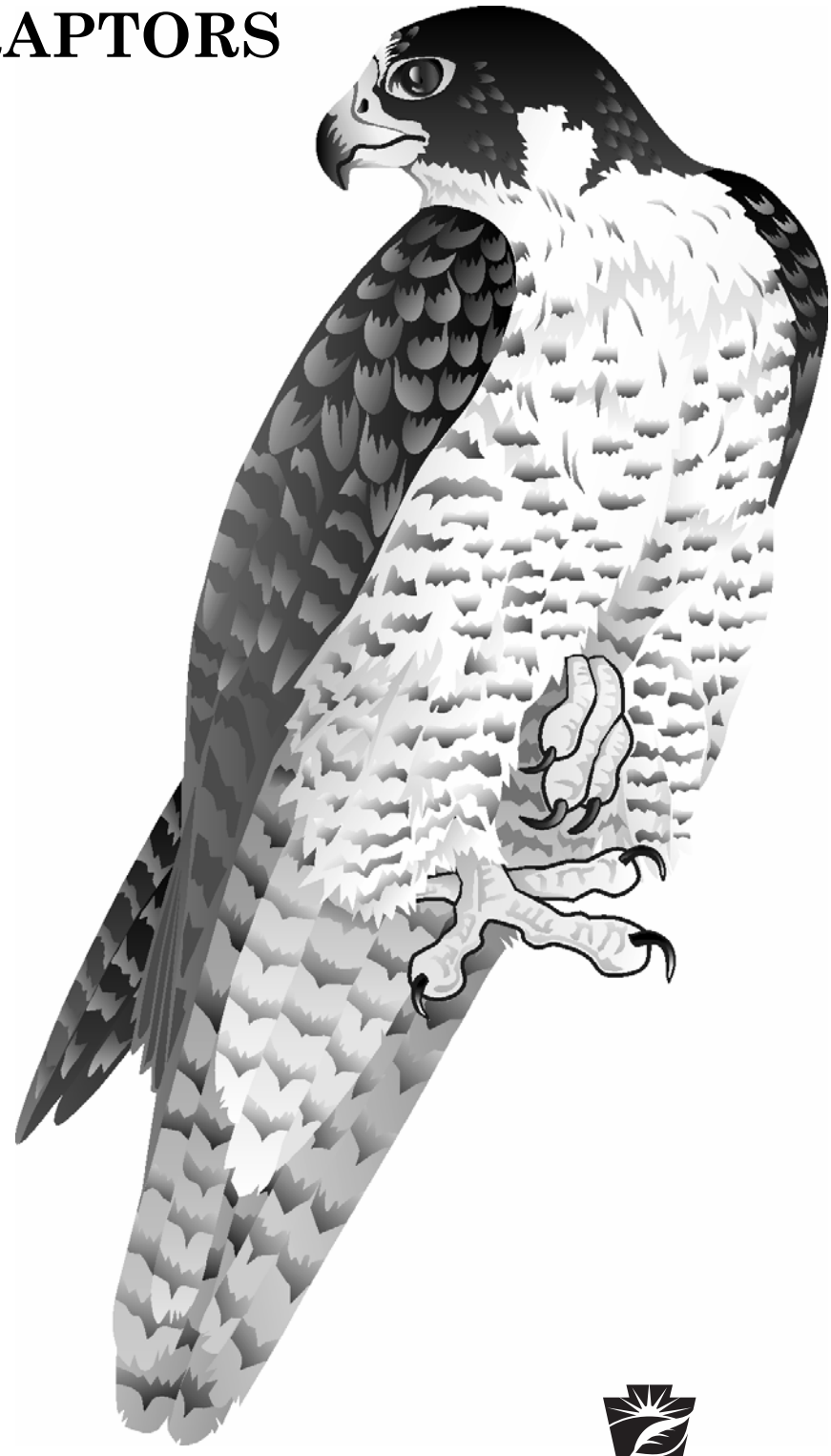
LEARN ABOUT PEREGRINE FALCONS AND OTHER RAPTORS



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Learning Activity

Peregrine Falcons

Grade Level: 4th, 5th and 6th grade

Subjects: Environment and Ecology, Science, Geography

Concepts:

1. The city is habitat
2. The study of wildlife and the environment, past and present, leads to a better understanding of ecological systems and the effects of human activities on those systems.
3. Falcons have adapted to fill a predator niche in urban areas.
4. Wildlife at the top of the food chain is more susceptible to some poisons in the environment.

Skills: Determining cause and effect, analysis, kinesthetic concept development, evaluation, synthesis, discussion.

Pa. EE Standards: Threatened, Endangered and Extinct Species 4.7.4 (a) (b)

Integrated Pest Management 4.5.4 (b)

Environmental Health 4.3.7 (a)

Ecosystems and Their Interactions 4.6.4 (a)

Materials: Pictures of falcons, pictures of other birds (pigeons, starlings etc.) foam packing peanuts or something similar to represent food (360 pieces for a class of 26), colored arm bands, flip chart, markers, and baggies or other containers, one per child.

Preparation Time: 20 minutes

Class Time: 1 hour

Teacher Preparation: Read through the entire activity.
Find photos or drawings of peregrine falcons and or explore the falcon web site for images and background information:
http://www.dep.state.pa.us/dep/falcon/ Select an open area appropriate for the game and select/prepare the "food" for the game.

Background:

Peregrine falcons, eagles, ospreys and other avian (bird) predators have been adversely affected as a result of human activity from the 1930s through the early 1970s. Primarily, these activities involved the then unregulated use of pesticides such as DDT and habitat changes due to land use. This lesson deals specifically with the peregrine falcon; its biology, habitat, reproduction/growth and the environmental conditions that have changed this falcon's status over that period. Terms used in this activity are footnoted. Visit the following sites on the Internet to learn more about peregrine falcons:

The Falcon Research Group, http://www.frg.org
The Canadian Peregrine Foundation, http://www.peregrine-foundation.ca
Pa. Department of Environmental Protection,
http://www.dep.state.pa.us/dep/falcon/falconinfo.html
Pa. Game Commission, www.pgc.state.pa.us, click on "Wildlife," select "Birds" and then "Peregrine Falcon."

Action:

Hold the following discussion:

1. Falcons are raptors[1] or birds of prey. Ask your class "What is meant by a bird of prey?"

2. Falcons have adaptations that help them fill their niche and survive. Point out the following adaptations on a photo or drawing:

    a. Eyes – Both eyes are set forward to allow for zeroing in on prey. Conversely, birds that are preyed upon have eyes set more toward the sides of their heads, allowing a wider field of vision to increase their chances of spotting an attacker. The "price" for this extra range of view is that their vision is less sharp than that of such birds as falcons.

    b. Talons – powerful, sharp… why? (to catch and hold prey)

    c. Wings tapered for speed… why? (effective pursuit of other birds)

    d. Bones hollow… why? (light weight for flight)

    e. Beak is notched and hooked… why? (quick kill of prey and tearing meat)

3. Peregrines in Pennsylvania now nest on tall buildings and bridges. Where do you think they nested before there were cities with these structures? (Peregrine historic nesting areas were rock outcroppings and high cliffs overlooking such places as the Susquehanna and Juniata Rivers in central Pennsylvania.)

4. There are certain habitat[2] requirements for peregrine falcons. As with all wildlife, they need food, water, shelter and space. Falcons find all these requirements in urban areas.

[1] Raptors: Birds of prey, including eagles, ospreys, owls, hawks, falcons and harriers.
[2] Habitat: The place where a population (plant or animal) lives and its surroundings.

5. What problems do you think peregrines may have had to face in the past?

   a. DDT, a pesticide[3] used to control crop pests, was harmful to peregrines and other birds of prey because it caused their eggshells to become dangerously thin. DDT was banned in 1972.

   b. Shooting to protect game birds (as a result of lack of understanding of predator/ prey relationships - Shooting is now unlawful).

   c. Natural predators, such as great horned owls and golden eagles.

   d. Egg collecting (now also unlawful).

6. Of all the threats that the peregrines have had to face, DDT and other poisons in the environment are the most insidious. The word insidious as used here means having a gradual and cumulative (or build up) effect. Insidious also means treacherous. DDT is a nickname for a very long chemical name, dichloro-diphenyl-trichloroethane. DDT was produced early in the 1930s and used to combat mosquitoes spreading malaria, typhus and other diseases and as an agricultural pesticide. Some pesticides are safer than others, but farmers and scientists did not immediately know this difference.

7. The single most important factor leading to the ban of DDT was Rachel Carson's book *Silent Spring*. Have any of you heard of Rachel Carson or her books? To learn more about Rachel Carson, go to: The Rachel Carson Connection at http://www.dep.state.pa.us/dep/falcon/nesting.html. Pesticides are an important tool in feeding growing world populations; some pesticides are safer than others. Today, farmers are seeking innovative programs such as IPM (Integrated Pest Management)[4] to control destructive insects.

   The following is an activity adapted from "Deadly Links" found in *Project WILD,* a national curriculum.

8. Explain to the students that they are going to complete an activity about food chains. Define the term food chain as a "chain" of living members of a community, one consuming another and the next consuming it in sequence. You can use as an example - insects eat leaves, starlings eat insects and at the top of the food chain, the falcon eats the starling. Each student will role-play a member of the food chain consisting of grasshoppers, starlings and falcons. Foam packing peanuts, tongue depressors, pipe cleaners or any other materials that students can easily pick up will do. If the activity will be done outdoors, dry dog food of two different colors or popcorn could be used. You may also use the same popcorn or dog food, marking one third of the amount of food used with a color. Be sure to select a material appropriate for your setting.

   A playing field will work well if the activity is done outdoors. If indoors, use the gymnasium or other large open floor area. The material you select will represent the food that the grasshoppers will hunt for and eat. The starlings will hunt for the grasshoppers and take their food. The falcons will hunt for the starlings and take their food. One third of the food consumed by the grasshoppers is tainted with a harmful pesticide, (marked or

[3] Pesticides: Chemical agents used to destroy insect pests and thus prevent destruction of agricultural crops.
[4] Integrated Pest Management: The practice of using physical measures and natural predators to reduce reliance on pesticides. Crop rotation, resistant host plants, and the use of parasites are some IPM methods.

a different color) the remaining two thirds is okay. The food is identified by two different colors. Our example will be: tainted food – red, not tainted – green.

a. Divide the students into three groups. For a class of 26 students, there would be two falcons, six starlings and eighteen grasshoppers. Whatever the group size, work with approximately three times as many starlings as falcons and three times as many grasshoppers as starlings. You may use arm ties and or bandannas of different colors to identify falcons, starlings and grasshoppers.

   Explain that the playing area represents the falcon's habitat. Ask the students what needs to be here if , indeed, this is the falcons habitat. (As with all wildlife they need food, water, shelter and space. The food is the foam peanuts, or whatever you are using, the water is nearby, but we don't need it for this game, the space is – define your boundaries and where would the falcons go for shelter nearby – which they are not going to need during our game).

b. Have the students face away from the activity area as you spread the food material around the entire area. The amount will depend on the number of grasshoppers (20 pieces each - two thirds green or unmarked and one third red or marked will work well).

c. Hand each grasshopper a plastic baggie or other container. The container represents the stomach of whatever animal is holding it.

d. Explain to the students that the grasshoppers will have 60 seconds to gather food within a designated area (set boundaries). Then the starlings will have 30 seconds to hunt the grasshoppers, who will try to avoid being tagged by the starlings. When a grasshopper is tagged, the tagged student must give their bag to the starling and sit on the sidelines. Then the falcons will have 30 seconds to hunt the starlings – the same rules apply.

e. When the falcons have reached their time limit have the students form a circle. Those who do not have bags are dead, having been consumed. Have them identify what animal they were and what ate them. Ask those who still have bags to empty them and count the number of red and green or marked and unmarked food pieces they gathered. List the remaining grasshoppers and the number of red/green or marked/unmarked pieces in their bag. Do the same for the starlings and falcons.

f. Tell the students that as the grasshoppers were feeding, some of them ingested poisons in the form of pesticides used to destroy insects that are harmful to lawns and farm crops. Some pesticides are safe to use others are not. If the remaining grasshoppers have any red or marked pieces in their bag, they are dead. Starlings with half or more red or marked pieces are dead. The falcon with the highest number of red or marked pieces will not die but the bioaccumulation[5] of poison from the pesticide will block the production of calcium and the egg shells produced will be too thin to hatch successfully. When DDT was used from the 1930s until it was banned in 1972, it caused avian predators at the top of the food chain, like peregrines, to dwindle to near extinction.

[5] Bioaccumulation: When levels of a substance build up and become concentrated as they work their way up in the food chain.

g. Review the outcomes of the activity. Ask the students if they know of other food chain sequences and how toxins[6] may enter the food chain in different ways. (For example, aquatic food chains, mammalian food chains, or combinations of these, etc.)

h. To conclude, hold a discussion with your class on the following points:

- Falcons once lived in wild open areas where they ate smaller birds that were exposed to agricultural pesticides.
- Do you think falcons living in cities are still exposed to pesticides? Why or why not? (yes, falcons and prey birds range or move long distances and are, at times, migratory. They can be exposed to pesticides in cities as well as agricultural areas in other parts of the world such as Latin America where DDT is still being used).
- As science has evolved or grown, more is known about safe and unsafe pesticides. How has this knowledge helped the falcons?

Extension:

Review the definition of IPM. To learn more, visit http://www.paipm.cas.psu.edu, "The Pennsylvania Integrated Pest Management Program," a cooperative effort involving Penn State University and the Department of Agriculture. Have students select a book from the raptor related reading list at the end of this lesson to read and review.

Assessment Ideas:

Divide an 8.5 x 11 inch sheet of paper into two sides. Draw a picture of peregrine falcon habitat as it may have been many years ago on one side, and on the other side draw a picture of the peregrines in today's urban habitat, making sure to include everything the falcons need (food, water, space and shelter) in each.

Science gave us DDT, but science didn't stop there… the body of scientific knowledge kept on growing. Have students explain, in their own words, why the flow of scientific knowledge is important to the falcons, and to people and the environment in general.

[6] Toxins: Poisonous substances that are harmful to living tissue.

Use the following vocabulary match-up list below and have the students match the term to the definition. Review the list with the class.

Column A	**Column B**
1. Raptors	a. _____ Chemical agents used to destroy insect pests and thus prevent destruction of agricultural crops.
2. Habitat	b. _____ The place where a population (plant or animal) lives and it's surroundings.
3. Pesticides	c. _____ The practice of using physical measures and natural predators to reduce reliance on pesticides.
4. IPM (Integrated Pest Management)	d. _____ Poisonous substances that are harmful to living tissue.
5. Bioaccumulation	e. _____ When levels of substances build up and become concentrated as they work their way up the food chain.
6. Toxins	f. _____ Birds of prey including: eagles, osprey, falcons, hawks, owls and harriers.

Raptor Related Reading List

Arnold, Caroline and Robert Kruidenier. ***Hawk Highway in the Sky: Watching Raptor Migration.*** Harcourt, 1997.

This book details the habits and migration patterns of . . . {hawks, eagles, and falcons} and shows . . . the capture, measurement, and banding processes used at the HawkWatch International observation site in the Goshute Mountains of Nevada--the busiest raptor trapping and banding location in western North America. **Recommend Grade Level: 4-6.**

Bird, David M. ***Raptors in Human Landscapes: Adaptation to Built and Cultivated Environments.*** Academic Press, Inc., 1996.

Despite the continuing, often harmful changes wrought upon many natural habitats by modern development, the opportunistic and resourceful nature of many raptor species has enabled them to find a variety of ways to both adapt to and often benefit from the activities of humans. In addition, the growing concern for the health of raptor populations has increasingly led planners and land users to make special, and often innovative, arrangements to ease these impacts and to provide for the special needs of birds of prey. The papers presented at a meeting organized by the Raptor Research Foundation form the starting point for the collection presented here. The coverage of this book is broad, ranging from the impact of human activity on country wide scales to the particular conditions associated with urban, cultivated and industrial landscapes, as well as to the various schemes specifically directed towards the provision of artificial nest sites and platforms. The cases described hail from a wide geographic range including North and South America, Europe, Africa and elsewhere, and from a broad spectrum of species groups such as the falcons, accipitors, eagles, kites and many others. The message is a hopeful one. While much land development is inherently disruptive to wildlife, a knowledge of raptor biology and a concern for the birds can be combined to find solutions to the problems that arise, so that Peregrine Falcons can be tempted to nest in the heart of our cities, Ospreys can be encouraged to return to their old haunts, owls and hawks can thrive in managed woodland, and the problems of mortality from power lines can be minimized. This is a book of immense value not only to ornithologists and conservation biologists, but also to engineers and managers involved in all kinds of building and environmental work in cities, power and water works, agriculture and forestry. **Reading level: intermediate to advanced birders.**

Clark, William S. and Lisa White. ***Peterson Field Guides, Field Guide to Hawks: North America.*** Houghton Mifflin Company, 1998.

This guide includes all 39 species of North American hawks and other diurnal raptors, including eagles, falcons, and vultures. Color paintings and photographs show each species in various color morphs and plumages, which are also described in detail. Roger Tory Peterson's unique system shows exactly what features to look for to tell one species from another. Peterson Field Guides are designed to work in the field, and every illustration, every, is directed to that end. **Reading level: intermediate to advanced birders.**

Harwood, Michael. ***The View from Hawk Mountain: The Story of the World's First Raptor Sanctuary.*** Stackpole Books, 2001.

The rocky north-facing slope of Hawk Mountain in eastern Pennsylvania attracted scores of hunters who would shoot hawks, falcons, and eagles out of the sky. Rosalie Barrow Edge, one of Pennsylvania's environmental heroes, founded Hawk Mountain, the world's first sanctuary for birds of prey. Today, the mountain's famous lookout attracts thousands of birders, nature-lovers, and scientists to marvel at the river of raptors that annually comes streaming by. The story of how Hawk Mountain went from hunting hotspot to a thriving research center with an important role in raptor conservation is told in vivid prose. **This book is a good read for the general birding audience.**

Jenkins, Priscilla Belz. ***Falcons Nest on Skyscrapers.*** Harper Collins Publishers, 1996.

This is the story of an adult peregrine falcon pair raising young in a nest box on a skyscraper in Baltimore Maryland. This book deals with issues that will address the following Environment and Ecology Standards: Threatened Endangered and Extinct Species, Humans and the Environment and Environmental Health. **Recommended age range 5 - 9.**

Newton, Ian. ***Population Ecology of Raptors.*** Academic Press, Inc., 1997.

Dr Newton's book is concerned with all aspects of population regulation in diurnal birds of prey, their social behavior, dispersion, numbers, movements, breeding and mortality. He has drawn on his own studies in Scotland and on material and investigations worldwide to produce an authoritative and stimulating synthesis of current thinking and research on the ecological problems of the Falconiformes. He also deals in detail with the effects of pesticides and other pollutants on these birds, and with their scientific management and conservation. **Reading level: intermediate to advanced birders.**

Priebe, Mac. ***The Peregrine Falcon: Endangered No More.*** Mindful Publishing, 2000.

Celebrate the saving of a species! In 1999, the peregrine falcon - the fastest creature on earth - was removed from the federal List of Endangered Species. Just 30 years ago, it was believed to be extinct east of the Mississippi River and was disappearing across North America. Filled with facts, color photographs and illustrations, this book relates the dramatic rescue of a species and teaches the sensitive subject of endangered animals from a positive perspective; caring people can help - even save - a species. The kids have all seen the *Star Wars* movies. Now they can learn about the namesake of the famous spaceship, the Millennium Falcon, which appears in the book. The peregrine falcon is a falcon for the millennium. **Recommended age range: 7 – 10.**

Snyder, Noel and Helen Snyder. ***Raptors: North American Birds of prey.*** Voyager Press Inc., 1997

This book provides an introduction to the biology and conservation of the thirty-four species of diurnal raptors found in North America. These are the hawks, kites, falcons, eagles, and vultures. All are from the order Falconiform-carnivores with hooked bills adapted for tearing animal tissue apart, capable of soaring flight, and possessing visual acuity that far surpasses that of humans and other vertebrates. **This book is well suited for the general birding audience.**

Swinburne, Stephen R. ***In Good Hands.*** Sierra Club Books for Children, 1998.

Beginning with the rescue of a baby barred owl, Swinburne follows a 16-year-old volunteer through her summer duties at the Vermont Raptor Center, ending with the owl's release into the wild in the fall. Full-color photos show Hannah at work as she feeds and cares for the injured birds that the center is rehabilitating. Dialogue between the teen and visiting families gives immediacy to the narrative. Numerous boxed inserts add more detailed facts on raptors. By the end of the book, readers will share some of Hannah's knowledge as well as her feeling of closeness to these creatures. They will also know more about the dangers birds face from modern conveniences such as cars and electric wires. --Ruth S. Vose, San Francisco Public Library. **Recommended age range: 7 - 11**

Walter, Hartmut. ***Eleonora's Falcon: Adaptations to Prey and Habitat in a Social Raptor.*** University of Chicago Press, 1979.

In this study, illustrated beautifully and extensively with 59 line drawings and 38 photographs, Hartmut Walter shows how the unique geographical and biological situation of *Falco peregrinus* makes the species' health an important indicator of environmental decay, a biosentinel species, if you will. **Reading level: general birding.**

Weidensaul, Scott***. The Raptor Almanac: A Comprehensive Guide to Eagles, Hawks and Falcons.*** Globe Pequot Press, 2000.

This book covers over 300 species of raptors, blending the latest natural history facts and scientific research with photos and details of the birds in nature. From population and distribution statistics to accounts of items recovered from nests and nesting habits, Raptor Almanac is packed with fine details any avid birder will relish. **Reading level: Intermediate to advanced birding.**