Mnemonics are different than phonetics, which help us pronounce a word properly.)

Return to order and be seated.

Now, using your clock or digital time cards, indicate that the time is 3:30 a.m. The field sparrows should arise and begin singing. (To avoid that initial embarrassment, it’s best to have at least two sparrows sing together.)

As you indicate the passage of time, additional birds join in.

All birds sing continually until full dawn chorus is achieved.

Time	Bird	Mnemonic Sound
3:35 a.m.	Field Sparrow	Tew...tew...tew, tew, tew, tew, tew
3:40 a.m.	American Robin	Cheerup, cherrily, cheerily
3:45 a.m.	Baltimore Oriole	Pidoo, tewdi tewdi yewdi tew tidew
3:50 a.m.	Indigo Bunting	Sweet sweet chew chew chew
4:00 a.m.	House Wren	churff chrff chrff chrff
4:05 a.m.	Rose breasted Grosbeak	chink chink chink
	Brown Thasher	What's Up What's Up (repeat 2 times)
	Yellow Warbler	sweet, sweet, sweet, I'm so sweet
4:10 a.m.	Eastern Bluebird	cheer, cheerful charmer
	White-eyed Vireo	chick-per-a-weeo-chick
	Red-Eyed Vireo	Look up over here, see-me-up-here
4:15 a.m.	Rufous-sided Towee	Drink your teee, drink your teee
	Northern Cardinal	What-cheer! What-cheer! What-cheer!

Results

In Leopold's words – a “bedlam” of sound – followed by laughter, smiles and increased awareness of bird songs. Who says learning can't be fun?

Conclusions

Many students – and adults – have never experienced the dawn chorus. One of the goals of the Leopold Education Project is to foster connections with the natural world. This activity may raise awareness of the songs that so often fall on deaf ears as we go about our busy lives.

Going a Step Further

Outdoor opportunities:

Leopold and his dog, Gus, made observations using many senses. Armed with sharp senses, hunt for the living things that are tenants on the schoolyard.

Establish a bird feeding station to observe and record data.

Plan a field trip to a local park, zoo or aviary to observe birds.

Evaluation

Keep nature journals. Use a bulletin board for data collection. Do observations increase over time and become more detailed? Are students more conscious of their environment and the other creatures that share it? Do they ask more questions about what they observe?



For information about the
Leopold Education Project
 Go to: <http://www.lep.org/>

Western Bird Song Mnemonics

- | | |
|---------------------------|---|
| 1. Song Sparrow | maids, maids, put on your tea kettle-lettle-lettle |
| 2. American Robin | cheerily, cheerily, cheer, cheer-up |
| 3. Bullock's Oriole | chuck, chuck, chuck-it-too-ee, zhew, zhew |
| 4. Willow Flycatcher | fitz-bew, fitz-bew |
| 5. Mourning Dove | hoooo-la-hoop, hoop, hoop |
| 6. MacGillivray's Warbler | chiddle-chiddle-chiddle-turtle |
| 7. Hermit Thrush | why don't you come? why don't you come? why don't you come to me? |
| 8. Black-capped Chickadee | cheeseburger, cheeseburger |
| 9. Spotted Towhee | che che che che zheeeeeee |
| 10. Cassin's Vireo | see me? here I am |
| 11. Yellow Warbler | sweet, sweet, sweet, I'm so sweet |
| 12. Western Wood Pewee | peeeer, peeeer |

Society Birds



Subjects: Language Arts & Social Studies

Objectives:

Social Studies: Students will be able to investigate roles birds have played in history.

Language Arts: Students will be able to plan and deliver an oral presentation.

Materials:

- Materials for classroom presentations
- Society Birds Crossword

Procedure:

1. Ask students to think about some way a bird was part of their life recently. Did they eat chicken for dinner? Did they watch a bird at a feeder? Did a bird call wake them up this morning? Were they called a birdbrain yesterday?
2. Explain that birds have affected human life in one way or another for most of history.
3. Divide your students into groups. Ask them to brainstorm ways in which birds have affected history. When finished, gather the groups together to come up with a group list. The list might look something like this: Food and Feathers, Recreation, Literature, Symbols, and Arts.
4. Divide students into groups and assign each group a different category from the list they came up with. Students should work as a team to develop a presentation for one of the categories. Presentations should include a break down of the ideas under the particular categories. Examples: Food and Feathers might include information about how birds have been used for food, (don't forget eggs) and how we have used feathers (feather beds, down vests, quill pens). Recreation might include falconry, bird watching, pets, photography and hunting. Literature could include poetry, fairy tales, myths, and cartoons. Symbols might include sports teams, national and state symbols, common sayings, birds used in advertising, etc. Arts could include paintings, sculpture, carvings, songs, dance, stamps and coins.
5. Students should work to make the presentation educational (and fun) for their audience. Short plays, visual aids and activities to get the audience involved should be encouraged.
6. When finished, have the students complete the Society Birds Crossword.

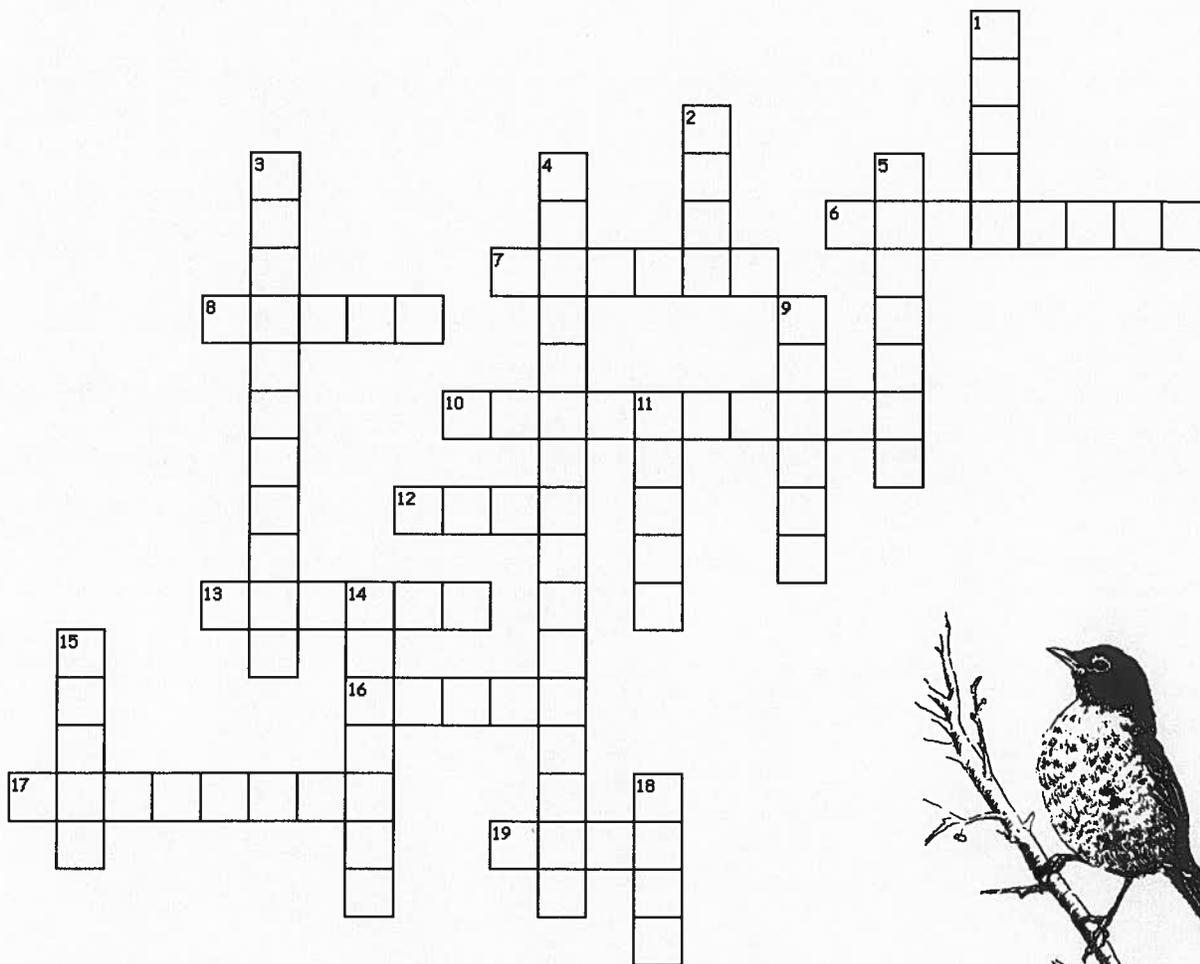
Across

- | | |
|----------------|--------------|
| 6. duckling | 13. magpie |
| 7. turkey | 16. goose |
| 8. flock | 17. flamingo |
| 10. roadrunner | 19. crow |
| 12. loon | |

Down

- | | |
|----------------------|-------------|
| 1. stork | 9. canary |
| 2. dove | 11. robin |
| 3. stellers jay | 14. pigeons |
| 4. mountain bluebird | 15. eagle |
| 5. vulture | 18. Swan |

Society Birds



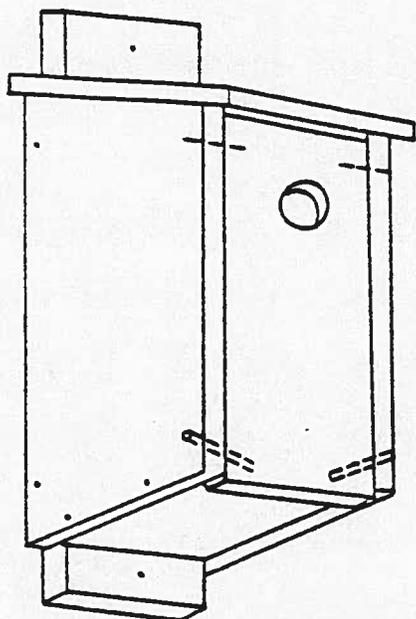
Across

6. The ugly _____ was really a beautiful swan.
7. To talk _____, is to speak frankly and get down to the basic facts of a matter.
8. "Birds of a feather _____ together."
10. This bird can be found in southwestern deserts. In cartoons, he's Wile E. Coyote's enemy.
12. "Crazy as a _____."
13. This black and white bird is often considered mischievous and noisy.
16. "Silly as a _____."
17. This bird is the national bird of the Bahamas. Sometimes people in our country decorate their lawns with statues of it.
19. Farmers sometimes use a scare _____ to keep birds away from their crops.

Down

1. Stories are told about this bird delivering human babies.
2. Rhyming with love, this bird also is a symbol for peace.
3. A camp robber by trade.
4. Idaho's state bird.
5. This scavenger bird feeds mostly on carrion. Sometimes greedy people are called this name.
9. This small yellow bird is a popular pet and was once used by miners to test for dangerous gases.
11. In Idaho, the coming of this bird signals the beginning of spring.
14. Egyptians used these birds as messengers as early as 3000 B.C. Nearly 20,000 of these military messengers were killed during World War I.
15. Our national bird.
18. *The Trumpet of the _____* by E.B. White is a story of love, friendship and coming to terms with a disability.

NEST BOX CONSTRUCTION PLANS



The front of this nest box swings open to allow easy cleaning. The hinge nails should not be driven in too tightly and should be directly opposite each other so the front does not bind when lifted up. The bottom of the front is held in place by nails inserted at an angle into drilled holes. Leave ¼-inch openings at the top under the eave for ventilation.

Materials are scrap 1-inch by 6-inch lumber. A plank four and a half feet long will build one nest box. Galvanized or coated nails hold better than smooth nails. To avoid splitting the boards with nails, use a drill bit slightly smaller than the nails to start the holes.

The roof of the box should be beveled slightly so that there is a snug fit against the back of the box. Bluebirds use a 1½-inch hole cut six inches above the floor. (Remember, the 1⁹/₁₆-inch hole is preferred if there is no problem with starlings.) Grooves should be sawed beneath the hole on the inside. This gives birds a toe-hold for easy exit.

A non-toxic paint such as latex should be used and only the outside of the box should be painted. A light colored paint or stain is best, adding years to the life of the box.

Place the nest box on posts, snags or tree trunks between four and 15 feet from the ground. It gets hot inside the box in summer, so select a spot that is shaded from the afternoon sun. Boxes should not be placed closer than 100 yards. Bluebirds are extremely territorial and prefer open areas near the nest. House sparrows will be discouraged if the boxes are set up away from farm buildings. Fewer wrens will take over boxes if they are away from thick brush.

