

# ACTIVITIES

On the following pages you will find multidisciplinary activities to assist you in teaching your students about raptors and their role in the environment. A recommended age group is listed at the beginning of each activity (K-2, 3-6, 7-12). Most of the activities, however, can be easily adapted for a wider age range. We encourage you to adjust the activities to fit the needs of your curriculum and your students.

## Literature:

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Raptors have played an important role in human culture, literature and art throughout the world. The following activities will help students understand how our lives and even our language have been influenced by raptors.

### GRADES K-12

1. Compile a classroom library of books and magazine articles about raptors including both fictional and nonfictional materials. A few suggestions are listed in the resource section of this packet.
2. During your search you might find older books that depict raptors in a more negative light than do those in the most current literature. If you do, include them and discuss with your class how attitudes towards raptors and predators in general, have changed over the years as we learn more about their importance in the balance of nature.
3. In small groups or individually, have students research one species of raptor, write a report on it and present it to the class with appropriate visual aids.
4. Once your students have learned about different raptor species by listening to their classmates' presentations, have each student write a poem about a favorite raptor, group of raptors or about a specific raptor behavior.
5. Make a class book containing the students' illustrated poems. Books can be reproduced and sold to raise money to support a rehabilitation center, or raptor organization, or to adopt a raptor at Woodland Park Zoo or other local facility (see *Resources* section).

### GRADES 7-12

6. Have students compile a list of raptor or falconry words or phrases in literature and investigate their meaning. Examples might include: haggard, harried, tethered, hawk-eye (see background information for more examples). Alternatively, you can show your students the words from the background information list and then have them research current meanings to the word. From the current meanings, have the students figure out how the word originally related to falconry.
7. Have students research the meaning or the scientific names of raptors. Most scientific names use Latin or Greek root words to describe the species. Sometimes the name will honor a person or describe where the species is from; these names are usually "Latinized" too. Many raptor books, including some field guides, include this information. Example: The scientific name for bald eagles, *Haliaeetus leucocephalus*, means white-headed sea eagle.

Students can then develop a quiz show to test each other's knowledge about the origin of raptor names.

## Culture:

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### GRADES K-12

1. Read or have students read stories or myths involving raptors. *Keepers of the Animals* by Michael Caduto and Joseph Bruchac is a good source for Native American stories. Then have the students work in groups to create their own myth explaining how a raptor got a certain trait. Myths can be acted out in front of the class or for the school.
2. Have the students bring in pictures of raptors from stories, advertisements, logos or money to display on a bulletin board. You may also ask them to do an Internet search using the names of raptor species.
3. Discuss why particular raptors are used to represent different ideas. Why has a particular bird been chosen for a logo? Why do schools have raptors as mascots? What are companies trying to symbolize by having a bald eagle or vulture in their advertising? Why are owls sometimes considered wise and other times are symbols of bad luck? Why are vultures used to depict evil and eagles to represent freedom?

### GRADES 3-12

4. After completing the previous two activities, generate a discussion with your students about what effects myths, advertisements etc. have on the fate of raptors. Is it positive, negative or both and why?

### GRADES 7-12

5. Ask your students to discuss how people's attitudes toward raptors, and predators in general, have changed over the years. What has influenced changes in attitudes? (For example: as we have learned more about the important role of raptors in the balance of nature, we have realized their value to us as well as to their ecosystems.) Has our switch from a rural/agricultural economy to an urban/industrial economy also influenced our attitudes?

## Math:

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### GRADES K-6

1. As a class or individually, have the students research the speed of several raptor species and compare it with that of people (walking and running), cars, airplanes and other animals. Graph the results.
2. Using a field guide for data, compare the wings of various birds of prey. Start by discussing how different wing shapes are used for different types of flying (see background information). Also point out that different species of birds have different wingspans (distance from wing tip to wing tip) depending on the size of the bird and the type of flying it does. Have the students measure the arm span of a partner.
  - The arm span data can be graphed to show the variety of arm span even in a single class of children.
  - Find the average arm span for the class.

- Then ask the students to compare their arm spans and/or the class average to those of the raptor wingspans they researched. Which raptors have shorter wingspans than the arm spans of the students? Are there any raptors with longer wingspans? Which raptor's wingspan is closest to that of the students?

3. Give each student or group of students a card listing the wingspan and showing the silhouette of a different raptor. Go outside to a sidewalk or asphalt area and have the students measure the distance listed on their card and mark it with chalk or tape. Students can then draw the outline of the bird with chalk. Students can compare the different outlines and try and guess what type of raptor other students drew. Alternatively, students can draw their silhouettes on butcher paper, color them in and post them in the hallway for all students to see.

## GRADES 3-12

4. Using the background information provided about the speed of raptor flight, have the students compare their own speed to that of various raptors. In the gym or outside have the students run a 100-yard dash and a half-mile run. Then have them compare each of their speeds to that of various raptors. (100 yards = 300 feet. There are 5,280 feet or 1,760 yards in a mile.)

**\* Note \*** We generally cannot maintain speeds for the same duration raptors can.

## GRADES 7-12

5. Use the *Population Control* worksheet at the end of the *Activities* section to have students calculate the effects of raptors on rodent populations.

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## Science:

### GRADES K-6

1. In class, have your students cut out pictures of any birds they find in magazines or ask them to bring pictures of birds from home. Point out the different types of beaks and feet. After describing the major characteristics of raptors (strong legs with long sharp talons, sharply hooked beak, good eyesight), have the class sort the bird pictures into raptors and non-raptors based on the feet and beak characteristics. (If the students do well at this you can have them try and divide the non-raptors into other categories as well, i.e. ducks and geese, parrots, penguins, etc.) Make a class bulletin board illustrating raptors/non-raptors and have your students add to the collection.

### GRADES 7-12

2. Complete the previous activity. Then ask your students to use field guides to identify and label the raptors. Students can then further divide the raptor pictures into groups of raptors, i.e. eagles, falcons, kites, hawks.

### GRADES K-12

3. Each of the following activities can be done separately or, with help from parents, each can be a station through which students rotate. These activities can be used to teach inquiry-based lessons. Ask your students to develop hypotheses about what they will discover at each table. Then have them carry out activities to test, evaluate and reformulate their hypotheses.

- Dissect owl pellets to discover what an owl has been eating. Most raptors cannot digest all of the bones, fur and feathers that they swallow and they periodically cough up pellets of this undigested material. Since owls swallow much of their food whole, it is possible for scientists, and students, to learn what the owls have been eating by examining their pellets (see *Resources* section for owl pellet and prey chart suppliers).
- Bring a clean, dry chicken bone from home, saw it in half and look at its hollow structure. If you can get a mammal bone (such as a pork or beef rib) from a butcher, do the same thing. Have your students examine and compare the bones' structures. Then ask your students to weigh the bones and have the students compare the weight of the bird and mammal bones. You may ask older students to measure and weigh the bones and then develop a calculation which will show the relationship of weight to size.
- Bring in several bird feathers, including contour and flight feathers, and have the students examine their structure under a microscope. (Note: it is illegal to collect raptor feathers due to their protected status.)

- **Lift demonstration:** Give each student a strip of lightweight paper such as notebook paper or copy paper (approximately 1"x8"). Have the students place one of the narrow ends of the paper just under their lower lip and let it hang. Have the students blow gently but steadily across the top of the paper. The air over the top of the paper is now flowing faster than the air underneath the paper causing lift. The piece of the paper should rise.
- **Thermal demonstration:** Have students cut out a paper spiral and hang it from a string. With adult supervision, have the students hold their spiral over a candle or warm light. As the warm air from the candle or lamp rises it will push the spiral and make it spin.
- **Paper airplane competition:** Have the students design paper airplanes and then test fly them. Which ones fly faster? Which ones glide for a longer period of time? Compare the flight patterns of the paper airplanes to the information you have learned about raptors.

4. To demonstrate what happens when members are removed from a habitat, build a pyramid using building blocks or Jenga blocks. Explain to the class that the pyramid represents a forest community and each block represents a plant or animal in the community. Now ask the students what they think will happen if you remove a block. Remove a lower block. The pyramid should still be standing but be a little less stable. Ask the class how the community has been affected. Ask what would happen if you keep removing blocks (community members). Continue to remove blocks from the middle of the pyramid until the pyramid crumbles. Point out to the students that just as a block pyramid collapses when too many pieces are disturbed, a natural community will also collapse if too many of its members are disrupted or removed.

This activity can also be done using a piece of cloth such as burlap or other wide weave fabric. Remove threads throughout the cloth by pulling the exposed end. The cloth will begin to fall apart. Cloth with a plaid pattern works best since different colored strings can be removed.

5. Have the students observe birds, including raptors, at school, at a local park or during a field trip. Bring bird field guides and invite any parents who are birders to help out. Have students bring binoculars from home if they can. You can also contact the Audubon Society near you for trip suggestions, information on the best times to view raptors or to find out if they lead bird walks in your area.

## GRADES K-12

### 6. Pesticide Game

#### Materials:

(This activity assumes a class of 30 but may be adjusted to suit your class size.)  
 approximately 30 small bags (stomachs)  
 250 white poker chips (aquatic plants)  
 125 red poker chips (contaminated aquatic plants)

**\*Note\*** This game can be done in a classroom or outside. If doing this activity outside, you may want to substitute biodegradable food stuff for the poker chips so that if all of the pieces are not collected they do not harm the environment.

Explain to the students that DDT is a pesticide that was once used widely in the United States until the early 1970s. Explain how DDT concentrated at the higher levels of the food chain and began to cause problems for bald eagles, peregrine falcons and other birds. To illustrate this effect, play the following game:

Divide the class into three groups: 1) eagles, 2) salmon, 3) small fish. The groups should be divided so that for every eagle there are three to four salmon and for every salmon there are three to four small fish. So in a class of 30 you would have two eagles, six salmon and 24 small fish.

Hand each small fish an empty bag (its stomach). Then spread all of the poker chips (or substitute items) around the play area — don't allow the students to watch you place the playing pieces.

Tell the students that the poker chips are aquatic plants the small fish need for food, but don't tell them that some are contaminated. Give the small fish 15-30 seconds to run around and collect as many aquatic plants as they can. The amount of time will depend on the size of the area in which you are playing.

After the small fish are done collecting food in their stomachs (bags) give the salmon an equal amount of time to try and tag as many small fish as they can. Each time a small fish is tagged, the salmon gets to take the bag of the small fish. Explain to your students that each time a salmon eats a smaller fish, whatever the small fish ate goes into the salmon. Any small fish that is tagged must sit on the sidelines after giving up its bag.

Repeat the tag game with the eagles catching the salmon.

Have each student who is still "alive" (has not been tagged) record the type of animal it was and then how many white and how many red poker chips he/she has in his/her bag. Now explain to the students that pesticides were introduced into the environment by being sprayed on plants. The pesticides then washed into rivers when it rained and contaminated the aquatic plants. Tell the students that the red chips represent contaminated plants. Discuss the effects of the contamination on the fish and the salmon (see background information on DDT). You may want to assume that any fish with more than one-third red chips is dead and that any eagle with more than one-quarter red chips will not be able to reproduce because its eggs' shells are too thin and break.

## GRADES 3-6

7. Play the following Food Web Game to demonstrate how plants and animals depend on each other for survival. If possible, do this activity outside.

### Materials:

One 3"x5" card for each student in the class (you may opt to divide the class in two and run the game twice).

One ball of string or yarn

Tape, string or pins to attach 3"x5" cards to students' shirts

*Web of Life Animal List* included in this packet

Write the name of one plant or animal on each 3"x5" card (see *Web of Life Animal List*) and give one to each student. Have the students illustrate their cards.

Before beginning this activity, discuss with your students the concept of interdependence: animals and plants rely on each other for many things including food, shelter and population control (see the background information on ecology). Have the students sit or stand in a circle with the cards around their necks or attached to their clothing. Ask the students to imagine a field on the edge of woods. Explain that this habitat gets its energy from the sun. Hand the end of the ball of yarn to the student with the sun card (student #1). This student should hold on to the end of the yarn.

Ask the students to raise their hands if they think their plant or animal relies on the sun for energy (hint: plants photosynthesize and animals need warmth). Select one student who correctly raised his/her hand, and give her/him a section of the yarn to hold (student #2). Make sure the sun is still holding on to the end of the ball of yarn.

Now, ask if any of the students think their plant or animal depends on this (student #2) plant/animal. Making sure the first two students continue to hold on to their section of the yarn, pass the ball on to the third child (student #3). In this way a web will begin to form.

Continue to ask questions and pass the remainder of the ball of yarn around until all the students are holding at least one section of the yarn. A web should form as string is passed back and forth from student to student.

After you have completed your “web,” explain to the class that factors that affect one member of the community (ecosystem) will be felt by other members as well. Have the students imagine that a

tree is cut down. Have a student with a tree card tug on his/her yarn. Have any students who felt the tug raise their hand. Now, have these students tug on their yarn. Again have all students who felt the tug raise their hand. Make up other scenarios (disease, introduced species, habitat reconstruction) that would affect the habitat and repeat. Explain how natural and man-made disruptions to habitats have consequences throughout the community.

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## Geography:

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### GRADES K-2

1. Select a raptor and, using blank U.S. maps provided, color the states in which the species is found.
2. Using the animal fact sheets enclosed, write down the names of each species of raptor represented in the fact sheets. On a bulletin board write the names of habitats, for example, woods, desert or forest. Then ask the students to match the names of the raptors with their habitats.

### GRADES 3-12

3. Research and map the ranges and/or migration routes of North American raptors on the maps of North and South America provided. Most field guides have North American ranges but students will need to dig further for migration routes and winter ranges.
4. We mentioned before that raptors are often used in advertisements, on logos and in other various capacities. Raptors are also used to name towns, cities, bodies of water and other geographic areas. Working in teams or individually, ask your students to utilize atlases, maps or other resources to find geographic landmarks named after raptors. This could be accomplished as a game or a contest.

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## Arts, Crafts and Drama:

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### GRADES K-2

1. In the gym or on the playground have the students imitate the flight pattern of different raptor species or play follow-the-leader with you leading the group. Describe the bird that they will be imitating including wing shape, type of flying it does, what and how it hunts.

*For example:*

A turkey vulture searches for dead animals to eat by soaring for hours in wide circles with its wings held in a V-shape over its back. Because turkey vultures are so lightweight they tilt back and forth slightly as they soar. When they do flap their wings, they flap a few times than soar again.

A Cooper’s hawk bolts from a tree branch with a quick flap-flap-glide-flap-flap-glide pattern to its wing beat. It swerves around trees to sneak up on its prey, a small bird. If it does not catch the bird within a few moments it will stop to rest and try again later.

A barn owl sits in a tree at the edge of a field and listens for mice. When it hears a mouse 100 feet away it silently flaps its wings a few times then glides low over the field and grabs the mouse with its talons.

## **GRADES K-12**

2. Read a story or poem about a raptor or make up your own visual imagery while the students close their eyes and listen. Ask the students to imagine (but keep the ideas in their head) what the hawk might see, how it might feel, etc. Have the student draw or paint a picture from a hawk's eye view.
3. Give a description of a raptor's habitat, prey and hunting style to each student or group of students. Have the students design a raptor with characteristics that would help it survive under the prescribed conditions. Or, give the students the description of a bird and see if they can create a habitat for the bird, including all the necessary components for survival, such as prey.

4. As a class, write a play incorporating information the class has learned about raptors such as adaptations, habitat, threats to their survival and what can be done to protect raptors. This play can then be performed before others to teach them about raptors.

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## **Conservation:**

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Our action, or inaction, and the choices we make can have significant effects on the environment and natural systems. The following activities are ideas that will help students understand that they play an important role in conservation and that they can make a difference.

## **GRADES K-12**

1. Improve wildlife habitat at school or home by planting native vegetation, picking up trash, or constructing bird feeders, bird baths or nest boxes (see the *Resources* section for books about creating habitats).
2. Have a school fund-raiser to support a raptor organization or an organization such as the Nature Conservancy that protects habitat by buying land or Woodland Park Zoo's Raptor Rehabilitation and Release Program. Students could sell the poem books they created, bird feeders, bird-shaped cookies or buttons.
3. Ask your students to develop their own ideas about how they can make a difference and help wildlife.

## **GRADES 7-12**

4. Whether it's a spotted owl controversy, a change in status of an endangered species or the success or failure of nesting birds, raptors are frequently in the news. Have the students bring in current newspaper or magazine articles related to raptors and discuss them.
5. Write letters to elected officials. Letting your elected representatives know how we feel can influence how they vote on important environmental issues. You can focus attention at the federal, state or local level.

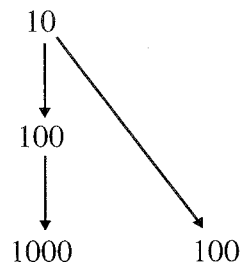
# POPULATION CONTROL

## Master

1. Raptors are very important in controlling mouse and other rodent populations. Assume six barn owls live in your barn. If each barn owl eats two mice per day, how many mice are consumed by the owls in a year?

**A:  $6 \times 2 \times 365 = 4,380$**

2. Mice give birth to 8-12 offspring every eight weeks. If one female mouse gives birth to 10 babies and each of those 10 babies gives birth to/sires 10 babies (assuming no deaths by predation or natural causes), how many mice will there be after the third generation of offspring is born? **A: 1210**



3. Now, assume that each generation of mice from problem #2 lost 30 percent of their population to predation by a barn owl before those mice reproduced. How many babies will be **born** in the third generation? **A: 560**

First generation:  $10 - 30\% \text{ of } 10 = 7$

Second Generation:  $7 \times 10 = 70 - 30\% = 49$

Third Generation:  $49 \times 10 = 490 + 70 \text{ (first generation reproduces again)} = 560$

4. Develop your own math problem that illustrates the rapid population growth of mice and how raptors keep this growth in check. Trade your math problem with a fellow student.
5. Calculate the number of raptors that grow up to reproduce their own offspring. Assume 1/10 do not hatch, 1/5 die in the nest and 1/3 that do leave the nest do not survive to their first year due to predation, accidents or other causes. Also assume that all raptors surviving their first year reach reproductive age. If 150 peregrine falcon eggs were laid in Washington state how many would hatch? Leave the nest? Survive their first year?

**A: = 71**

$$150 - 10\% (15) = 135$$

$$135 - 20\% (27) = 107$$

$$107 - 33 \frac{1}{3} \% (35.6) = 71.26$$

71 peregrines will survive the first year.



# POPULATION CONTROL

## Worksheet

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5. Calculate the number of raptors that grow up to reproduce their own offspring. Assume  $\frac{1}{10}$  do not hatch,  $\frac{1}{5}$  die in the nest and  $\frac{1}{3}$  that do leave the nest do not survive to their first year due to predation, accidents or other causes. Also assume that all raptors surviving their first year reach reproductive age. If 150 peregrine falcon eggs were laid in Washington state how many would hatch? Leave the nest? Survive their first year?



**WEB OF LIFE ANIMAL LIST**

**HAWK**

**OWL**

**FOX**

**SNAKE**

**ROBIN**

**WEASEL**

**SQUIRREL**

**TURKEY**

**VULTURE**

**SHREW**

**GRASSHOPPER**

**PRAYING**

**MANTIS**

**GRASS**

**CATERPILLAR**

**WORM**

**SUN**

**RABBIT**

**BEETLE**

**DOUGLAS FIR**

**TREE**

**CATERPILLAR**

**FLOWER**

