Helpful Hawks
Silhouettes that save

Topic Page

Bird feeders provide excellent opportunities to watch our favorite birds "up close and personal." Unfortunately, they also pose the risk of substantially increasing avian mortality.

Increased risks to birds at bird feeders come in three forms, (1) natural and unnatural predation, (2) contagious diseases, and (3) window strikes.

This activity is designed to help you reduce the risk of window strikes. Suggestions for reducing predation and contagious diseases at your feeders are provided at the end of the activity.

Window strikes pose a significant hazard to birds (see Facts about window strikes, below). Your window may be killing birds even if you don't find any bird bodies, which can fall unnoticed in shrubbery of be scavenged by cats, crows and squirrels. In addition to dead bodies, there are other tell-tale marks that can help you determine if your windows are killing birds such as a bit of blood or feathers stuck on the pane. Another tell-tale sign is a "bird angel"--the impression left on the window by the birds feathers. Some bird angels are so clear that they can be used to tell which species collided with the window.

Reducing window strikes

One easy way to reduce window strikes near bird feeders is to place your feeders within a foot or two of your windows, or, alternatively, more than 20 feet from your windows. Placing feeders close to windows reduces the risk of window strikes by reducing the

Facts about window strikes

- 25%, or 225 of 917 of all bird species in the United States and Canada, are known to be killed by striking windows.
- Tiny hummingbirds can be victims of window strikes, as can large hawks and falcons.
- Window strikes may kill as many 100 million birds each year in North America alone.
- Birds have been hitting windows in North America for over 150 years.
- Gender, age, and whether the bird is a migrant or resident, appear to have little effect on a bird's vulnerability to window strikes.
- Window strikes occur in all habitats, including urban, suburban, and rural neighborhoods.
- Windows of all sizes, heights, and orientations kill birds, including windows in parked cars and phone booths.
- Birds strike windows because they view the reflective glass surfaces as real habitats, or because they fail to see the window at all.

Topic Page

Helpful Hawks
Silhouettes that save

continued ...

bird's opportunity to develop sufficient momentum before striking the glass. Placing feeders far from windows reduces risk by reducing the likelihood of window strikes, period.

Another way to reduce window strikes is to place netting over your windows. Hawk Mountain Sanctuary uses this method to reduce window strikes at feeders at its Visitor Center.

Yet another way to reduce window strikes is to place silhouettes of hawks on your windows. Hawk silhouettes help reduce window strikes for two reasons. First, silhouettes work because feeder birds fear hawks and are unlikely to fly near them. Second, silhouettes work because they alert birds to the presence of the windowpane. Silhouettes do not need to be life-size to reduce window strikes. Even small images help.

Research suggests that the use of silhouettes works best when the images involved are placed on the outside of the window pane, when they contrast with any reflected images, and when they are spaced uniformly over the window surface. Single silhouettes do not work as well as groups of silhouettes. Although covering the window uniformly with images spaced several inches apart will completely eliminate window strikes, several images spaced over large surfaces will reduce the strike-rate somewhat.

The patterns presented in the activity that follows represent a series of images recommended by Hawk Mountain Sanctuary. The images can be used in combinations or by themselves. Their sizes can be increased or decreased to suit your needs.

Commercially available silhouettes can be purchased at nature and bird-feeder stores as well as at the Sanctuary's bookstore.

Rescuing window-strike birds

Not all birds that strike windows are killed. Should you see or hear a window strike, look for the bird underneath the window. If you see a dazed bird, bring it indoors and protect it from predators–a darkened cardboard box with several holes punched in the side works well. Do not attempt to give the bird any food or water. Most birds revive within minutes. Release the bird outdoors when it appears alert.

Reducing contagious diseases: Keeping your bird feeders clean

Poorly maintained bird feeders may kill or harm birds by increasing the occurrence of infectious diseases. The following steps will help you reduce the risk of death and disease at your feeders:

- Avoid crowding birds by providing enough feeders. Lots of birds using a feeder looks great, but close proximity is a key factor in spreading disease.
- Keep the feeder area clean by raking up waste food, birdseed hulls, and droppings, regularly. Discard food that smells musty, is wet, looks moldy, or has fungus growing on it.

Helpful Hawks
Silhouettes that save continued ...

Topic Page

Facts about cats and birds

- There are more than 66 million pet cats in the United States including more than 40 million that are outdoors and unsupervised some or all of the time. Combined with an estimated 40 to 60 million stray and feral cats, cats have a significant impact of native wildlife.
- Scientists estimate that free-roaming cats kill hundreds of millions of birds, together with more than a billion other small wildlife, in the United States, annually.
- Birds killed by cats include endangered species such as the Piping Plovers, and declining species such as Black-throated Blue Warblers and Wood Thrushes.
- Belled cats do kill wildlife. Cats with bells learn to stalk prey silently, and many wild animals do not associate a ringing bell with danger.
- Even well-fed cats kill wildlife.

- Make sure that your feeders have no sharp points or edges. Even small scratches and cuts will allow bacteria and viruses to attack otherwise healthy birds.
- Clean and disinfect your feeders at least once per month, twice per month if you notice sick birds. Clean your feeders by scrubbing them with soap and water, and then dip them into a 10% solution of chlorine bleach (i.e. one part liquid chlorine bleach to 10 parts tepid water, mixed and used out of doors; use rubber gloves while cleaning with the solution and avoid eye contact). Rinse feeders thoroughly with clean water, and allow them to dry before filling them with seed. Clean and disinfect containers with spoiled food and all other items used at the feeders such as thescoop used to fill the feeders.

Reducing natural and unnatural predation

Cats

Keep cats indoors to reduce this unnecessary form of bird predation. Keeping your cat indoors is not only good for the birds, it also is good for you and your cat. Many veterinarians recommend that cats be kept indoors. The life expectancy of an outdoor cat is 2 to 5 years, compared with 10 to 15 years for indoor cats. Cats that frequent the outdoors often are killed by cars and other animals, and can be stolen, lost or poisoned. Free-roaming cats are more likely to contract diseases such as rabies. Some of these diseases may be transferred to humans. Although rare–only 18 cases in the United States since 1977–almost all human cases of pneumonic plague have been linked to domestic cats. More that 20,000 people per

Topic Page

Helpful Hawks
Silhouettes that save

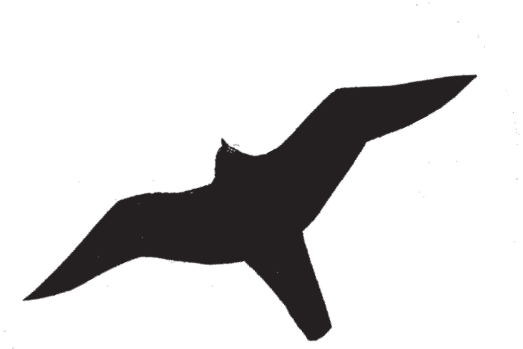
continued ...

year are affected by cat-scratch fever, acquired from infected fleas on cats.

If your cat is accustomed to roaming outdoors, it will take some time and patience to train the animal to remain indoors; but it can be done. The key is to make the conversion gradually and provide plenty of attention and stimulation while the cat is indoors.

In addition to keeping your cat indoors, the following also can help provide a safer environment for birds, you, and your cat:

- If you no longer can care for your cat, take it to an animal shelter. Never abandon a cat.
- Resist the urge to feed a stray cat unless you can make the commitment to offer it a home.
- Be a responsible pet owner; spay or neuter your cat before it can breed; put a nametag with an address and phone number on your cat; provide routine veterinary care; comply with requirements for licensing.



Natural Predators

Natural predators, including several species of hawks and falcons, also take birds at bird feeders. Natural predation is part of nature. All hawks and falcons are protected by State and Federal Law. Do not interfere with predatory birds chasing and eating birds at and around bird feeders. If you wish to reduce the risk of natural predation at your bird feeders, place you feeders near natural cover (including bushes and shrubs). This will make feeder birds less vulnerable to natural predation by giving them a better chance to avoid approaching hawks and falcons. It may even reduce the rate at which these predators visit your feeders. On the other hand, if feral or pet cats visit your feeders, the latter's proximity to cover may increase predation risk rather than reduce it!

Helpful Hawks
Silhouettes that save

Activity Page

Rationale
This activity is designed to help you reduce the risk of window strikes by native birds.

The activity meets several National Science Education Content Standards for grades K-8, including:

Science as inquiry standards:
Abilities necessary to do scientific inquiry (grades K-8)
Understanding scientific inquiry (grades K-8)

Life Sciences standards:
Characteristics of organisms (grades K-8)
Diversity and adaptations of organisms (grades 5-8)

For additional information on these and other NSE standards see: National Research Council. 1996. National science education standards. Washington, DC. National Academy Press.

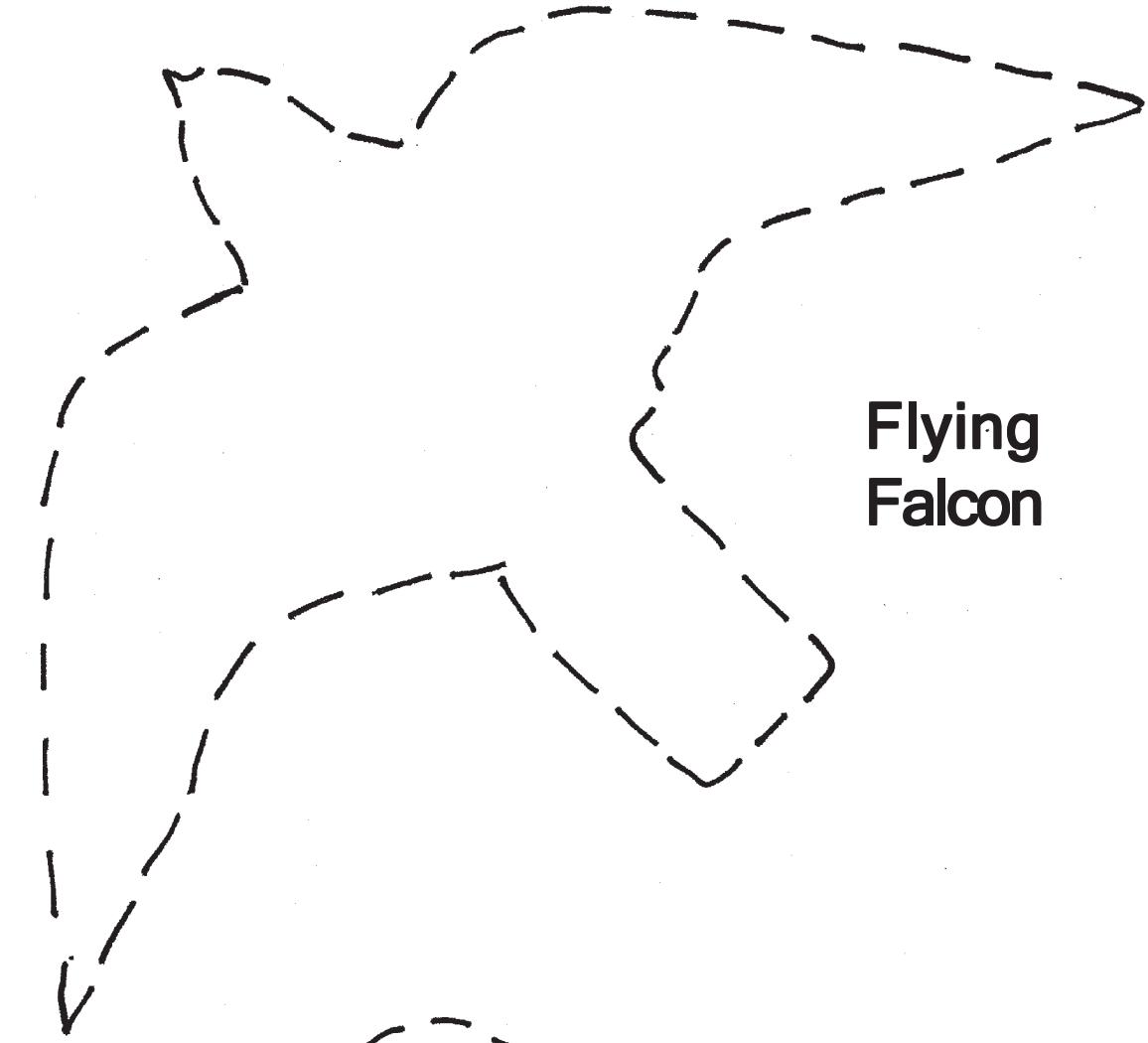
Instructions
The patterns that follow represent a series of images recommended by Hawk Mountain Sanctuary. The images can be used in combinations or alone. Their sizes can be increased or decreased to suit your needs.

Trace the images onto black, white, or any color of sticky shelf paper (the kind available in hardware, discount, and department stores). Cut out the silhouettes and place them on your windows. Sit back and see how they work.

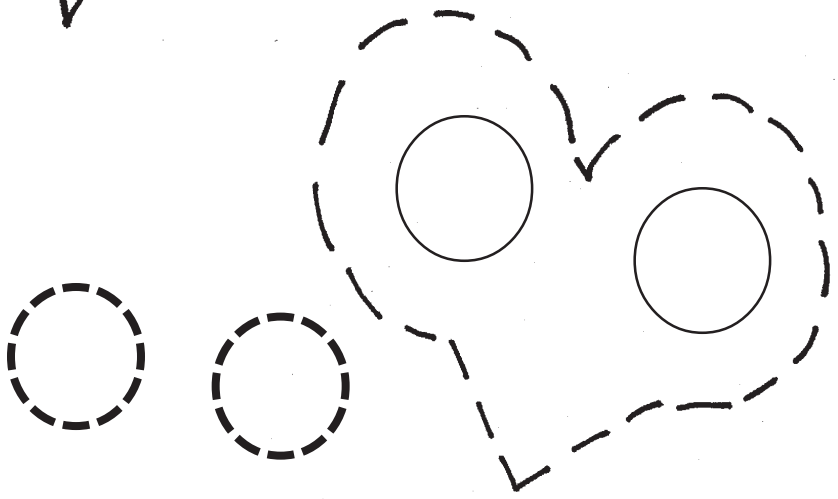
Commercially available silhouettes can be purchased at nature and bird-feeder stores as well as at the Sanctuary's bookstore.

Activity Page

Helpful Hawks
Silhouettes that save



Flying Falcon

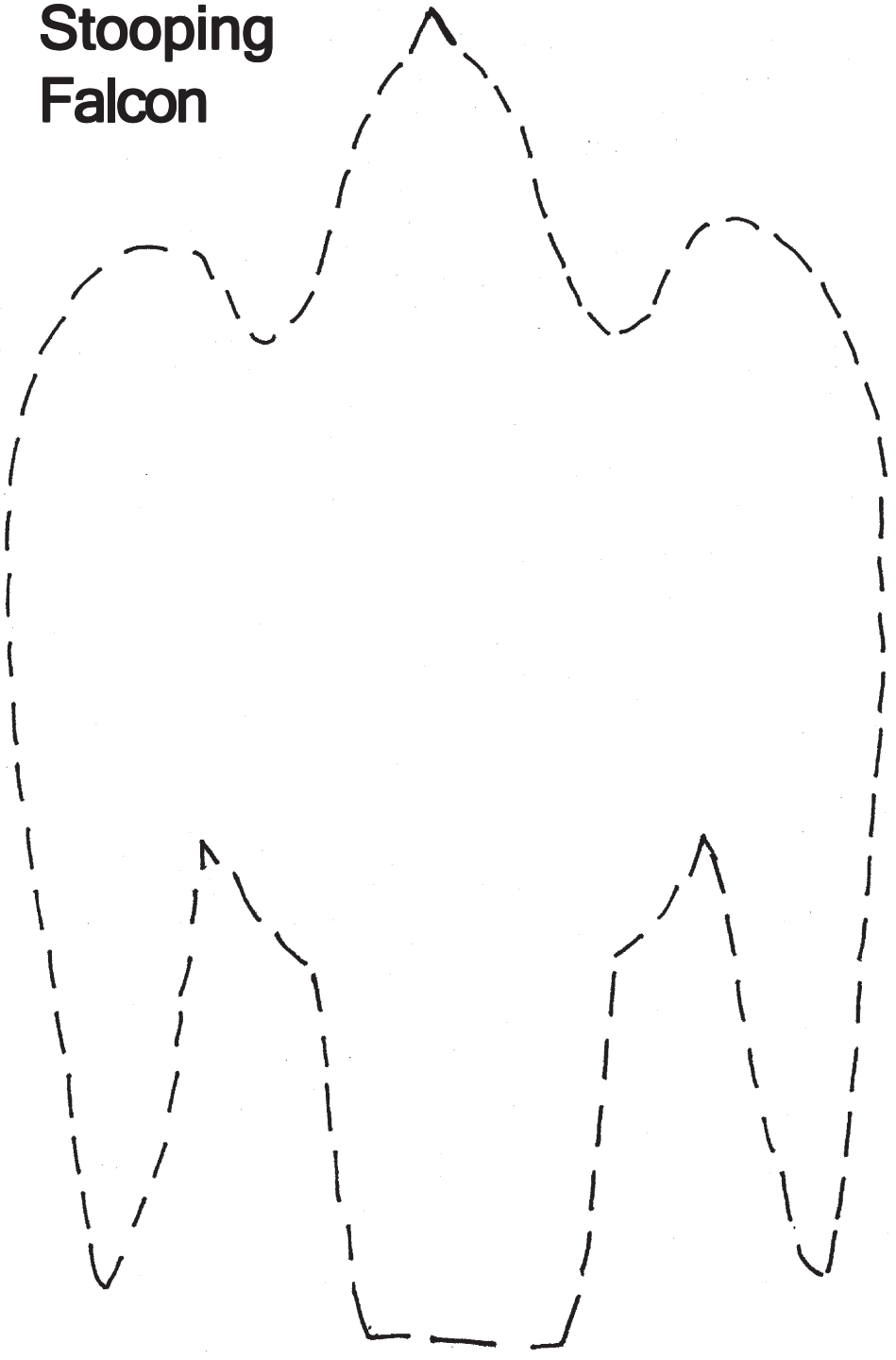


Owl's eyes

Helpful Hawks
Silhouettes that save

Activity Page

Stooping Falcon



Binocular Basics

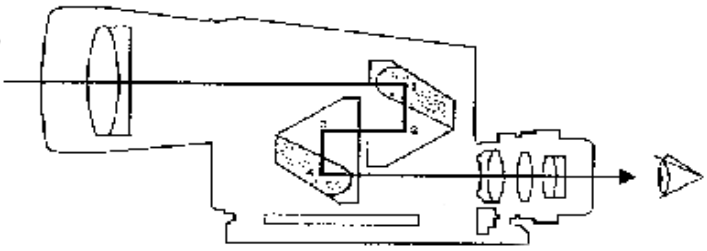
Topic Page

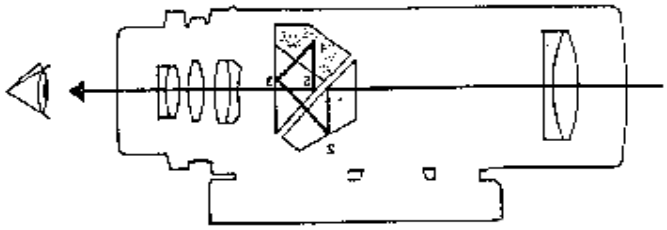
Binoculars allow you to see birds in more detail by making them appear to be closer than they actually are.

Viewing and identifying raptors as they migrate pass Hawk Mountain Sanctuary Lookouts is much easier with binoculars.

Unlike hand lenses and magnifying glasses that use circular lenses to produce magnified images, binoculars use both prisms and lenses to create an enlarged image of an object. The first prism binoculars were developed by a French professor, Ignatz Porro, in 1880. In addition to Porro or hip-prisms, roof-prisms are used in some binoculars. In both instances, the binoculars achieve greater magnification in a compact instrument by "folding" the path of the image as it travels through each binocular tube.

A Porro prism system uses two prisms that bend light rays as shown in the diagram. This prism arrangement results in hip-shaped binoculars.





Roof prisms use one to three prisms in an arrangement that makes binoculars shorter, slender, and straight.

Topic Page

Binocular Basics

continued ...

What do the numbers etched on your binocular mean? ("8x 23"; "7x 35")

"8x" or "7x" is Power or **Magnification,** or how close a bird or other object will appear. Binoculars used for nature watching usually range in power from 7x to 10x. The higher the power, the closer the object appears and the more detail seen. Looking at a hawk with 7x binoculars makes the hawk appear 7 times closer than it actually is; 10x binoculars make the bird appear 10 times closer.

"23" or "**35**," the diameter in millimeters of the binoculars' objective (larger) lens, indicates **Brightness**. Brightness depends upon how much light the binocular lens can gather. 8x 23 binoculars do not let as much light in as do 7x 35 binoculars. Brightness is an important consideration if you plan to use your binoculars in dim light conditions such as birding at dawn or dusk or in forests. Larger objective lenses do not increase the field of view (see below).

"200ft at 500 yards" refers to the **Field of View.** This is the horizontal width of the area (field) seen through the binoculars and is dependent on distance of the object from the observer. A binocular with a field of view of "200 feet at 500 yards" means that when you are 500 yards from an object, the width of the field that you see through the binoculars will be 200 feet. If you move away from the object to 1000 yards your field of view increases to 400 feet. Wide- angle binoculars have additional lenses to increase their field of view.

Apparent Distance is the distance at which objects appear when looking through binoculars. To calculate the apparent distance, divide the actual distance by the power. For example, using 7x 35 binocular to view an object 100 feet away, your apparent distance is 14.3 feet.

BaK-4 Prisms refer to the type of glass used for making high-quality prisms.

Center Focusing is an easy method of focusing that allows you to adjust the focus of both barrels of the binoculars simultaneously.

Coated Lenses: Magnesium fluoride and other coatings are used on optical surfaces of binoculars to reduce reflection. Without coatings, as much as 50% of the light entering a pair of binoculars can be reflected off optical surfaces, resulting in dim and hazy images.

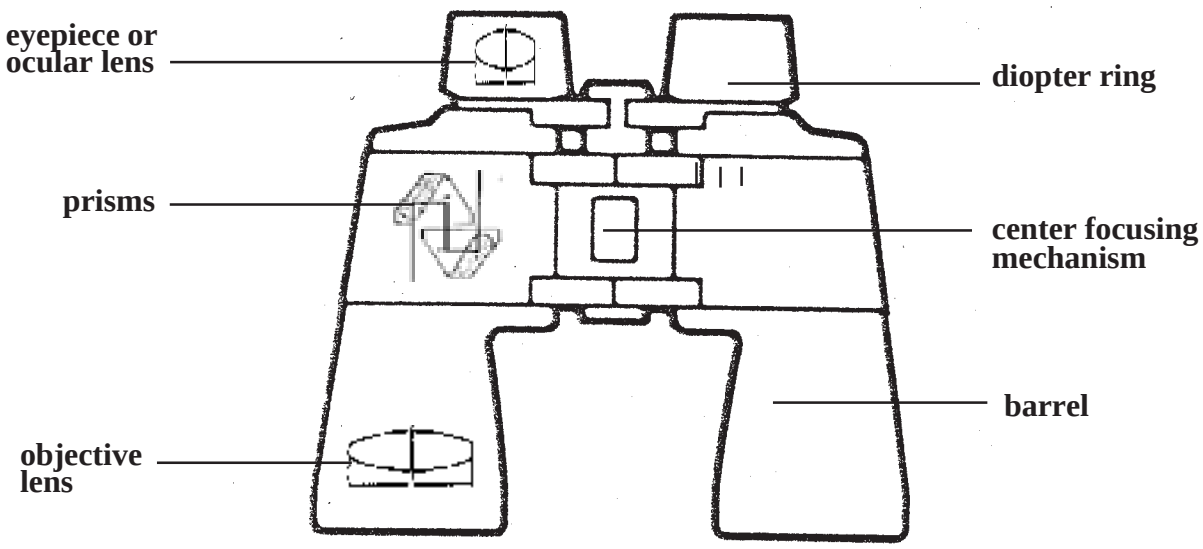
Diopter Rings allow you to adjust the right and left barrels of a pair of binoculars to suit individual eye strength in people whose left and right eyes have different long distance vision. Some binoculars have a diopter ring that locks the diopter setting so that your binoculars remain in the exact setting for your vision requirements.

Exit Pupil is the bright circle that is visible when the ocular (near or smaller) lens is viewed at a distance of about 10 inches (25 cm) with the objective lens facing towards a bright background or light source. The larger the exit pupil, the brighter the image will appear under dim light conditions. To

Binocular Basics

continued ...

Topic Page



calculate the exit pupil, divide the objective lens size by the magnification power. For example, using an 7x 35 binocular, your exit pupil is 5mm. [35mm / 7x = 5 (exit pupil size)]. Using a 8x 23 binocular, your exit pupil is 3. [23mm / 8x = 3 (exit pupil size)]

Eye Relief is the maximum distance in millimeters that your eye can be from the eyepiece and still see the entire field of view. Eye relief is an important consideration for people who wear **eyeglasses**, because glasses increase the distance of your eyes from the eyepieces. If the distance of your eyes from the eyepiece is greater than the binoculars' eye relief, you will see only the center part of the image: this is like looking into a large room through a peephole. Normal eye relief for binoculars ranges from 0.35 to 0.5 inches (9 to 13 mm). If you wear glasses, you will need binoculars whose eyepieces are designed with long eye relief, (ie., 14 mm or longer). **To measure your eye relief,** point the binocular's objective lenses at a bright source of light and move a paper back and forth near the eyepiece. The distance from the eyepiece at which the circle of light on the paper comes into sharpest focus is called the eyepoint. This is the optimal place for your eyes to be.

Interocular Distance which also is called interpupillary distance, refers to the horizontal distance between the center of the pupils of your eyes. Your binoculars need to be adjusted so that the horizontal distance between the center of each ocular is your interpupillary distance.

Ocular Lens is the eyepiece lens, (the smaller lens and the one that is closest to your eyes), of your binoculars. The occular lens focuses the image to make it visible to your eye.

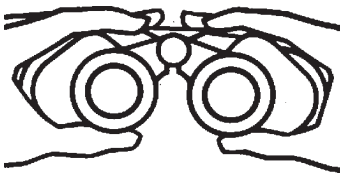
Objective Lens is the larger lens at the distant end of the binocular barrel. The larger the objective lens, the more light the binocular will gather. The diameter of this lens determines the **Brightness** of the binocular.

Activity Page

One … Two .. Three Binoculars Are Ready!

Follow these three simple steps to personalize your binocular adjustments.

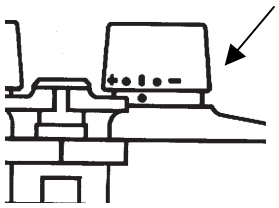
Step One. (Adjust your binoculars for the interocular distance between your eyes).



Move the binocular's two barrels together or further apart until you can see a single circular area when looking through the binoculars with both eyes.

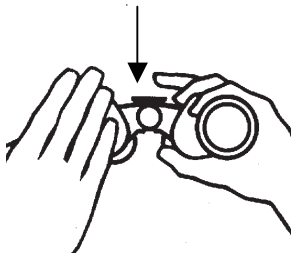
Step Two. (Adjust your binoculars for individual eye strength).

If you are wearing eyeglasses or corrective lenses set the diopter ring to 0.

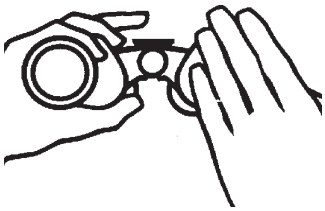


If you are not wearing corrective lenses, procede as follows. (a) Find the diopter ring (see diagram), set it to 0, then look through the binoculars at a distant object.

(b) With both eyes open, cover the lens on the same side as the diopter ring, with your hand. Rotate the center focusing ring until you see a sharp, clear image with your other eye. (You must keep both eyes open during this procedure!)



Step Three.



Now, again with both eyes open, cover the opposite lens with your hands and rotate the diopter ring until the image is clear and sharp with your other eye. Note where this setting of your diopter mark is. This is your correction factor. If you have the same distance vision in both eyes, your correction factor will be 0.

Remember to treat your binoculars with care.

Happy Nature Watching!

Focusing on Raptors

Activity Page

Rationale

This activity is designed to teach children to properly use binoculars as a tool for scientific inquiry, to familiarize children with terms used in describing binoculars, and to help students develop skills in identifying raptors in flight.

The activity meets several National Science Education Content Standards for grades K-8, including:

Science-as-inquiry standards:

Abilities necessary to do scientific inquiry (grades K-8)
Understanding scientific inquiry (grades K-8)

Life-Sciences standards:

Characteristics of organisms (grades K-8)
Diversity and adaptations of organisms (grades 5-8)

For additional information on these and other NSE standards see: National Research Council. 1996. National science education standards. National Academy Press. Washington, D.C.

Time

1hr (Additional time is needed before activity to make hawk silhouettes.)

Supplies

Binoculars, binocular eye-chart, hawk silhouettes.

Instructions

1. Review with your students information from ***Binocular Basics***, together with Identification of Raptors, pages 7-10, and Hawk Mountain Flight Guide, page 67, in ***Enjoying Hawk Mountain Teacher Guide: Raptors and the Central Appalachians.***

2. Have your students follow instructions on the previous page for personalizing their binocular adjustments.

3. Place the binocular eye-chart (see instructions below for making binocular eye-chart) 25 - 100 yards away from your assembled students.

4. Have your students view the eye-chart through their binoculars and adjust their focusing ring until they have a sharp image of the letters.
5. Ask your students to record the letters written on the eye-chart so that you can check that students are using their binoculars correctly.

Activity Page

Focusing on Raptors

continued ...

6. Place hawk silhouettes. Use the colored imagesand enlarged to the desired size 25 to 100 yards away from your students. Using the following statements as cues, ask your students to identify the raptor species by observing the silhouettes through their binoculars. Make a game of the activity by awarding points for correct answers or putting students in teams and having teams compete against each other.

Broad-winged Hawk:

- I am a hawk with the wide, white tail band.
- The dark outline on the trailing edge of the underside of my wings appears as though I have been outlined in black ink.
- My offical species name *platypterus* comes from two Greek words *platys* meaning "broad" and *pteron* meaning "wing."

Red-tailed Hawk

- I am a chunky buteo with long, broad wings and a wide, fanned tail
- I have dark patagial marks on the underside of my wings.
- I have a dark belly band, and, as an adult, I have a red tail.

Sharp-shinned Hawk

- I have short, rounded wings and a long, narrow rudder-like tail.
- My tail has alternate dark gray and light gray bands.
- My official species name *striatus* ins Latin for striped and refers to the reddish brown streaking on my chest and belly.

Peregrine Falcon

- I am a crow-sized falcon whose prominent sideburns are a good field characteristic.
- As an adult, I am blue-gray above and heavily barred below, with a bright white chest and throat.
- I am the largest of the pointed-wing falcons regularly seen at Hawk Mountain.

American Kestrel

- I am a bluejay-sized, colorful falcon with long, sickle shaped wings.
- The markings on my head are conspicuous and include a gray crown with a rufous patch, and eye-spots on the back of my head.
- My white cheeks have two black mustache marks.

Focusing on Raptors

continued ...

Activity Page

Osprey

- Note my “M”-shaped wings in my flight silhouette.
- Although I am a large raptor, it is my white and dark brown or blackish appearance, white head and dark eye stripe that set me apart from the eagles.
- My tail is dark and banded.

Turkey Vulture

- In flight, I hold my wings in a strong dihedral, or “V.”
- As an adult, I possess a featherless red head adapted for picking through dead carcasses.
- My two-toned underwings and longer and more rounded tail separates me from my relative the Black Vulture.

Northern Harrier

- My white rump patch, located where my tail begins, is my most notable field characteristic.
- My wing tips are jet black
- I am a lanky, long tailed raptor that carries its wings in a slight dihedral, or “V.”

Activity Page

Focusing on Raptors

continued ...

How to make hawk silhouettes

There are two sets of instructions.
a) if you are limited in time or resources
b) if you have more time to spend on this project.

Sharp-shinned Hawk silhouette attached to a post and placed in cement for stability.

1. Copy each silhouette onto transparency film.

2. Using an overhead projector and stiff cardboard as a screen, project each silhouettes onto the screen and enlarge them until they are the suggested dimensions.

2a. Trace silhouette projections onto the screen and cut out life-size silhouettes from the stiff cardboard.
2b. If you have more time, you can use the cardboard stencils to cut silhouettes from 1/4 inch plywood. Then, paint appropriate field marks on your silhouettes.

3a. Attach heavy string or twine to the back of the silhouette.
3b. Mount the silhouettes on a 2x2" post about 2-4 feet long as shown in diagram, attaching with 3" screws and wingnuts.

4a. Hang silhouettes in the classroom or from a tree in the schoolyard.
4b. If you've attached the silhouettes to a post, secure the post in a 2 gallon bucket of cement with a 2" PVC pipe in the center to hold the post.

Focusing on Raptors

continued ...

Activity Page

To Make a Binocular Eye-Chart

Enlarge the eye-chart below by 75%, onto a 11x17" sheet of paper; mount the enlarged chart onto stiff cardboard or 1/4" plywood. Place chart in classroom while reviewing binocular instruction.

1. **H**

2. **AWKS**

3. **MIGRATE**

4. **IN SPRING AND**

5. **AUTUMN ALONG THE**

6. **APPALACHIAN MOUNTAIN RANGE.**

OWL

large head; short neck; silent flight; flies mainly at night

medium to large: long-eared owl, barn owl
large: great-horned owl, barred owl
small: screech owl, saw-whet owl

BUTEO

wide, fanned tails; long, broad wings; soars

red-tailed hawk, broad-winged hawk, red-shouldered hawk, rough-legged hawk

EAGLE

large dark bird; long, broad wings; wide, fanned tail; mature bald eagle has white head and tail

bald eagle, golden eagle

VULTURE

turkey vulture - large dark brown bird; tee-ters in flight; wings held in V-shape; gray under wings

black vulture - similar to turkey vulture but holds wings flatter; has shorter tail; white patches at wing tips

ACCIPITER

short, rounded wings; long, narrow, rudder-like tail; flap, flap glide flight pattern

sharp-shinned hawk, cooper's hawk, gos-hawk

OSPREY

very long wings held in M-shape; all white underneath; may be seen carrying fish

FALCON

streamlined; long, pointed wings; strong, often continuous wing beats

merlin, peregrine falcon, American kestrel

HARRIER

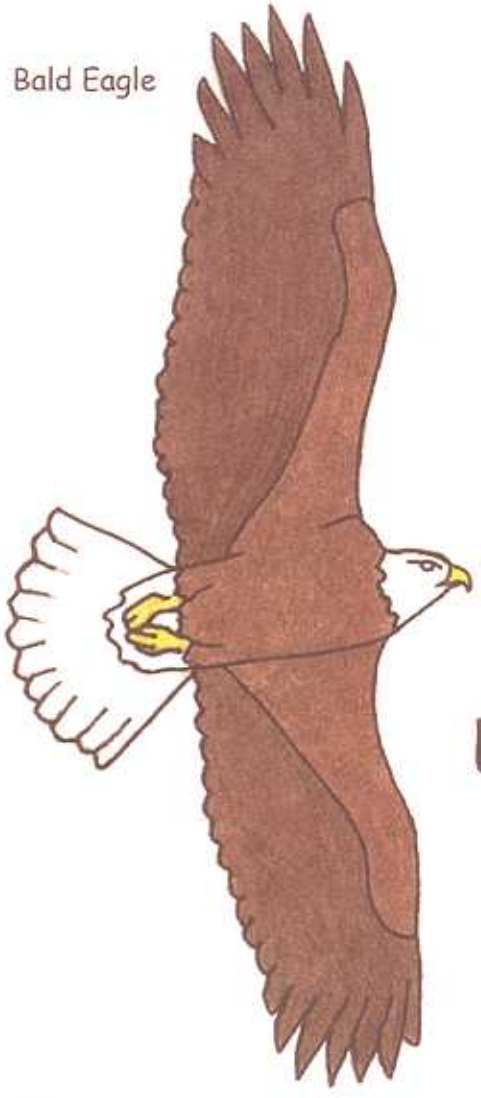
long wings; long tail; wings rounded at tips; wings held in slight V; white rump patch

northern harrier

DIRECTIONS:

Photocopy front and back of this hand-out; be sure to align silhouettes with descriptions; make enough copies for each student or pair of students.

Cut along dotted line to make eight flash cards. Students can work with a friend to test their skills at identifying the silhou-ettes of hawks in flight.



Eagles & Falcons

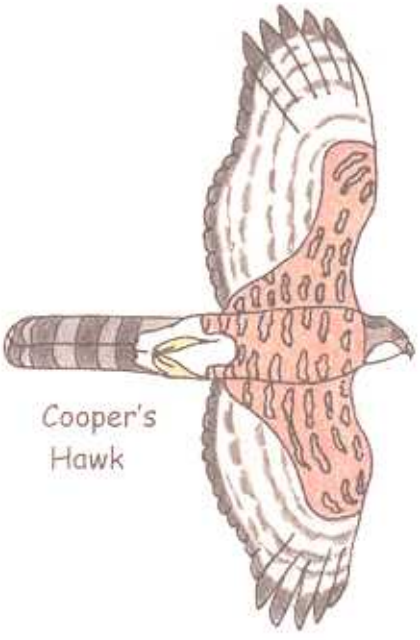
Vultures, Osprey & Accipiters

Black Vulture

Osprey

Turkey Vulture

Northern Goshawk



Cooper's Hawk

Sharp-shinned Hawk