



Wings of the Woods



Concepts:

- Observing a bird's field markings, habits, and habitat allows one to identify bird species.
- Birds living in wooded areas are adapted differently than birds living in aquatic environments.
- Unique beak and foot adaptations allow each different bird species to eat meat, seeds, insects, berries and other types of food.

Objectives:

- The students will identify different species by observing their field markings, feeding and other behaviors, and their habitat using binoculars and a field guide.
- The students will differentiate between woodland and wetland bird species by observing the adaptations of birds living in wooded and wetland environments.
- The students will form a hypothesis regarding a particular bird's food preferences by observing the shape of its beak and foot.

Equipment:

- What makes a Bird a Bird cards
- Signs of Bird Life Scavenger Hunt sheets
- Binoculars (one per pair)
- Field guides
- Pencils and paper
- 2 #10 cans
- Which Bird Lives Where cards

Note to Teacher:

This lesson is designed to encourage students to understand the relationship between an animal's habitat and adaptations. Encourage students to discover the similarities and differences between birds they see in a forested area and birds they observe in a wetland area. Remind them to look closely at the details of particular bird's colorings, body shape and behaviors to accurately identify an animal's species.



Time: 1 hour, 30 minutes

Activities in Lesson:

- What Makes a Bird a Bird? (20 min)
- Binoculars & Field Guides (15)
- Junior Birder (10 min)
- Bird Observation– Woodland (15 min)
- Signs of Bird Life Scavenger Hunt (ambulator)
- Bird Observation– Wetland Area (15 min)
- Which Bird Lives Where Relay (15 min)



Vocabulary

Adaptation- an alteration or adjustment in structure or habits, often hereditary, by which a species or individual improves its condition in relationship to its environment.

Binoculars- an optical device, such as a pair of field glasses or opera glasses, designed for simultaneous use by both eyes and consisting of two small telescopes joined with a single focusing device.

Field Guide- an illustrated book that provides descriptions of plants or animals found in nature.

Field Markings- markings used to identify an unknown species, usually birds.

Focus Knob- knob on binoculars used to focus image, located between the two eye pieces.

Habitat- the area or environment in which an organism or ecological community normally lives or occurs.

Right Eye Piece- piece on the binoculars that should be adjusted first, with the left eye closed.

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What Makes a Bird a Bird? (20 min)

Materials: What Makes a Bird a Bird cards

1. Divide the group into groups of five or six, and hand each group a set of What Makes a Bird a Bird cards. Ask the students to examine each item on the list and determine which of the items listed is the single characteristic that makes birds different from all other animals. Each card should include the following characteristics of which most people commonly think when thinking of birds:

- Builds Nests
- Has Wings
- Lays Eggs
- Has Feathers
- Has a Beak

2. While squirrels build nests, bats and insects have wings, reptiles and fish lay eggs, and turtles have beaks, only birds have feathers. Allow each group to explain which characteristic they chose and why they chose it. Alternatively, you can have a student read each characteristic aloud and have one person from each group raise his or her hand to indicate the single attribute decided upon by the group and, then, tally the votes. If there is any disagreement among the groups allow the students to debate their answers until a consensus is reached.

Binoculars & Field Guides (15 min)

Materials: binoculars, field guide, pencil, paper

1. Divide the students into pairs. Give one member of the couple a set of binoculars and give the other student a field guide, pencil and piece of scrap paper. The students may take turns using the binoculars and other materials.

2. Instruct the students to place the neck strap attached to the binoculars around their necks. Remind them to always place the neck strap around their neck when they switch users. People who wear glasses may use the binoculars either with or without their glasses.

3. Both the left and right eye pieces on the binoculars have rubber ends like suction cups, they can be folded back onto the eye piece to make viewing more comfortable for those who will be using the binoculars while wearing their glasses.

To use the binoculars properly the students should:

- Adjust the focus of the right eye piece. This should be done each time the pair switches binocular users to accommodate individual differences in vision. Hold the binoculars to the eyes, close the right eye and turn the right eye piece until the objects in view looks crisp and clear.
- The students should try to spot a bird with their naked eye, then bring the binoculars up to their eyes while looking at the bird to get a closer view. The students will be much better able to locate the birds they are trying to view if they look first, then bring the binoculars to their eyes.
- Adjust the focus knob. The focus knob is located between the left and right viewers. This knob is used to adjust for clarity depending upon the distance of an object away from the user. Once the students have a bird in view, they may turn this knob (or tilt this lever, depending on the design of their set of binoculars) until the bird can be seen clearly.

4. To identify a species using the field guide the students can simply look through the field guide until they find the picture of the bird that matches the actual animal they are observing in the wild. While using the guide to identify a bird, the students will need to be reminded to look carefully at the bird's field markings. Remind the students to either write down or make a mental note of field markings such as:

- head crests (feather tufts on the head like on the Cardinal or Blue Jay)
- black or white eye lines (complete or partial rings of black or white feathers around the eye)
- black or white stripes on the tail or wings
- bright patches of red on the head
- soft peach or orange colored patches on the belly
- beak shape (short, long, pointed, hooked, etc.)
- foot shape (small, large, clawed, webbed, etc.).

All of these details will allow the students to pinpoint the species in their field guide.

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Junior Tracker (10 min)

1. Scientists who study wildlife, Wildlife Biologists or Wildlife Ecologists, have very good observation skills. They use these skills to collect information about a certain species and their habitat. Ask the students:

- What are observation skills?
- Do they include any other senses in addition to sight? (smell, sound, touch, taste)
- What about memory?
- How might Wildlife Biologists use observation skills to study wildlife? (tracking, examining)

2. Tell the students that they will be learning to be good trackers by using their observation skills. Organize the students into pairs of two students. One student will turn around for 30 seconds while the other student changes something about their appearance (clothing, shoes, jewelry, etc). After 30 seconds, the student may turn around and try to guess what changes were made. The students then switch places and this time make more subtle changes in their appearance.

3. After three or four rounds, ask the students:

- What sorts of changes were easy to detect?
- Which ones were difficult? Why?
- Do you think that signs of wildlife will be more like the easy changes, or the hard ones? Why?

Bird Observation– Woodland Area

(15 min)

Materials: binoculars, field guide, pencil, paper

Note: If using the bird blind, remember to fill the feeders a few hours before your lesson in order to attract more birds to the area.

1. Using the bird blind is an ideal spot to observe birds. Explain to the students that they will be observing birds that live in/around a forest and then birds that live in/around a lake.

2. First, the students will be observing woodland birds at the Bird Blind behind the Interpretive Center. Each feeder is numbered with a wooden block. The students can indicate the location of the bird they are observing by whispering the feeder number to their partner. Before entering the blind, emphasize that it is very

important to be as quiet and still as possible to avoid scaring the birds. The blind is not sound proof nor does it totally obscure the students from view of the animals.

3. Remind the students to take turns using the binoculars as they work with their partners to identify as many woodland birds as possible. Instruct the students to sit on the bench facing the feeders as they enter the blind. Some common woodland species that may be found at the bird blind include:

Tufted Titmouse
Black-capped Chickadee
White-breasted Nuthatch
Goldfinch (males olive colored in winter)
Downy Woodpecker
Hairy Woodpecker
Red-bellied Woodpecker
Redheaded Woodpecker
Cardinal
Blue Jay
Purple Finch

3. Students should be recording a list of birds they see or hear. Have the students share what species they have listed before.

Signs of Bird Life Scavenger Hunt

(ambulator)

Materials: Signs of Bird Life Scavenger Hunt sheet, pencils

1. Once the students have identified as many birds as they can at the blind, explain that they will now be walking to the lake to observe birds that live by the water. On the way to the lake, use the Signs of Bird Life Scavenger Hunt to keep the students focused on the lesson topic.

Note: Remind students never to walk with the binoculars held to their eyes. This will prevent them from falling or tripping and causing themselves to receive an eye injury from the eyepiece of the binoculars.

Bird Observation – Wetland Area

(15 min)

Materials: binoculars, field guide, pencil, paper

1. At the lake, allow the students to observe and identify as many different types of birds as possible using their binoculars and field guides.

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Some birds common to the Bradford Woods lake include:

Mallard Ducks
Canada Geese
Great Blue Heron
Bald Eagle
Osprey
Red-winged Blackbird
Bank Swallow
Kingfisher
Green Heron
Grebe
Wood Duck
Loon (migrating)
Turkey Vulture
Black Vulture
Broad Wing Hawk
Red Tail Hawk
Kestrel
Screech Owl
Barred Owl

2. At the end of the observation period, bring the students together into a small group to brainstorm the similarities and differences between the birds they observed at the bird blind and the birds they observed at the lake. Ask the students:

- How many different species did you identify at the bird blind? At the lake?
- What were the shapes of the beaks on the birds at the bird blind? What were they eating? What other types of food might those birds eat?
- Were the beaks different on the birds at the lake from those at the blind? If so, how were they different?
- What types of food might a bird living at the lake eat? Would it depend on the species?
- A Bald Eagle does not swim. Neither does a Red-Winged Blackbird. Why might either of these birds live near the lake?
- Woodpeckers have sharp claws on their toes. Why does a woodpecker not eat fish like an eagle?

3. Ask the students if they are familiar with the term adaptation. Allow one of the students to explain the term and ask the students to point out the special adaptations of the species they observed.

4. Ask the students if they know the term habitat. Allow one of the students to explain the

term and ask the students to name the two different habitats they observed today. Challenge the students to tell you how an animal's adaptations are related to its habitat based on the observations they have made.

Which Bird Lives Where Relay (15 min)

Materials: two tin cans, Which Bird...cards

1. Divide the group into two teams. Give each team a set of cards labeled with the following bird species in two different colors:

Great Blue Heron
Kingfisher
Redheaded Woodpecker
Black-capped Chickadee
Blue Jay
Tufted Titmouse
Downy Woodpecker
Bald Eagle
Mallard Duck
Red-Winged Blackbird
Canada Goose
Grebe
Hairy Woodpecker

2. Have the teams line up at one end of the playing field. At the opposite end of the playing field, place two #10 tin cans. Label one can, Wetland and the other can Forest. The object of the relay is for the students to place as many species in their proper habitat as possible. The first student should pick up a card, run to the other end of the playing area, and place the bird card in the can they think is correct. Once they return to their group the next student should go. Review the results of the relay to conclude. Point out any birds that landed in the wrong habitat and clarify with the group why they belong elsewhere.

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Evaluation

- √ Students can identify different species by observing their field markings, feeding and other behaviors and their habitat using binoculars and a field guide.
- √ Students can differentiate between woodland and aquatic oriented bird species by observing the adaptations of birds living in wooded and wetland environments.
- √ Students can form a hypothesis regarding a particular bird's food preferences by observing the shape of its beak and foot.

Notes:

Keep in Mind

Birds are not always willing to be visible for this lesson. Using observation skills such as hearing will allow students to increase the number of birds they list. Be prepared to help students identify birds throughout the module.

You may need to separate the students in order to increase their chances of their seeing birds by minimizing noise.

Students may become impatient with waiting to locate birds, this down time can be used to practice using the field guide or the binoculars.

Back in the Classroom

Investigate raptors that live in your community. Find out if there are any known bald eagle nests and what is being done to protect them. Visit a raptor center or watch for raptor displays at local museums. Contact the Division of Fish and Wildlife and find out what you should do if you find an injured raptor.

Background



Bald Eagles

Bald eagles were placed on the endangered species list when the list was created in 1973. The bald eagle was given a status of “endangered,” which means in immediate danger of becoming extinct, in a majority of our country’s states. Bald Eagles had seen a decline in numbers between the mid 1800s and the 1980s that the national Fish and Wildlife Service (FWS) attributes to loss of habitat, poaching, and contamination of food sources.

One cause of food contamination for eagles was the insecticide DDT, which was sprayed onto crops and ran into bodies of water where fish and plants absorbed it. DDT caused bald eagles’ eggs to have extremely fragile shells, resulting in a decrease of successful hatchings. DDT was banned in the United States in 1972.

In July 1995, the FWS changed the status of the bald eagle from “endangered” to “threatened.” The listing of “threatened” means that a species is not in immediate danger of extinction, but is likely to become endangered in the future.

By June 2007, the species had seen such an improvement in numbers that the FWS removed the bald eagle from the endangered/threatened species list. The bald eagle remains under the protection of the Migratory Bird treaty Act and the Bald and Gold Eagle Protection Act, both of which forbid the selling, harming or killing of the species.

Protection of eagles has been a nationwide initiative. Stiff penalties have been enacted for people who are found disturbing or killing eagles. Occasionally people who find eagles nesting on their property are tempted to kill the eagles so they do not have to deal with the federal regulations that surround the birds.

While the number of bald eagles in Indiana comes nowhere close to the number of eagles in states like Alaska, Minnesota, and Wisconsin, the number of pairs is going up and many pairs are successfully reproducing. The state of Indiana removed the bald eagle from its endangered species list in 2008, and the species is now considered one of special concern. Part of the solution for bringing the number of eagles up is to educate people about the role the birds

play in the ecosystem. Educating people, however, often makes them curious and increases their desire to see eagles in the wild. Eagles are easily disturbed birds and restoration of them in the United States will rest on them being left alone.

Birds

Birds have often been called “glorified reptiles”. They are grouped as a separate vertebrate class called “aves” and apart from the power of flight and features connected with it this power of flight, they are structurally similar to reptiles.

Since birds are warm-blooded, they have a higher metabolism than reptiles. The maintenance of a high body temperature is necessary for flight because it requires a great input of oxygen and energy, over a long period of time.

Anatomy, Locomotion & Behavior

Birds are one of the few groups of animals that have developed true flight. Powered flight, not just gliding. Insects and bats are the two other groups who have also achieved this.

Lightness is achieved in several ways. The teeth have been lost and are replaced by a horny bill. Many bones, such as the skull, are extremely thin. Because the wings cannot support the bird on the ground, there are many profound modifications in the skeleton, which enable the bird to walk on its hind legs—a method of locomotion called bipedalism.

Another adaptation for flight is seen in the shape of birds. Whatever their shape, they are always streamlined. Streamlining is necessary to reduce friction to a minimum when the bird flies and is achieved, not only because the body itself is streamlined, but also the feathers provide a smooth outer surface.

Birds are extremely active and not only do they need large quantities of food, they also need equally large amounts of oxygen required to transform this food into energy. The blood functions to transport this oxygen as well as regulating the bird’s temperature, which is maintained at between 106 and 114 degrees Fahrenheit.

Beaks & Bills

The bill is often brightly colored or ornamented.

Background



The beaks of birds come in a variety of shapes. A specific species design is related to its diet. In general, beaks are light. This is necessary to reduce weight wherever possible so that birds are able to fly.

The mouth is opened by the lower mandible being moved away from the upper mandible, in a way that is similar to humans. In many wading birds and some other species, there are touch receptors in the tips of the mandibles. This allows birds to feel the prey they can't see – i.e. searching for worms underground and insects in a tree (woodpecker).

The nostrils pierce the upper mandible. Few birds are known to use the sense of smell in their search for food.

Legs

Birds have evolved legs with few large muscles, except for those at the top of the leg near the center of gravity. The lower part of the leg has very little muscle and is controlled by a pulley system from the muscles at the top of the leg. When the bird sits down onto its foot, the tendon is tightened over the end of the joint, which pulls in the toes. The action of sitting down over the foot makes the toes curl around the perch and lock the bird into position. This is why birds such as an owl can hold tightly onto a branch even when asleep. To let go it must raise itself up off its feet in order to release the toes.

The foot has only four toes. Perching birds may have two toes pointing forward and two backward, or three forward and one backward.

Feathers

The feathers of the birds perform four important functions:

- They form an insulating layer around the body, which helps control body temperature.
- They create wing and tail surfaces that are essential for flight, giving the body a streamlined shape.
- They keep the body waterproofed.
- Their coloration can provide a bird with camouflage by enabling it to blend with its surroundings. It can also make it conspicuous by providing colors and patterns used with breeding behavior and courtship ceremonies.

The feathers are perhaps the most important component of flight. Feathers are also important in species recognition. There are two categories of feathers:

- Pennae: outer feathers (contour and flight)
- Plumulae: down feathers

The number of feathers on a bird varies according to the species and time of year. A colder climate means more feathers.

Color

Birds are among the most brilliantly colored members of the animal kingdom. Color has evolved to perform several biological functions.

- Aiding in recognition of species and sex by particular birds.
- Some colors are used to keep the flock together.
- Camouflage enables birds to merge with their background.

Many birds resort to camouflage in order to increase their chances of survival. Not only the birds themselves but their nests and eggs may also be well camouflaged. An important aspect of animal camouflage involves the elimination of shadows. Animal undersides are more palely marked than the upper side. This is called counter shadowing.

In all aspects of camouflage, the behavior of the animal is crucial if the effects of the camouflage are not to be ruined. (i.e. crouching close to the ground to get rid of its shadow, or closing its eyes so the enemy doesn't see him).

Flight & Flying

In order for a bird to fly, it must obtain upward force, called a lift. A bird's wing is shaped to enable the birds to obtain this lift. Lift is only obtained when airflow is smooth over the wing's surface. The lift is affected by three factors:

- Surface area of the wing
- Wind speed
- Angle of attack at which the wing is held

Take off is usually achieved by first jumping into the air. During landing the wings tilt the body into an almost vertical position and act as brakes. During flight, power for forward movement is derived from the downbeat of the wings. Taking off requires more energy than level flight

Background



since the bird must accelerate and climb. A bird has to beat its wings more vigorously to obtain the extra lift needed.

Bones

Birds have hollow bones in order to reduce their weight. In order to be able to fly, large birds have evolved more severe modifications to the skeleton than have smaller birds. Certain aquatic species of birds have some solid bones to aid in their ability to dive.

Instinct and Intelligence

Birds show a remarkable range of behavior. Many of their habits are intricate; like nest building. Study has shown that many of a bird's activities are learned and perfected during its life. However, a number of behavior patterns are still innate in that the bird is born with the ability to do them. Learning by trial and error and continued practice is also very important.

Song

Humans tend to notice birds because they use the same sense organs as we do. The most important one is probably color vision, but hearing is also at the top of the list. Birds tend to have ears that detect the same kinds of sounds as humans. They hear and communicate over a similar vocal range as humans, so birdcalls are audible to humans.

The ear of birds is in many ways similar to that of a human. The voice of birds, although produced from a slightly different structure to that of humans, bears some resemblance. The ability of some species of birds to mimic human's voice shows that they can produce sounds closely similar to those that we make. One distinctive feature of the voice of birds is that some can produce as many as three or four complex sounds that overlap one another in time.

The speed with which a message can be transmitted and received is the other important feature of the voice. Some complex songs may include as many as 80 notes per second. Such sounds seem like a single continuous note to the human ear but with the help of sound spectrograph recordings, we know they are not.

Messages can be transmitted in many different ways by many different animals, but sound is a particularly useful form of communication.

Sound travels well in most of the habitats, which birds live and is a much better method of communication in habitats such as woodland, than any other type. It is not surprising that birds use sounds as one of their most important forms of language.

Bird songs are the most elaborate series of message in the language of birds. Song is not usually produced equally at all times of the year, but is mainly concentrated during periods prior to breeding when territories are being set up and courtship undertaken.

Songs may be relatively complex, however, they are highly characteristic, with each species usually having a very distinct song. A complex song usually includes a series of notes that are formed into a recognizable pattern.

There are around three main functions of the song and the importance of each may vary between different species. By recognizing their own type of singing, birds achieve reproductive isolation from other species. By singing, a male bird announces his claim to a territory and he also wishes to attract a mate.

Just as there are different dialects within the human population, it is common to find local variations in the songs of different species. These 'dialects' may occur over large areas or by just crossing over from one valley to the next one may find that the song of a given species has changed quite markedly.

Most often song is produced by the males and not by the females of a species, although there are exceptions.

Feeding

Because of their lack of teeth, birds feed rather differently from mammals. The food is not chewed at all, but transferred to the gizzard where it is ground up. Many birds eat their prey whole. This may involve the swallowing of lizards, snakes, large insects or fish that are larger in relation to the size of the bird. The majority of birds, however, take smaller prey than this. Other birds such as the birds of prey tear up larger prey with their beaks and talons and others such as the ducks and game birds may eat foliage.

Background



Birds do not usually prepare their food, but there are exceptions. Many bee-eaters remove the stings from their prey before swallowing them. Birds that eat large insects, like caterpillars that have powerful biting mouthparts, usually peck the head of their prey. This prevents the possibility of the insect biting the bird after it has been swallowed.

Feeding can be dangerous since the bird must concentrate upon it and therefore run the risk of not noticing the approach of a predator until it is too late. Drinking is often dangerous too. Some birds obtain most of their water from their food, especially the insectivores and birds of prey which may never need to drink, but many other species come down to water. In doing so the birds expose themselves to predators.

Many small birds may satisfy their needs from the dew or rain by merely sipping drops off the vegetation. Most birds when drinking lower their beak into the water until the mouth is filled up, then they raise their head so that the water runs down the throat.

Seed Eaters

Birds do not always digest plant material as efficiently as mammals do; birds lack the ability to break down cellulose and digest leaves and grass. The parts of plants which birds can and do eat in quantity are the seeds and fruits. These are a major component of the diet of most birds.

Seeds are hard structures and many are relatively difficult to break open and eat. Most birds that eat these hard seeds have one way or another of breaking into them. Some birds avoid these hard-covered seeds and do not have to worry about this problem. Bird species, which are closely related, tend to eat the same thing; however, the resources are divided up pretty evenly. The larger species of say a cardinal, will eat the larger seeds, while the smaller cardinals will eat the smaller of the same seeds.

Seed eating birds face other problems in relation to their diet. They need powerful gizzards with a good supply of grit in order to break up the seed. Seed eaters usually possess a crop, a bag-like extension of the side of the lower throat in which food can be stored. Birds that bring

seeds back to their young carry them in the crop. The possession of a crop enables the birds to feed rapidly in exposed places and digest the seeds later in safety.

Some birds eat seeds all year round and feed their young on them. Seeds keep well and as a result, many seed eating birds store seeds so that they can find them during the winter when food is more difficult to come by.

Insect Eaters

A wide variety of birds eat insects. The full reasons for feeding insects to the young are not known, but insects are probably richer in certain proteins necessary for animal growth than are seeds. In addition, insects contain large quantities of water, which are essential to a growing chick; seeds do not. The periods of the year when birds change over from a diet of seeds to one of insects and back again may be difficult ones for the birds. The digestive tract is more powerful and muscular when the bird is eating seeds than it is when the bird is eating insects; little is known of what happens during the period of changeover from one diet to the other.

Fish Eaters

Some species of birds feed predominantly on fish. A number of ducks, a few birds of prey, and kingfishers feed largely on fish, as well as a few species of owls.

The different species hunt their prey in a wide variety of ways. Some dive and swim after catching them from behind, while others dive upon them from above. Either way, all must chase their prey briefly. The fish eating birds of prey and owls plunge down on the prey and catch them with their talons. Fish are extremely slippery prey and the mandibles of birds have evolved in a way that reduces the chances of their escaping. Once caught, the prey must be held firm so that it cannot escape. The owls, ospreys, and sea eagles have particularly long talons that sink into their prey and roughened pads on their toes that enable them to prevent their prey from slipping. Most of the fish eating birds, including the owls, have unusually long legs that are bare of feathers, which presumably reduce the amount of water logging when the bird strikes the water.

Background



Sight is important for predatory birds, but fish eaters have two problems to deal with that other species do not encounter. An eagle aiming at a fish underwater has to be able to allow for the refraction of the water, since the fish is not exactly where it appears to be. No one is sure exactly how this is done; it may be true that the young have to learn how much to allow for when they are fishing with their parents. Birds swimming after fish underneath the water have a different problem. The optical characteristics of water are different from those of air-as you can see when you open your eyes under water. Birds have a second, inner eyelid that makes the eye suitable for seeing underwater without the loss of good vision when the bird is in the air.

Birds of Prey

The largest birds of prey are the eagle, condors, and vultures. The largest species have wingspans of eight or nine feet. Not all these birds kill their prey and most are not above scavenging from carcasses if they get the opportunity. The largest eagles take a wide variety of prey. Hares and rabbits are common prey for many species.

The method used by birds of prey in hunting requires considerable skill and like most, the hunters can meet with bad luck or scarcity of prey. Success at hunting affects the breeding of the birds of prey. They usually have only a small number of young, usually between one and three, though a few of the smaller species may lay more eggs. The young hatch one after the other rather than all together.

Social Behavior

A number of bird species nest in huge colonies (about 13%) while the rest are solitary nesters. One group of fish eating birds commonly found nesting in colonies is the herons. Among the smaller birds, a number of seedeaters nest in colonies. One advantage to being in a colony is that the birds can 'gang-up' to attack a predator. When danger threatens, the numbers of birds attacking a potential predator are often sufficient to drive the animal away.

Pair Bonds

Some birds are noted for their unusual mating systems. The large majority of birds, well over

90% of them, have monogamous breeding partnerships. Large groups of birds such as birds of prey and swallows are all monogamous. Most of the other birds that raise their young in the nest are also monogamous. Although most birds are monogamous, it's an old wives' tale that many, such as the swans mate for life or will not re-mate if they lose their partner.

Territorial Behavior

A territory is an area that a bird defends against other birds. Once a bird becomes established in a territory, either as a result of driving the previous owner out or, more frequently, by taking over one vacated as a result of the death of the previous owner, it tends to retain this territory for the rest of its life. Even if the bird is a migrant, it usually returns to the same patch of country each year to breed.

Courtship

Courtship is the behavior by which birds recognize others of the same species, find a member of the opposite sex and become established members of the breeding population. A lot of the behavior depends on the type of pair bond that is formed. However, in most normal, monogamous birds a lasting bond is established.

Courtship serves to ensure that each individual bird successfully pairs with a mate from the correct species. Elaborate displays or songs are characteristic of each species enabling the females to select a correct partner more easily.

Courtship performs a second important function. The continual presence and display of one bird to the other enables them to increase their confidence in one another so as to behave as a pair and, eventually, to breed.

The most common way a pairing occurs when the male occupies a territory, and then advertises his presence and the fact that he is without a mate. The female approaches the male and then "persuades" the male to let her get near him, when he finally "accepts" her presence, the pairing is finalized. This happens in many species whether the territory is a large area of woodland or a small part of a colony.

Nests & Nest Building

Birds build nests in order to raise their young so it is important that the nest should be safe from

Background



disturbance. There are two main ways in which birds seek to protect their nest.

- Concealment: By hiding the nest in an out-of-the-way place, covering it with camouflaging materials and taking care to visit it cautiously so as not to draw attention to it, the birds hope to protect their young.
- Putting nests in inaccessible places. Being secretive is not as important since the birds rely on their enemies being unable to reach the site at all.

Concealment is the most widely method practiced. It is better to avoid conflict with a potential predator than to look for trouble.

There are many different types of bird nests but the simplest is probably that of a pile of sticks in a tree where a flimsy platform is formed on which to put the eggs.

Eggs

The hard-shelled, often distinctively shaped, eggs of birds are well known. They are composed of three main parts - yolk, albumen, and shell. The yolk is the most nutritive part, being relatively rich in fat and proteins. The egg white, or the albumen, surrounds the embryo and, although relatively low in nutrients compared with the yolk, holds much of the water essential to the growing chick's survival. Two layers of shell membrane just inside the shell surround the albumen. The eggshell is a porous structure composed mainly of calcium carbonate.

The developing chick must obtain all its nutrients from within the eggshell. The chick draws on these as it develops and also obtains the calcium it needs for its bones by withdrawing calcium from the shell.

In order to metabolize its food, the developing chick must be able to breathe. For this oxygen must be absorbed into the egg and carbon dioxide expired; a series of blood vessels throughout the egg, outside the chick, enable this respiration to occur.

The laying bird must find extra amounts of food in order to form eggs. It's estimated that this may increase her food demands by as much as 40 percent during the laying period.

The size of eggs varies considerably. The smallest eggs are laid by the smallest hummingbirds and weigh about 0.02 ounces, while the largest, those of the ostrich, weigh about 3.3 pounds.

Young & Their Care

Young birds hatch from the eggs at the end of the incubation period. This may be as short as 11 or 12 days for the smaller birds or as long as 11 to 12 weeks in some of the larger birds.

The parents are responsible for making sure predators are kept away from their babies. They must also keep the little ones warm and feed them. If well fed, the young may reach almost adult weight before they leave the nest.

Additional Information

Birds migrate because the area in which they spend the non-breeding season is not as good an area to breed on as their summer grounds and because they cannot survive on their breeding grounds during winter.

Many birds obtain their direction by use of the sun. In addition, birds can navigate by the stars. Under normal circumstances it seems likely that birds usually find their way either by use of the sun or the stars.

Studies have shown that most birds die of old age. This is true of birds that live in zoos or those which have been tagged. It is not known how long birds not living in captivity live. Deaths of young birds are high throughout the nestling stage, but in many species it is thought that there is a very high loss during the period just after the young have left their parents and when they are learning to fend for themselves.

Black-capped Chickadee

- Are named after the call they make - chick-a-dee-dee-dee (6).
- They often form the nucleus of mixed flocks of woodpeckers, nuthatches, and creepers that move through the winter woods (5).
- They often feed upside down clinging to the underside of twigs and branches in their search for insect eggs and larvae (5).
- They are easily tamed and soon learn to feed from the hand (6).

Background



- In the warmer months they move into the woods to nest in holes in trees (5).

Blue Jay

- Eat fruit, insects and grain and are one of the few birds that store their food (5).
- They have a violent dislike for predators and their raucous screaming makes it easy to locate a hawk or a roosting owl (6).

Canada Goose

- Flocks migrate south in a V formation (5).
- They have powerful voices and are often heard before they are seen far off in the sky (6).
- They nest on Snake Island and are often seen feeding at the observatory field in spring.

Cardinal

- It is the Indiana State bird.
- The male is bright red and the female is grayish with a pink crest (5).
- They are very shy and the slightest movement will cause them to take flight (6).

Cowbird

- Is the smallest of the native blackbirds (6).
- They never build their own nests but foist their offspring on other birds. The female cowbird will sneak around looking for a suitable nest with eggs in it that she can lay her eggs in, while the owner is absent. She then deposits her eggs and hurriedly departs, leaving the egg to be hatched and the young bird to be reared by the real owner of the nest. The owner of the nest is usually a smaller bird e.g. sparrow or a warbler and thus the young hatchling is therefore the biggest and strongest of all the youngsters in the nest. Usually the cowbird is therefore the only hatchling to survive at the cost of the whole brood of another smaller bird (5).

Great Blue Heron

- Is the largest of the heron family and is often seen flying over the surface of the lake.
- While in flight, it watches for fish or frogs, which are its principle food, however it also eats small mammals and reptiles (5).

Nuthatch

- Can move down the trunk of a tree head first.
- Do not migrate but is a permanent resident.

Kingfisher (Belted)

- Feed on minnows, frogs and large aquatic insects. They often sit on a perch or hover over the water and then dive beak first to capture their food (5).
- It always swallows its food head first after flipping it in the air to turn it around (6).

Starling

- Are not native to America but were introduced from Europe in 1892 to Central Park in New York City. Since then they have spread throughout the whole country (5).
- They feed in flocks of up to tens of thousands of birds (6).
- They compete with native species for nest cavities and food. There have been many debates regarding their economic value, but their consumption of insects seems to tip the balance in their favor (5).

Tufted Titmice

- Are social birds and often join with mixed small flocks of chickadees and nuthatches.
- Although they are frequent visitors at feeders they are not as tame as chickadees.

Woodpecker

- Well-adapted to living in trees, woodpeckers have four strong toes, two pointing forward and two pointing back, with sharp claws that enable them to cling upright on the bark of trees and branches. They also have stiff tail feathers to prop them up vertically (h).
- Have long, flexible, bristled and sticky tongues that they can probe into small holes to catch insects (h).
- Their hard pointed beaks are used to chisel into wood in search of insects and sap, or to excavate cavities for nesting and roosting. The birds tunnel down 6-18 inches deep, making the excavation wider at the bottom for the egg chamber (h).
- Have especially hardened, thick skulls and cushioning around the brain like a shock

Background



absorber) to protect them while they hammer. In this way they do not get head aches (h).

- Hammer on a dead limb of a tree as part of its courtship ceremony and to proclaim its territory (h).
- In feeding, most woodpeckers start at the base of a tree, searching for insects and spiders and then they move up the trunk in spirals until they reach the larger limbs where they explore the undersides of a branch (h).

Woodpeckers Common to BW

Downy

- Is the smallest tamest and most abundant of our woodpeckers. They prefer to drill holes in dying trees (5).

Hairy

- Is one of the most beneficial birds, saving both forest and fruit by destroying many harmful insects such as wood-boring beetles. They prefer to drill holes in living trees (5).

Red-Bellied

- It also is one of the woodpeckers that habitually stores its food (5).

Pileated

- Is the largest woodpecker about the size of a crow. It tends to stay out of sight but it whacks away with such force that from a distance it often sounds as though a man were chopping in the woods. When a pileated woodpecker goes to work it makes chips fly and rips off heavy strips of bark that no other member of the family can. Traces of the pileated woodpecker are unmistakable; they excavate huge rectangular hollows that look like topless boxes (5+6).

Yellow-bellied Sapsucker

- Gets its name from its habit of drinking the sap that oozes from the regular rows of holes that it drills in the bark of trees. The birds wipe up or suck the oozing sap with their brush-like tongues. It also eats the insects that come to drink the sap. Unfortunately sapsucker holes damage trees and sometimes provide points of entry for fungus and other tree diseases. Unlike other woodpeckers this one migrates south in winter (5).

** The above birds can be found at Bradford Woods all year round. However, whether they are the same birds or not is unknown. Some species may migrate south in winter, and be replaced by birds of the same species from more northern parts of the States and Canada. All these birds are found in greater numbers in spring. (Kari Price - Naturalist)**

Raptors

There are three characteristics of raptors that make them different from other birds (4):

- They have talons to stab and catch their prey.
- They have excellent binocular vision, which allows them to see much better than humans.
- They have strong hooked beaks for plucking feathers and tearing flesh.

Owls Common to Bradford Woods

Barred Owl

- A very common species. Its call sounds like *who-cooks-for-you, who-cooks-for-you-all* (6).

Great Horned Owl

- It is the largest of the tufted owls. Is a very adaptable bird living in a variety of habitats and eats many different kinds of prey. They have talons up to 3 inches or longer (f).

Screech

- A small owl only standing about 8 inches high. A good night hike trick is to mimic this owl's call. It often replies back within 5 minutes and has even been known to fly overhead, while mimicking its call.

Red-tailed Hawk

- Hawks see greater distances than humans, but their visual acuity (the ability to see clearly) is eight times that of human's (e).
- Some hawks can attain speeds of over 150 miles per hour when diving for their food (e).
- The red-tailed hawk mostly eats mice and other rodents, and rarely eats poultry (6).
- Farmers have often mistaken them in the past for other hawks that eat hens and chicken and have shot them down (6)

Conservation - state and federal laws protect all hawks. It is illegal to capture or kill a hawk, or to possess a hawk, alive or dead, without proper permits from local state governments as well as the U.S. Fish and Wildlife Service (e).

Background



Bald Eagle

- The bald eagle was chosen as our national symbol in 1782 and stands for justice, strength and fairness.
- It is the only eagle unique to North America.
- It is not actually "bald", but was named by colonists who used the Old English word "balde", which means, "white".
- Before 1800, there were approximately 1/4 million bald eagles in the lower 48 states.
- Between 1917 and 1940, approximately 100,000 bald eagles were shot in Alaska alone.
- Shooting, possessing without a permit and selling bald eagles became illegal in 1940, but shooting remains one of the leading causes of eagle mortality.
- In 1970, there were only 3,000 bald eagles and 400 breeding pairs. Today, there are over 5,000 bald eagles and 1,400 breeding pairs.
- Adult bald eagles have a wingspan of 6 to 7.5 feet and are 3 to 3.5 feet tall.
- The female bald eagle is larger than the male.
- An eagle's beak is almost as long as its head, is steam-lined, and has a hook on the end. These adaptations help it to fly fast, and to tear open its prey.
- The flight muscles of a bald eagle account for half of its body weight.
- An eagle, like all birds, has hollow bones. The skeleton of an adult bald eagle weighs about a half a pound.
- The eyes of an eagle are very similar in structure to a human's, but they have a higher concentration of cones and lower concentration of rods, therefore giving them 8 times better resolving power (ability to focus), but bad night vision. They can see a 12-inch fish a mile away.
- The feet of eagles have sharp claws called talons that are up to an inch long and curved, which allow them to catch their fish. They also have bumps on their toes to help them hang onto slippery fish.
- An adult eagle has about 7,000 feathers, which collectively weigh less than 21 ounces (30 feathers weigh less than a penny). They are made of keratin, which is the same thing our fingernails are made of.
- Pound for pound, an eagle's wing is strong-

er than the wing of a jet plane.

- 90% of a bald eagle's diet is fish, but they will also eat ducks, wading birds, turtles, rodents, snakes and dead animals. The sometimes steal the prey of other animals.
- They mate for life.
- Bald eagles usually nest in tall (50-150 ft.), large trees located near water and will return to the same nest year after year. Every year, more twigs and branches are added. One nest that was used for 34 years weighed an estimated 2 tons!!
- Young eagles stay in the nest for 10 to 11 weeks and begin to venture out in mid to late summer. By the end of the summer (4 months old), they are on their own.
- Bald eagles do not have a white head or white tail until they are at least 4 years old.

Turkey Vulture

- Turkey vultures can soar in circles over the same area for an hour without flapping their wings. They are the champion non-stop gliders of the feathered world (6).
- Turkey vultures have the reputation of being the "feathered street cleaner", as they are scavengers, eating any carrion and other refuse (6).
- Sometimes if turkey vultures feast too strenuously they cannot lift themselves off the ground when they try to take off. In this case they readily disgorge some of the banquet, so they can take off (6). Amazing Fact - Turkey vultures practice UROHIDROSIS. This means that they deliberately void their own excretory waste on their legs, cooling their appendages as the water portion of the waste material evaporates (4).
- You can tell a turkey vulture from another bird of prey when it is in flight as it's wings are held upwards in a shallow V shape (5).

Background



Grade 3

English/ Language Arts

- 3.7.3 Answer questions completely and appropriately.
- 3.7.15 Follow three- and four-step oral directions.
- 3.7.11 Distinguish between the speaker's opinions and verifiable facts.

Science

- 3.2.4 Appropriately use simple tools, such as clamps, rulers, scissors, hand lenses, and other technology, such as calculators and computers, to help solve problems.
- 3.4.1 Demonstrate that a great variety of living things can be sorted into groups in many ways using various features, such as how they look, where they live, and how they act, to decide which things belong to which group.
- 3.4.2 Explain that features used for grouping depend on the purpose of the grouping.
- 3.4.3 Observe that and describe how offspring are very much, but not exactly, like their parents and like one another.
- 3.4.4 Describe that almost all kinds of animals' food can be traced back to plants.
- 3.6.3 Explain how a model of something is different from the real thing but can be used to learn something about the real thing.

Grade 4

English/Language Arts

- 4.4.6 Locate information in reference texts by using organizational features, such as prefaces and appendixes.
- 4.7.1 Ask thoughtful questions and respond orally to relevant questions with appropriate elaboration.
- 4.7.2 Summarize major ideas and supporting evidence presented in spoken presentations.

Science

- 4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.
- 4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same.
- 4.4.3 Observe and describe that organisms interact with one another in various ways, such as providing food, pollination, and seed dispersal.
- 4.4.4 Observe and describe that some source of energy is needed for all organisms to stay alive and grow.

Grade 5

English/Language Arts

- 5.4.5 Use note-taking skills when completing re-

search for writing.

- 5.7.1 Ask questions that seek information not already discussed.
- 5.7.2 Interpret a speaker's verbal and nonverbal messages, purposes, and perspectives.
- 5.7.3 Make inferences or draw conclusions based on an oral report.

Science

- 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving.
- 5.4.4 Explain that in any particular environment, some kinds of plants and animals survive well, some do not survive as well, and some cannot survive at all.
- 5.4.5 Explain how changes in an organism's habitat are sometimes beneficial and sometimes harmful.
- 5.4.7 Explain that living things, such as plants and animals, differ in their characteristics, and that sometimes these differences can give members of these groups (plants and animals) an advantage in surviving and reproducing.

Grade 6

English/Language Arts

- 6.4.5 research Process and Technology: Use note-taking skills when completing research for writing.
- 6.7.3 Restate and carry out multiple-step oral instructions and directions.

Science

- 6.2.7 Locate information in reference books, back issues of magazine and newspapers, compact disks, and computer databases.
- 6.4.3 Describe some of the great variety of body plans and internal structures animals and plants have that contribute to their being able to make or find food and reproduce.
- 6.4.8 Explain that in all environments, such as freshwater, marine, forest, desert, grassland, mountain, and others, organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter. In any environment, the growth and survival of organisms depend on the physical conditions.
- 6.4.9 Recognize and explain that two types of organisms may interact in a competitive or cooperative relationship, such as predator/prey, producer/consumer, or parasite/host.

