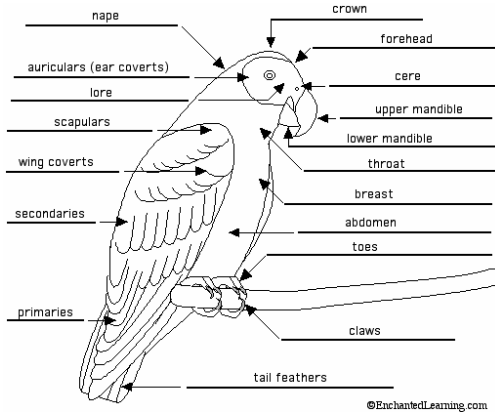


Bird Biology

What Make A Bird?

After they have birdbrains, have them start listing the unique features of birds. These are things that only birds have and make them a unique class of animal. Remember, they aren't mammals. The list may include but not be limited to:



Air sacs
Beaks
Crop (or gizzard)
Feathers

Hollow bones
Oil glands
Strong sense of sight and hearing
Wings

This can lead directly into an **adaptations** discussion. An “adaptation” is a particular characteristic of a plant or animal that makes it better suited for its environment. Simply put, it is something that helps an organism survive. (You could even drill it into their brains by doing it as a “repeat after me: Adaptation - something that helps something survive!”) Ask them how the characteristics that they listed can help birds survive. Transition from general adaptations of birds into specific adaptations of bird types (raptors = talons/hooks beak etc.). It is a good idea to have visuals of specific adaptations.

When they mention things like feathers or hollow bones or beaks, hand out the samples. Draw the difference between a mammalian bone and a bird bone (mammal bones are basically solid with a hollow core like a doughnut, and bird bones have a hollow core surrounded with “spokes” like a bicycle wheel.) Ask them how having lighter bones help birds survive? (float better, easier take off/get away from predators, lighter for flight) When they mention beaks, break out the bird picture/tools packet. There should be pictures of birds and some tools that mimic beaks. Show the students cards/handouts and ask them to point out the corresponding tool that mimics its beak. You could also do this as a matching/relay game. The list of beaks and tools follows:



Beak Type: seed cracker
 Used Like: pliers
 Examples: Cardinal or Grosbeak



Beak Type: spearing
Used Like: dissecting instrument
Examples: Great Blue Heron



Beak Type: filter feeder
Used Like: filter tongs
Examples: Mallard



Beak Type: hooked
Used Like: can opener
Examples: Red-Tailed Hawk



Beak Type: nectar feeder
Used Like: eye dropper or straw
Examples: Hummingbirds



Beak Type: insect eater
Used Like: tweezers
Examples: Warbler

If they mention feathers, do a runoff experiment. Have two pieces of cloth, one with Vaseline and one without. Drop some water onto each and compare the results. This also demonstrates the oil glands of birds.

Spend some time introducing students to the different parts of a bird's body with the laminated pictures of the birds. This is essential if you are planning to spend time in the field.

Please note: The majority of this class is designed to be spent in the field birdwatching. If weather or group interest does not permit, see the appended activities.

Activities

After the introduction, it's generally a good idea to get the students moving around. You can hand out the books and binoculars now, or you can play a game to really get their blood flowing. Feel free to mix and match activities to your group.

1) Hawks and the Hare (modified Deer/wolf Tag):

Gather the students around and put out the rules. It's a game of tag where there is one "Hawk" who is *it*, and the others are all hares. And what do hawks like to do with hares? EAT THEM! Unfortunately here at St. Croix we can't eat each other. (This can be demonstrated by pretending to eat a student's arm and letting them pull away). Instead, the hawk will be "eating" the hares by tossing a beanbag *underhanded* at the hares. When the hare is touched by the beanbag, that hare becomes a new hawk. Once you've become a hawk, there's no turning back: Once a hawk, always a hawk! Yes, if the hare CATCHES the throwable, it has still touched it, and therefore becomes another hawk. There is a small catch. When a hawk is holding the beanbag, a hawk may not move its feet.

This variation is based on a *behavioral adaptation* of the Harris Hawk. They are the only raptors (perhaps the only birds) that use pack hunting. They will take turns harassing a hare until that hare is too tired, then the pack will swoop in for the meal. This game can be processed many ways. A few examples include over predation, pack hunting, communication, herd tactics, hawk adaptations, etc. If you want, go ahead and play it again and see if there are any changes.

2) Fast Flippers:

This is just a way to get the students used to using the ID books. Pass out the books and let them page through it a bit. See if they can find the page that the Cardinal is on. Ask them how they found it? Did they use the Index? Did they look at the bird to find distinguishing features then paged through the book?

Have the students open the books to page 8 to learn different parts of a bird. You can break out the laminated picture from the bin to help. Things to key them to are the crown, throat, tail, eyes, breast and bills. There is also another region that isn't shown in the diagram. It's a region of the closed wing called wingbars. Basically, they are stripes across the wings that are seen when the bird is at rest.

After you've gone through the parts of a bird, randomly call out names of birds and see who is the fastest flipper (the one to find the bird first). Then go over the identifying characteristics of it.

3) Binoculars:

Depending on the size of the class or number of groups, there may be enough binoculars for each student, or they may have to be paired up. Pass out the binoculars and have the students place them around their necks. Always remember to take good care of the binoculars. When they are not in use they should be stored in their case. When in use they, should be around the birdwatcher's neck at all times. Avoid getting the lenses wet or dirty.

To focus your binoculars, first close your left eye. Focus on an object and turn the eyepiece until the object in your right eye is in clear focus. Open both eyes and focus with the main focusing wheel.

Call out objects to have them practice spotting and focusing. After they become proficient, try calling out moving objects. The key to finding objects with binoculars is to look for them with your eyes, *then* bring the binoculars to your eyes. Otherwise, using the binoculars only, you've greatly reduced your field of vision. (Wait, these binoculars act just like raptor's eyes! Fixed vision so they need to turn their heads, reduced field of vision, greater range....hmmm a game of thicket anyone?)

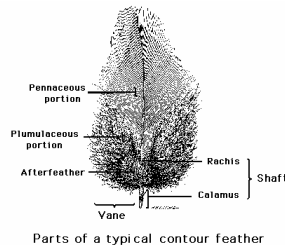
4) Finding the Birds:

This is a long section, but it is designed to enable you to review or sharpen the students' birding skills. Don't feel that you need to cover it all. As long as they are interested in finding the birds, doing it well, and having fun, so be it!

Introduce field observation to students by asking them three main questions. Where and when should I look? How do I identify birds? I see one! Now what do I do? Discuss all three topics and make sure to review the section on proper binocular use before going into the field. If you aren't finding many birds, pull out another activity like *Thicket* (use the binoculars to mimic raptors). Also, try to find nests or open the bird boxes to see what is inside. This can lead into nest building activities if the birds aren't out. Keep a sharp eye out for signs of birds also. You'll often find birdpeck (holes in trees) or the coolest thing in the whole wide world....SCAT!

Where and when do I look?

No single place is the best. You are more likely to see birds in places such as young scrubby woods compared to mature forests. Wood margins are especially good during migrations. Different ecosystems such as marshes, shores, fields, forests or deserts all attract different species of birds. So try them all! The north and south ends of the berm are great places as is Birch Grove. Early morning is ideal birdwatching time. This is when birds are most active. Also look at the feeders that are around camp and check to see if it is alright to visit the permanent staff housing since they often have feeders out too.



How can I identify birds?

1. Physical features

See diagram in journal to learn the physical features. This will help in identifying distinguishing marks in the field.

2. Voice

Songs - Complex sounds made a birds, these are partly instinctual and partly learned.

Calls - Usually short simple sounds that are instinctive.

I see one! Now what do I do?

1. Describe what you see before you identify. Try to memorize this before you look through a field guide. Use binoculars.

What colors do you see?

Where are the colors located?

Where is the bird located (habitat)?

Forest vs. Prairie

Ground vs. Trees

What is the general beak shape?

What is the general tail shape?

What is its general size?

How is it behaving?

Climbing up or down a tree, soaring, hovering, flapping then falling?

2. Use a field guide. Remember to use the pictures as guidelines only, as there will be some differences between the guide and the actual bird. Also, there are difference based on:

- Males and females
- Summer and winter plumage
- Immature vs. mature

These differences are illustrated in any field guide or also on a laminated poster in the bird bin. Also, if possible, make sure to take note of the bird's range.

3. Practice proper birdwatching etiquette:

- Walk slowly and quietly
- Avoid wearing bright colors
- Use a hide if possible (parked cars, buildings, trees, etc.)

4. Call to the birds. You can often attract songbirds by:

- Repeating the sound, "psh psh psh"
- Squeaking
- Sucking air through your lips, noisily kissing the back of your hand

5. Learn to recognize families of birds (This is more advanced)

Conclusion

All Aboard:

For the All Aboard, explain to the students that they are now some kind of bird. Even have them make the bird's call. Ask them what are the four basic needs of all creatures? (*food, water, shelter, and space*). Explain that in order to be happy birds, they need to have two feet on their nests (*platforms in the ini's forest or footprints*). After they are on their nests, tell them that they will have to leave home and go out to find one of the four basic needs that the instructor will call out. They should PRETEND to find these things. They shouldn't find a worm and try to eat it! (Tell them this, it makes for some smiles.☺) Then they will come back home. Each time they leave their homes, remove some nests from play. Perhaps some lightning hit a tree, maybe a wildfire, perhaps a subdivision or mall. The final goal is to have everyone's feet on one or two homes.

This activity also shows another *behavioral adaptation*, that of sharing. There are three species of sparrows in Europe that like to nest in the same type of tree, but this lead to severe competition for space. Over time, they figured out that sharing is much more effective. One species nests in the tops of trees while another nests only in the lower parts. The third used to try for this same tree, but now nests later in the season when the other two have vacated.

Often during this activity, there will be some obvious behaviors demonstrated. There was probably some selfishness, pushing, defending, and hopefully sharing. Ask them if this happens in nature? where? give examples? How did it feel to have your home taken away? This is a great way for students to realize how habitat destruction works, and it leads right into a great discussion of how we as humans affect animals. Hmm, sounds like a great way to wrap up the class?

Journaling

Ideas for questions can center on different kinds of adaptations, how to identify birds, how we affect birds, etc. Some samples are listed:

- Define adaptation and give two examples.
- Draw a bird and label five adaptations.
- Explain how to identify a bird.
- Compare/contrast a bird with a mammal.
- How can you bring birds to your own yard?
- How do humans affect birds and how do they affect us?
- Create a bird. Where does it live? What kind of nest? What adaptations?
-

You can add other questions if you covered other topics such as camouflage, how birds' wings create lift, binocular vs. monocular vision, and on and on...

Appendix

Depending on the length of time you want to spend outside, stations can be added or subtracted. Approximate time for five stations and group divided is 1.5 hours. You may want to consider setting the stations up in a common location so they may be shared without infringing on anyone's classroom space.

The students will be divided into groups of two-three. Before dividing them, briefly explain how the system will work to ensure efficiency. Be sure to stress the fact that at each station **they should first read the directions card together as a group** so that everyone is involved. Secondly, each station will have either a question or a drawing that will go into their journal. And finally they should put the station back together as they found it so that it is ready for the next group.

STATION 1 *Feathers*

Materials: -Assortment of feathers
-Handout of feathers/barbules/barbs
-Instruction card

STATION 2 *Eyes*

Materials: -2 blindfolds (depending on group size)
-Small bean bag
-Photos of birds
-Instruction card

STATION 3 *Beaks*

Materials -Beaks for Every Need page
-Pictures of birds
-Pliers (seed cracker, i.e. Cardinal)
-Dissecting instrument (spearing, i.e. Great Blue Heron)
-Filter tongs (filter feeder, i.e. Mallard)
-Hooked (bird of prey, i.e. Red-Tailed Hawk)
-Eye dropper or straw (nectar feeder, i.e. Hummingbirds)
-Tweezers (insect eater, i.e. Warbler)
-Instruction card

*All or just some of these tools can be used depending on length of time available.

STATION 4 *Combined bones and oil glands*

Materials: -Bones -- representation bones of birds and mammals to compare
picture of struts
-Oil glands -- Cloth
Vaseline
Eye dropper and water
Instruction card

*Have the first group only smear the Vaseline onto the towel. Each group thereafter can use the same area.

STATION 5 *Gizzard*

Materials: -Mortar and pestle or a bowl and stones
-Sunflower seeds or corn
-Instruction card

STATION 6 *Nests*

Materials: -2-3 Nests preferably built out of different materials
-field guides
-instruction card

Bring all the students back together. Discuss each station's purpose and answers to questions.

Binocular Use

Binoculars come in many different sizes and shapes. They all have two basic numbers associated with them. (Example: 7 X 35) The first number is the power of the binoculars to magnify an object. The best magnification is 7-8.5. The second number is the size of the opening at the other end of the binoculars. The larger the number the more light that is let into the binoculars therefore the clearer you will see the bird. The best size for the opening is 35-42.

Ranger Rick's Nature Scope. Birds Birds Birds.

Activities

Thicket:

Define adaptation and introduce predator/prey relationships. Great for demonstrating camouflage of ground nesters or prey. It can also be done with toilet paper tubes to narrow the vision of the spotter simulating the eyesight of predatory birds. It's basically like Hide and Seek with one student acting as a raptor, and the rest are its prey. The object is for the prey to get as close as possible to the raptor without being spotted. Ideally, the prey will end up tagging the raptor. There is a catch; the raptor can only search for its prey from its perch. In other words, the raptor may not move its feet.. See directions in Project Wild p 95.

Build a Nest:

This activity acknowledges the great variability in bird nests and indicates the difficulty of nest building. This activity does not need any props.

Birds nest in definite types of surroundings. Discuss the nesting habits of birds that you already know. Go out looking for nests. Check areas such as the ground, shrubs, holes in trees, over/near water, high in tree tops, etc. List some of the materials in which they are made. Try to determine if there is a correlation between where the nest is built and the eating habits of the bird.

This activity can be done just about anywhere and anytime: prairie, ini's forest, along river or the

coulees. You might introduce the nest construction by explaining that it is the spring of the year and birds are migrating back north for the breeding season. The students should work in pairs to minimize impact. First let them know that they are birds migrating to this area and they must prepare a nest for their brood. After deciding what type of bird they are going to be, give them 15 minutes to choose a site and build their nest. If they decide to be an eagle then obviously a large nest-mostly sticks will be in order. If they choose to be a songbird, then a smaller nest with grass, mug and/or twigs. Also let them know that there will be an open house when they are finished and they must be prepared to explain what type of bird the nest is for, why they built it where they did, and what materials they used.

When everyone is finished gather together and walk from nest to nest listening to each students spiel. You may want to challenge students about protection from predators and protection from environmental factors such as wind, rain etc. You could tell the students that they could come back to their nest before they leave and see if it is still intact.

Birds in the Nest:

(From a New Jersey education resource.) This activity discusses bird nesting requirements and adult/immature relationships. The materials needed are:

- 1 paper cup per nestling
- 4 bowls to hold food supply
- 20 berries/food symbols per group
- hoops of string/webbing/inner tubes to define nest site
- measuring tape (optional)

Follow the Falcons:

Full explanation and materials in each bin. (Also see An Eventful Journey for a similar activity From a New Jersey education resource – see attached.)

Bird Calling:

Cornell, Joseph Bharat. Sharing Nature with Children. pp. 100-101.

Birds on a Stick:

Cornell, Joseph Bharat. Sharing Nature with Children. pp. 102-103.

Bird Call Tape

Bird Adaptation Story:

The Hole Truth Written by Milo Mietzner 4/00.

The following pages are for the stations and the Follow the Falcons activities. There are spaced so that if anything needs to be replaced, they can be printed as is, cut, then laminated.

Bones

Materials: Bones from various animals
Picture of struts

Directions:

1. Study the different bones at this station. Note the difference in weight, size and interior. Bird bones are hollow so that they are lighter for flight. Bird bones are still strong though because they have struts that provide support and strength.
2. Name one human made structure that imitates the design inside a bird bone.

Oil Gland

Materials: Cotton cloth
Vaseline
Pipette
Water jar

Directions:

1. Note that birds have a special oil gland used for preening themselves. The gland is located on their rump by their tail feathers. The oil water proofs feathers and cleans them.
2. Smear Vaseline on the cloth and put one drop of water on top of the “oiled feather” with the pipette.
3. Describe what happens to the water droplet and the advantage it gives birds.

Beaks

Materials: Beaks For Every Need page
Pictures of birds
Tools

Directions:

1. Study the sheet that says, “Beaks for Every Need” and note how each is specialized for different diets.
2. Next, look at the color pictures of birds and set of tools. Divide the pictures of birds into stacks under the tool that resembles their beak function.
3. Bird beaks and human mouths have the same purpose (to take in food). How do beaks differ from mouths?

Feathers

Materials: assortment of feathers
Magnifying glass

Directions:

1. Examine the feathers. What type of feather is it (down or contour)? Where, on the bird, might it be found?
2. Examine the feathers with the magnifying glass. Can you see any difference? Find the barbs, barbules and shaft. Draw and label them.

Nests

Materials: Nests
Field guides

Directions:

1. Carefully examine the nests. What did these birds use to build their nests? How much time to you think it took each of these birds to build their nests?
2. Pick a bird you are familiar with or one from the field guide. Make sure you are familiar with its habitat. Draw a picture of what its nest might look like. Where is the nest located? What materials might it use?

Gizzard

Materials: Mortar and Pestle
Seeds
Gizzard grinders information card

Directions:

1. Read the Gizzard grinders information card.
2. Try to duplicate the action of the gizzard using the mortar and pestle. See if you can grind the seeds into a powder.
3. What part of the human body has the same function as the gizzard? Make a list of items you take time to grind up and those you don't.

Gizzard

Materials: Stones and a bowl
Seeds
Gizzard grinders information card

Directions:

1. Read the Gizzard grinders information card.
2. Try to duplicate the action of a gizzard using the stones in the bowl. See if you can grind the seeds into a powder.
3. What part of the human body has the same function as the gizzard? Make a list of the foods you take time to grind up and those you don't.

Gizzard Grinders

A gizzard is the specialized muscular part of the stomach. Most birds have a gizzard, but it is more highly developed in seed-eating birds and birds that eat hard-to-digest food. Many birds swallow grit (small pebbles, stones, eggshells, and other hard materials) which ends up in the gizzard and helps grind seeds, bones, and other hard to digest food. The gizzard helps the birds to get the most nutrients from the food they eat. This means they can get more energy from less food, which saves them time looking for food.

Notice: There are two gizzard write-ups because one station is using the mortar and pestle and the other is using a rock and a bowl.

Follow the Falcons Game

1. All falcons start in the summer habitat with 2 life tokens.
2. Falcons must land with their feet on a "habitat square." Two falcons maximum to a habitat square.
3. After each migration falcons will pick up and turn over the habitat square and read the situation on the bottom (if any). Then they will receive or give up a life token.
4. If a falcon loses all of its life tokens then they have died and go to "peregrine heaven" where they will wait to be "born again."
5. Falcons with 3 or more life tokens, when residing in summer habitat can add one "new" falcon to their habitat square. The new falcon comes from peregrine heaven. These baby birds start life with 1 token taken from the parent.

Notes for Instructors

1. Usually half the habitat squares are blank on the bottom meaning no change for the falcons that land there (no gain or loss of life tokens).
2. Hand out or collect tokens as needed.

3. Monitor the number of falcons in peregrine heaven so you can keep them being rotated into the game.
4. Modify the rules if necessary to keep the game in progress. Ex. Give baby falcons 2 life tokens for being born rather than one or remove some habitat squares to reduce the population.
5. Have all peregrines start out in summer and migrate together. Wait until all falcons have assessed their situations and received or turned in the correct number of tokens before calling the next migration.
6. Have fun with the boundaries, depending on how much your group enjoys running. Do make sure all the summer habitat cards are together and at the opposite end of all the winter cards.
7. Have fun.

Background:

Peregrine falcons are sleek, crow-sized birds of prey, famous for their speed and beauty. They have large, strong feet and a powerful hooked beak, which enables them to carry and eat its prey.

They eat small to medium-sized birds such as ducks, pigeons and starlings. They hunt primarily at dawn and dusk, when their prey is most active. They strike and capture birds in mid-air, a strategy that requires open space.

A peregrine hunts from the wing or from a high perch looking out over open terrain or water. It spots prey with keen eyes and begins its stoop, a streamlined dive with tail and wings folded and feet lying back. The falcon hits its prey with its foot, stunning or killing it, then swoops back around to catch it in mid-air. During a stoop, peregrines may reach speeds of 200 mph.

Peregrine falcons used to nest throughout the eastern United States. Original population estimates of the eastern states are put at 275 breeding pairs, perhaps 40 in Minnesota and 24 in Wisconsin. Their population was limited by the availability of high cliff nesting sites. The same nesting pair used their sites, once found, year after year. But by 1964, there were few peregrines left in the US and none nesting in Minnesota or Wisconsin.

Besides habitat loss and reductions in their prey populations (food source), it was the widespread use of DDT in the 50's and 60's that caused their extirpation (local disappearance). The pesticide caused their eggshells to be so thin that the mother crushed the eggs during incubations.

The use of DDT was banned in the US in 1972 after its disastrous effects on all wildlife and people were proven. Unfortunately, many countries in Central and South America still use it as a pesticide.

During the 80's, people began re-introducing the peregrine falcon in Minnesota and Wisconsin. Re-introduction involves more than just turning birds loose at a site. The birds are "hacked," a technique by which chicks are maintained (provided with food and shelter) at a release site until they are acclimated to it and old enough to fledge and hunt on their own. The hope is that the fledged birds will eventually return to the area and take up residence. Hacking, like rearing chicks in the wild, is

not foolproof; some chicks have died, often due to predation by great horned owls and raccoons.

One peregrine is known to have migrated 9000 miles from its nest in the Northwest Territories of Canada to the territory of Chaco in Argentina

There are about 12 nesting pairs of peregrine falcons in Wisconsin. All of these are in nest boxes on human-made structures. There is one pair nesting in Bayport, Minnesota that is often seen catching pigeons in Hudson. There are about 24 nesting pairs in Minnesota, about 5 of these are nesting on cliffs along the north shore of Lake Superior. One pair is nesting at a historic nesting site along the Mississippi River and the rest are in nest boxes or under bridges. Iowa has three territorial pairs. One in Des Moines, one in Cedar Rapids and the other at a nest box installed on a cliff near Lansing.

The peregrine was removed from the Federal Endangered Species List last August 1999. However, states can have their own lists and the falcon will remain on many of these lists until a cliff nesting population is achieved. Even then, it will always be a rare bird so it may continue to remain on these state lists.

Summer breeding range, for New World peregrines (peregrines living in the Americas), is on cliff faces or skyscrapers in the northern half of the United States and throughout Canada to the Arctic Ocean. (Peregrines are found on every continent except Antarctica.)

Peregrine release program started. +2

Students learn to conserve energy and clean up air and water. +1

Your cliff site for nesting was discovered by rock climbers without the sense to leave you alone.
-1

R.I.M. (Reinvest in Minnesota) program provides funds for farmers to allow some cropland to revert to natural habitat. +2

200-acre wildlife preserve set aside from development. +1

Beavers flood nearby stream, creating wetlands for waterfowl, a food source for falcons. +1

Young peregrine injured by car. Caring students bring to Raptor Center in St. Paul. -1

Wetland below cliff drained for agriculture. -2

Citizens protest the draining of a small lake for development. +1

A warm, wet year results in a good crop of seeds and insects. This increases the peregrine's songbird population. +1

Nicaraguan war creates a hunger problem for the people. Many people with guns begin to kill songbirds for food. -1

Tropical rainforest cleared to raise beef for American fast food restaurants. -1

Snowstorm along Gulf Coast slows migration and uses up energy. -1

DDT insecticide used south of US border kills insect populations and gets into the food chain. -2

You are illegally shot during migration. Go to peregrine heaven.