

A World of Feathered Friends

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It is hard to imagine a world without birds. Indeed a world without birds would be hell itself. In the Sixth Book of *The Aeneid* Virgil wrote, “The descent into hell is easy” (“Facilis descensus Averno”). The word for hell, “Averno,” means “a place without birds,” from the Greek *a*, “without,” and *ornis*, “bird.” Avernus, the entrance to hell, was a toxic Italian lake, the fumes from which were said to kill all birds.

- Diana Wells, *100 Birds and How They Got Their Names*

INTRODUCTION

As a child, I would look out our kitchen window and notice the birds that made their homes in our yard and raised their babies in our trees. There were many colorful birds, including cardinals, blue jays, robins, and the occasional hummingbird. I’m not sure if it’s the passing of many years or moving to a larger city, but I rarely, if ever, see beautiful birds now. The birds that visit my school and neighborhood are usually grackles, sparrows, pigeons, and mockingbirds. Where have all the lovely birds gone? I wonder if the colorful birds are still visiting my childhood home or whether the increasing human population is pushing them out of their natural habitats.

As the title suggests, the focus of this unit is birds. Some people are fascinated with birds and enjoy watching them as a hobby. Others view birds as noisy animals that stain their cars and sidewalks. Regardless of personal opinion, one thing is certain: birds are one of the nine animal groups that are vital to our environment. They rid the world of pesky insects, pollinate flowers, spread seeds, and serve as garbage disposals for rotting carcasses. In short, we could not live without them. They are unique creatures that have highly-specialized characteristics that help them survive in many different types of environments. They are worthy of considerable study.

My students are fourth graders in a school where the majority of students are considered at-risk because of low income or limited English proficiency. I have a bilingual class, and the children are all fluent in both English and Spanish. While I hope to address their needs as bilingual speakers, my bigger concern is that they learn to appreciate, preserve, and protect the environment. In terms of how much they know about the environment and how much time they spend outdoors, there is probably little difference between my students and children from wealthier neighborhoods. They all spend less time outdoors than children did a generation ago. Reasons for this change may include lack of safety outside, competition with television and technology, and diminishing natural habitats.

The world is a more dangerous place now than it was when I was a child. Children spend less time outdoors and more time watching TV and playing computer or video games. Gone are the days when children could safely roam the neighborhood until dinnertime. However, even though those carefree days are gone, there are opportunities for exploration and discovery in kids' own backyards. They can dig in the soil for earthworms, examine creepy-crawly insects, notice the scampering of lizards, and ponder the life of the ubiquitous squirrel. Additionally, my students have the added advantage of living near a large park with numerous old trees and attending a school that has a large courtyard. This courtyard is not being used for instructional purposes, due in part to the fact that it has not reached its potential as an attractive habitat for birds. I plan to change that.

One of my basic beliefs about students is that the more they know about something, the more they care. Furthermore, the more they care about something, the more likely they are to take care of it. With this in mind, my hope is that my students will learn to respect the nature around them. This respect is vital because ignorance of surrounding nature can lead to carelessness when curiosity goes awry. A perfect example of this wayward curiosity took place at our school last year when a few students at our school attempted to view some baby birds that were in a nearby tree. Pulling on the branches for a better look, they went too far and the babies fell out. Unfortunately, my efforts to save them were in vain. In order to avoid this tragedy in the future, my unit will provide plenty of opportunities to become well acquainted with the world of feathered creatures, as well as their specific traits. The students' greater understanding will lead to an appreciation and respect for birds on a small scale and life on a larger scale.

Of course, there is also the issue of making learning fun. This unit will be taught during the last month of school, when all testing has been completed. The students will be mentally exhausted and ready for a different and enjoyable kind of challenge. This unit will be the perfect sort of challenge as it is in no way similar to aptitude examinations. These differences are also beneficial because children have different desires, interests, and personalities. Many children thrive in an environment of "reading, writing, and arithmetic;" however, others have a love for the natural world. I have a firm grasp on what interests the Emily Posts and Albert Einsteins in my class, and want to explore what interests the George Washington Carvers and John Audubons. Since this will be a multi-discipline unit, there truly will be something for everyone.

BUILDING HABITATS

Natural Habitats

Attracting birds to our school is the first goal of this unit. There are many ways this can be done, but they generally can be grouped into two categories of habitats – natural and, for lack of a better word, artificial. A natural habitat provides birds with the trees, shrubs, and flowers that they need for survival. Habitats provide birds with an environment

where they use their instincts to search for food and build homes without too much human interference. People have the added benefit of getting to observe birds foraging for food, building nests, and raising their young. The environment will also be replenished by restoring it to a more natural state. By building homes and laying massive amounts of concrete, we have taken away bird's homes. "Because birds are sensitive indicators of the health of our environment, it is likely that a popular commitment to their well-being will lead to a more widespread concern for the quality of the environment on which we and the birds are mutually dependent" (Kress, *Audubon* ix). In essence, when we take care of birds, not only will their lives and the environment be enriched, but so will ours.

Food

Birds need three things to survive – food, water, and shelter. Similar to humans, birds eat a wide variety of foods. They eat nuts, berries, seeds, nectar, plants, earthworms, insects, spiders, small reptiles, amphibians, fish, shellfish, small mammals, and even other birds (Stokes 8). Since birds eat such a wide variety of foods, it will be necessary to plant a wide variety of plants to attract not only the birds, but also the creatures they eat.

Furthermore, it is very important that the yard be organic. Pesticides can harm the birds and even kill the small creatures that they eat. For example, some chemical fertilizers increase the acidity of soil. This increased acidity can lead to the demise of earthworms, a favorite food of robins. On the other hand, organic fertilizers will enrich the soil and keep its pH between six and seven (Stokes 41). One possible activity for the students will be to test the acidity of soil with an inexpensive kit that can be bought at most hardware stores.

Vegetation is also an important aspect of a natural habitat that caters to birds. It will be necessary to find out what is growing at our school. For example, what may look like a patch of brambles and thorns might have a nice meal hidden inside. In addition, rotting trees are a breeding ground for certain types of bugs. Because different birds will be visiting year-round, it will be beneficial to have mixed vegetation that thrives during the different seasons. When choosing plants, we need to be sure that the plants will grow at our school. Each plant is adapted to a certain climate based on the minimum temperature during the coldest season (Stokes 16). Houston is in zone nine, one of the warmest zones in the United States. A map of the zones of the United States is included in Appendix A.

Flowers

Flowers are not only beautiful, but they also provide nectar and seeds, and they attract insects that provide a nutritious meal for birds in the spring when they need to feed their nestlings. The flowers I've listed below will grow in Houston soil:

- Coneflowers - If given enough sun, these perennials grow well in most conditions. They bloom from early summer to the first sign of winter (Roth *Attracting Birds* 82). Coneflowers not only attract goldfinches, sparrows, and buntings (82), they also attract butterflies.
- Zinnias - Zinnias are easy to grow and come in a variety of colors making them an ideal attraction. They are annuals that take 10 to 12 weeks to grow and attract a wide variety of birds, including buntings, cardinals, and hummingbirds (Roth *Backyard Bird* 347).
- Lilies - Lilies are a personal favorite that may not be a bird's first choice but are beautiful and smell lovely. They will attract hummingbirds and small insects that can be eaten by other birds. They are also quite easy to care for and they propagate well.

Shrubs

Shrubs have multiple advantages in that they provide food, shelter, and/or nesting places. There are many beautiful varieties. It would be wise to have at least one type of winter and one type of summer shrub to feed birds year round. I recommend the following because of their ability to grow in all regions of the U.S., especially Houston:

- Honeysuckle - This summer shrub has a beautiful, sweet smell and the flowers that bloom in the summer will attract hummingbirds. Later in the season, they produce berries that are devoured by catbirds, mockingbirds, and other songbirds. When purchasing honeysuckle, it is imperative to get native species like the trumpet honeysuckle because exotic species can wreak havoc on our environment by choking out native species of plants.
- Sumac - This shrub produces pretty little red berries that grow in the winter and attract a large variety of birds. Care must be used as sumacs can take over any open area and become a problem unless they are maintained (Peterson 15).

Trees

Trees provide many necessities for birds – seeds, nuts, berries, insects, as well as shelter and nesting places. Variety is the spice of life when it comes to choosing what to put in our garden. I recommend the following:

- Junipers – Because junipers can grow quite large, they provide shelter at higher and lower elevations. Further, their berries provide a rich source of nourishment during the winter months. These low maintenance evergreens grow well from Zones three to nine (Roth, *Attracting Birds* 153).
- Pines – “Forty-eight species of birds have been recorded feeding on the seeds in the cones, the needles and the resin” (Peterson 15). Need I say more?
- Oaks – Certain species of woodpeckers depend on acorns of oak trees, which can be quite large and provide shelter for many birds (15).

Artificial Habitats

If it is too difficult to provide a completely natural environment, then attracting birds by other means may be good. However, there are drawbacks. For example, hummingbirds cross-pollinate flowers by sticking their beaks into the center of flowers and taking pollen from that flower to other flowers. If the only food source available to them is hummingbird feeders, they are not pollinating flowers. Furthermore, hummingbird feeders that are not cleaned weekly can grow fungus that is very harmful to the birds.

A common problem concerning seed feeders is that the birds come to rely on the seed. If the feeders stop being filled in the winter, the birds can starve. But the verdict is still out.

Feeders reduce the time it takes to find food, and the average meal size (juicy sunflower kernels and suet) is certainly larger than tiny weed seeds or wintering insects dug out of tree bark. Feeders may also reduce the risk of predation, since feeder birds spend less time foraging and have more time to watch for predators. However, these benefits can be offset by more exposure to disease, increased collisions with windows, and greater vulnerability to house cats that may lurk near feeding stations. (Kress “Winter”)

One way that birds benefit the environment is that they spread seeds; if those seeds are not available, new fruit-producing plants are not being created. Finally, birds might get so used to depending on humans to provide food and shelter for them, that they lose their foraging instincts. The best approach to take is to be consistent and knowledgeable. There are many resources for people who care to help birds. Artificial components like birdbaths, birdhouses, and bird feeders can replace what is lacking in the nearby environment and be a real advantage when kept properly. This will certainly be the cheapest and quickest approach to start attracting birds to our school.

Water

Water is necessary for all life, and birds need water to drink and bathe. They are attracted to running water (Roth, *Backyard Bird* 319), so if it is possible to provide a fountain or waterfall in our habitat, that would be ideal. We can start with standard birdbaths. They should be refilled and cleaned every few days, a task for which the students can be responsible. In addition, if there are cats present, placing the birdbath in an open area will make it more difficult for them to sneak up on unsuspecting birds. Furthermore, many birds like to use water at or near ground level. Building small ponds by digging holes in the ground, lining them with plastic, and placing rocks around them to keep the plastic down will be a task the children can attack with relish. When creating our pond, we need to make sure that there is a shallow place less than an inch deep because many birds will not go in water any deeper (320). To make it appear more

natural, rocks can be placed within the pond so that the water barely covers them in order to provide a perch. Water plants can also be placed around the pond.

Birdhouses

Birdhouses provide safe havens for birds at a time when more and more of their habitat is being torn down. While some birds are more agreeable and can find homes just about anywhere, some species are very particular about where they build their homes. The bluebirds' numbers have dwindled greatly over the years because of the loss of their habitat. Nevertheless, it is very easy to attract these birds. They build their nests in hollowed out cavities, but any birdhouse that fits their specification – one with a 1 ½ inch entry hole that is five to ten feet off the ground – will make an inviting home (Roth *Attracting Birds* 40). Other birds need holes of different sizes, making a variety necessary. Some, like the robin, are content to stay in an open home.

Bird Feeders and Feed

There are different kinds of feeders – tubular hanging feeders, ground feeders, platform feeders, etc. The type of feeder that is ideal for our habitat will often depend on the kinds of birds we want to attract. For example, to attract goldfinches, the tubular feeders that are made specifically for them can be purchased at any hardware or pet store. Filled with thistle, it could be the most popular feeder in the neighborhood. It is best to have a variety of feeders placed in several locations so that birds will be less likely to become territorial and chase the other birds off. In addition, it is best to place a feeder away from a glass window due to the fact that birds can become frightened by sudden movement, run into the glass, and likely lose their lives.

When considering what to feed the birds, the most popular birdseed is black oil sunflower seed. This is even more popular than the striped sunflower seed that is often sold in mixed birdseeds. Safflower seed is also becoming more popular. Unshelled peanuts, fruit, and suet, a type of animal fat, are also good for attracting many different kinds of birds. Avoid bread, millet, and cracked corn, as they will attract the less desirable birds.

BIRDWATCHING 101

Once birds are attracted to our lovely habitat, we can observe them. Our school is rectangular-shaped and built around a beautiful, open courtyard that measures approximately 90 feet by 225 feet. Birds can fly in and out, but other animals, such as cats, squirrels, and raccoons, have no entryway. This provides a safe haven for the birds and ensures that their food won't be eaten by these animals. Because the courtyard has windows all around it, it offers a great advantage: the students can observe the birds from inside the building without making their presence known.

When we begin our bird watching, our first task is to make a thematic map to find out what creatures are visiting our school. As a class, we will measure the courtyard and draw maps that are somewhat to scale. The students will then add the plants, trees, and other landmarks that are part of the courtyard. During the course of a week, the children will view our bird visitors at random hours of the day. The children will plot on the class map the number of birds, the different species, and where they were eating. A legend will show the particular species that visit our school. For example, an X could represent the mockingbird. Every time a student sees a mockingbird, they will mark an X at that location of the map. We will use this method to determine the number and types of birds that come to our school during a particular time of the year. Of course, it will also be necessary to know the most common birds in Houston.

Houston Birds

The most common birds in Houston today are not necessarily the most common birds that were here 50, 100, or 200 years ago. It seems to me that the numbers of many birds are in inverse proportion to their popularity. Might we ever consider pigeons desirable if they were as rare as the painted bunting? Would warblers still be considered precious if they were as common as the grackle? Since the birds mentioned below are the ones that are most likely to come to our school, it is imperative that the students know how to identify them. The better they can identify one species through its various traits, the easier it will be to identify the characteristics of other birds in their neighborhood and around the world.

Grackle

The grackle is probably the most common bird to frequent our school, though it won't win a beauty pageant or a singing contest. The male is black, but can have a purple or copper sheen in the light. The female is a dark, dull brown. Both have shiny, yellow eyes, are about twelve inches long, and are known for their long keel-shaped tails (Lindsey 66). They will scavenge for just about anything: worms, snails, and even garbage. Grackles are easy to identify by ear because their call sounds like a squeaky gate. They tend to congregate in large flocks; I have observed as many as 500 at one time. It is best to avoid attracting these birds because they will attack and kill smaller birds and will eat the eggs and chicks right out of the nest (Peterson 58).

European Starling

In 1890, English settlers brought 68 European starlings to New York and let them loose in Central Park. Because of this, there are now believed to be over 200 million starlings in North America (Lindsey 44). From a distance, starlings look like plump grackles with shorter tails and orange feet. In the winter and spring, they develop white speckles on their feathers, thus explaining their name. In the spring and summer, their beaks turn yellow (Robbins 260). They are usually seen in large masses and feel comfortable in big

cities. Native birds are protected by federal law, but introduced species, like the European starling and the house sparrow, are not (Stokes 55). Unfortunately, European starlings take over the habitat of other bird species and are one of the main reasons that bluebird numbers have declined so rapidly.

Sparrow

There are many different species of sparrows, and together, they make up one of the most prevalent birds in America. The overly abundant house sparrow and the rarer Eurasian tree sparrow are invasive species, meaning they were brought from another country. They are classified in a different family than the native species of sparrows. Because it is difficult to distinguish the different species, together they are often referred to as “the little brown birds.” Most are between five and seven inches long. The invasive species of sparrows often nest in cavities that bluebirds, chickadees, and titmice need (Kress, *Audubon* 117).

Domestic Pigeon

Domestic pigeons – the ones you see gathering in parking lots, on trees, and on telephone lines – are officially called rock doves. They have adapted well to city life, so much so that some consider them to be pests. These beautiful birds are plump and can be up to 13 inches long. They have variable plumage, or feathers, but are generally gray or light blue and can have multiple colors around their necks.

Mourning Dove

These gentle creatures are known for their soft, slow “coo coo coo” sound that can be mistaken for the calling of an owl. Their pale, beige bodies are slimmer than the pigeon’s and they have a long, tapered tail. Although the mourning dove is not as common as the pigeon, it is widespread throughout most of the United States.

Mockingbird

Not only is the mockingbird the state bird of Texas, it is also the state bird of Arkansas, Florida, Mississippi, and Tennessee. “Listen to the mockingbird” is a refrain from an old song, and if you have ever heard one sing, you would want to do the same. It is famous for its lovely song, a combination of different tones which may be sung throughout the night. The mockingbird can mimic other birds, dogs, and people. This 10-inch bird is light gray on top and white underneath. The wings are black and have obvious white streaks that can be seen as they fly. Mockingbirds are very brave and may chase away cats and larger birds such as the crow.

AVIAN ANATOMY

To begin this unit, I'd like to start with the simple question, "What is a bird?" All of my students can recognize a bird, but I'm not sure they can provide words or a definition to describe one. Because of this, I plan on beginning with what they already know and gradually shifting to the more complex. So what is a bird? Simply put, all birds have a beak, feathers, wings, and two legs, and they all lay eggs. Beyond that, birds are highly varied. The bee hummingbird, the smallest of all birds, weighs only 0.05 oz – less than some insects. The giant of the bird species, the North African ostrich, can weigh 275 lb – making it nearly 80,000 times heavier than the bee hummingbird (Burnie 8). Yes, birds are truly unique. Some birds don't fly. Some swim. And *many* don't eat worms. The children will break down the anatomy of a bird and look at its individual physical characteristics, including the composition of a feather, the structure of the beak, and the anatomy of the feet. If finances allow, the students can dissect regurgitated owl pellets, which reveal what the owl's last meal was, and put together the bones of the unfortunate prey. For a view of the parts of a bird, look at Appendix B.

On a Wing and a Feather

Every part of a bird except for the beak and usually the feet is covered with feathers – the one feature that distinguishes birds from all other animals. Birds have wings, but so do insects and bats. Birds are warm-blooded, but so are mammals. Birds lay eggs, but so do many other animals. Feathers, however, are one-of-a-kind. If you look at a feather under a microscope, you will see that there are long barbs intertwined with shorter barbules that interlock to keep the feather together. If the feather starts to come apart, the bird will preen the feather by pulling on it with their beak to zip it up. Birds have a special oil gland near the base of their rump that they use to make the feathers waterproof. Many species of birds have the same color plumage in both sexes, but in other species, the males often have more colorful plumage than the females. It is believed that the males use their plumage to attract their mates. Some, like the peacock, have extremely beautiful tail feathers. Females are generally duller because they have to be camouflaged while they sit on their nests protecting the eggs.

Birds' wings are divided into parts. The primary feathers are long and near the end of the wing. These provide most of the lift for flying. The secondary feathers are found on the center of the wing and make the wing curved so the bird can soar. The small tertiary feathers connect the wing with the body making one unbroken connection. Covert feathers near the front of the wing make a sleek, curved edge.

Birds are the masters of flight. Some birds have been known to go days without stopping during migration. Taking off is the hardest part. Some birds, like the sparrow, can take off from a standing start; others, like the gull, may have to get a running start to take off (Arnold 13). Generally, larger birds need more help to get off the ground. When they do fly, they flap less frequently. Large birds, like the vulture, may flap only about

one time each second. Medium-sized birds, like the dove, may flap two or three times a second. Small birds, like chickadees, can flap 30 times per second (14). Some birds are able to harness the power of wind and air currents and sail for long periods of time without flapping. Soaring birds can catch thermals (columns of warm rising air) and circulate upwards without ever having to flap their wings (Burnie 17). The hummingbird is distinct from other birds because it can go forward, backward, sideways, straight up and down, and can hover. These amazing birds can flap 80 times a second, which appears as a blur to the human eye. Despite their small size, hummingbirds are fearless and will chase other birds. There are birds that don't fly at all. The ostrich, kiwi, and emu have wings, but they aren't capable of lifting the bird off the ground. They may use their wings to help them turn as they walk and run. Scientists have calculated that any bird weighing more than 40 lb is incapable of flying. Their muscles would not be big enough to support their weight (Burnie 17). Of course, penguins don't fly but use their wings as paddles for swimming.

Eggs and Nests

One of the things that distinguish the birds' eggs from the eggs of other animals is the hard shell. Because birds are warm-blooded animals, their eggs need to stay warm; therefore, the mother (and sometimes the father) has to sit on the egg. Eggs provide the necessary nutrients and water for the growing chick. They are also semi-porous to allow oxygen to pass through. The albatross has the longest incubation of any bird: the parents sit on the egg for two and a half months (Burnie 51). Eggs come in all shapes, sizes, and colors. The eggs of birds that dwell on cliff edges are pointed on one end and round on the other. This helps prevent the egg from rolling off the cliff. A fun activity to do with the students that demonstrates this is to put an orange and a pear on a table and give them both a push. The orange will roll off, but the pear will go in circles.

Most birds build nests. They may be made of straw, mud, grass, string, leaves, feathers, seeds, hair, and even tin foil (Burnie 44-45). The penguin doesn't build a nest at all: the parents take turns holding the egg between their feet and their blubbery undersides. Many water birds simply push sand, mud, or pebbles into scoop-shaped dwellings to lay their eggs. Some nests are quite simple and some are very complex. West African weaver birds build beautiful nests that resemble hanging baskets. Probably the most unique of them all is the bowerbird from New Guinea. The male builds an elaborate nest that looks like a tent on the ground. It may be up to six feet high. He may paint the inside blue with a mixture of charcoal and berries. He will put a garden in front and decorate it with flowers, berries, and shells (Hornblow 26-29). A few birds don't do any work at all. One is the cowbird, which is considered a parasite. The female closely monitors her surroundings as other birds build nests and deposits her own eggs in them, often destroying some of the host eggs. Some of these birds may recognize that the egg is not theirs and remove it. Many will raise the chicks as their own, often to the detriment on their own offspring.

Beaks

Birds have no teeth, so they rely on their beaks to get food. Beaks come in all different shapes and sizes to allow the birds to get the food they need. Short conical beaks, like that of the cardinal, are good for breaking open seeds. Tubular beaks allow hummingbirds to drink nectar. The flamingo's upside-down beak allows them to filter the water out as it digs for crustaceans in shallow water. Hook-shaped beaks allow raptors, like the falcon, to tear flesh. Long, plunging beaks, like the pelican's, allow it to scoop up water and fish and then drain out the water. Herons have pointed beaks that allow them to stab fish underwater. Appendix C shows how some beaks are used to get food. Beaks are also useful for attracting mates. Many birds have more colorful beaks during mating season. The pelican, for example, has a bright, beautiful outer sheath on its beak in the spring, which it later sheds in the fall. Beaks are also imperative for building nests.

Feet

Birds' feet have many uses: walking, running, swimming, perching, climbing, and catching prey. Robins stomp on the ground to get the worms to rise. The ostrich has been known to use its feet to defend itself; it can kick so hard that it can kill larger animals. Even the blue-footed booby uses its colorful feet to attract a mate. Appendix C shows some pictures of birds' feet and how they are used.

Bird Poop

Yes, that's what it says. I could have written bird excrement or something a little more palatable to an adult, but poop is part of "kidspeak," the language of anyone that is not old enough to drive. Inevitably the question will come up, "Why is bird poop white?" In mammals, the kidneys break down ammonia, a poison, and convert it to urea, a white crystalline powder, which is released through the urine. Birds' kidneys excrete uric acid in the form of a white paste. That, combined with wastes from the colon, is expelled through only one opening, called the cloaca.

When I went on a birding expedition to the wetlands of Anahuac, Texas, I saw large pink and white bird droppings that appeared to have large pieces of crab or crawfish shell mixed within it. Parrots and other domestic birds that eat a lot of greens may expel green droppings. These foods, and other things that the stomach cannot break down, like seed casings, are fiber and pass right through the digestive tract. Not only does the excrement help identify what the bird ate, but it may also provide information about what kind of bird it is.

Droppings can be a problem, though. Large quantities of excrement on power lines can cause the power lines to shut down. Some people fear diseases that the excrement may carry. In addition, it smells and looks bad. It's not all bad news, though. As I

mentioned earlier, the droppings carry seeds from one place to another, sowing new plants. There is another unexpected benefit – fertilizer. Navassa, an unpopulated island off the coast of Haiti, is a virtual gold mine of bird guano, or excrement. In the 19th century, it was mined and used as fertilizer. There was a revolt over poor working conditions, and even the president of the United States had to intervene. The island was nearly forgotten until a few years ago when one enterprising American decided to lay claim to it. He hopes that the current boom in organic farming will increase the need for this kind of fertilizer (Jensen).

IMPLEMENTATION STRATEGIES

Incorporating Many Disciplines

Although the unit generally deals with science, there are multiple disciplines that will be covered. One aspect of science that should be dealt with specifically is classification. The students won't need to know the scientific names of the groups, but they should understand that birds and all living things are grouped by similar characteristics. Geography will also be incorporated, as the students will learn to determine where certain species of birds dwell and label those locations on a world map. Moreover, they should be able to mark the migration patterns on a map. Students will also describe different habitats. In addition, math will be incorporated in our unit by graphing the population of certain species of birds.

Classification

Taxonomy is the system of classifying all living things into groups. Living things are divided into kingdoms, phyla, classes, orders, families, genera, and species. Each group is broken down into a smaller group (each group sharing similar characteristics) until you get to one type that is like no other. This is called the species. I will attempt to explain the groups based on one bird, the American goldfinch, with the name of that group in italics.

- Kingdom – *Animalia* – These are all animals. They live and die, move, grow, reproduce, eat, and get rid of wastes.
- Phylum – *Chordata* – The animals in this phylum all have a backbone. They include mammals, reptiles, amphibians, fish, and birds.
- Class – *Aves* – This class is solely made up of birds.
- Order – *Passeriformes* – This group includes all perching birds. All order names end with – *iformes*.
- Family – *Fringillidae* – These birds have a cone shaped beak that they use to crack open seeds. The names of families end with – *idae*.
- Genus – *Carduelis* – This is a special group of finches with similar characteristics.

- Species – *tristis* – The genus name (always capitalized) and the species name (always in lower case) go together to describe that unique bird. *Carduelis tristis* is the American goldfinch.

The third lesson in the lesson plans provides an activity on classification.

Geography

One of the beautiful things about our avian friends is that they are found throughout the world: from the glaciers in the Antarctic to the hot sands of Africa, and from the mountain peaks of Colorado to the shores of New Zealand. The students will make a world map. On the map they will draw and label birds found at their particular part of the world. There should be at least 10 different birds drawn with at least one for each continent. The students will need to find out how these birds can survive in these extreme environments. For example, they may find out that the penguin has a very thick layer of fat to keep it warm. They may learn that the ostrich flaps its wings over its eggs to keep them from getting too hot.

Over 700 species of birds migrate. The primary purpose for doing so is to get food. Scientists are not exactly sure how birds migrate. Some believe it is due to following the moon, sun, and stars. Others think that birds may follow land formations such as rivers and mountains. Still some think that birds have a magnetic component in their brain that helps guide them. Seldom do birds fly in a straight line. They often fly over the ocean to avoid the strong continental winds. Many never stop to eat. Before their migration, these birds will eat a lot to have a thick layer of fat to keep them nourished on their voyage. The Arctic tern has the longest route; it can fly 12,000 miles from the Arctic to the tip of South America (Arnold 25). The students will trace the migration pattern of one bird and add it to their world map.

Math

Some species of birds, like the whooping crane, are near extinction. Others, like the grackle, are so abundant that they are considered a pest. There is a huge disparity between these numbers. The students should know the difference and a visual would be a great way for them to understand it. Therefore, the students will choose five birds to graph. A bar graph would probably be the easiest for them to do. They may need to use intervals of 100 or 1000 to be able to have the graph fit on one page.

Class Presentations

Once the children have a general understanding of many types of birds, they will be assigned one particular bird to research. The children should be allowed to pick the bird they want to study. No two students can have the same bird, so a first-come, first-served rule will apply. The teacher can suggest birds that represent different habitats, families, and regions of the world. For example, a variety may include the following birds:

penguin, ostrich, hummingbird, cardinal, macaw, eagle, goose, kiwi, stork, dove, and pelican. This way, the students will be learning about all the different kinds of birds.

They will gather data from books and the Internet and present their findings to the class in the form of a visual aid presentation. The students will use a poster board or large paper that measures two by three feet. The first thing that they need to do is draw the bird. The drawing should measure about one foot and have all parts of the bird in correct proportions. Some students may complain that they cannot draw and want their friend to do it for them. This should not be allowed, unless there is a physical disability that prevents them from doing so. The emphasis will not be on making a perfect drawing, but on making the best drawing that a given child can make. The reason for doing an accurate picture is that the child will be forced to really focus on all aspects of the bird. I remember a workshop that I attended which focused on developing creativity in gifted children. We had to copy a drawing with our non-dominant hand. What occurred was that we saw the details of the picture that we may have glossed over otherwise. My students will not have to go to such extremes, but the fact that they will not be drawing in their usual cartoon style will be a challenge for some.

When the drawing is completed, they will fill the poster board with other data that is significant about their species of bird (not about birds in general). For example, they should not say, "Birds lay eggs," but "The kiwi lays the largest egg in comparison to the size of the bird. The egg is one-fourth the weight of the bird." The data can be presented in many ways – prose, tables, graphs, charts, and other pictures.

Their research will culminate in an "interview" between themselves and their bird, focusing on the unique traits and behavior of that bird species. This can be done using a tape-recorded message or with a partner who will play one part of the duo. Much work will go into presenting a conversation that is smooth, interesting, and content rich. There is more information on this in the fourth lesson.

A HOPEFUL CONCLUSION

Before I started studying birds, I was blissfully ignorant. I would enjoy the sweet melody of the birds outside my window on a lovely spring morning and never worry that their lives were so fragile. Now that I am better informed, there is a bit of guilt mixed with this pleasure. I can no longer hear the songs without wondering what part I must play to ensure their survival. If my students share this mixed blessing of great appreciation mingled with the weightiness of responsibility, then I will have done my job.

LESSON PLANS

Lesson One – What Do They Know?

It will be necessary to find out how much the students know about birds. I like to start every new unit with a teaser. This will get their attention because it will be a sort of

contest; children love competition. This will leave no doubt as to what they will be learning.

Materials

Paper and Pencil

Procedure

After the students have gotten out a piece of paper, tell them they will have 10 minutes to write the names of as many different kinds of birds that they can think of. They must write different kinds of birds – not just different species. Therefore, writing golden eagle and American eagle would only count as one: eagle. After the time is up, have them count how many birds they wrote down. The students will probably make errors. So if the teacher wants to give a reward, she should count the answers. The students will call out what they found. There is plenty of praise to go around because most students find at least 10 birds. This exercise reinforces how much they already know and gets them ready for the next lesson.

Lesson Two – Bird Vocabulary

With a bilingual class, I wanted to do an activity that would bring their knowledge of English and Spanish together and give them something they could be fairly successful with at the same time.

Materials

“Birds and Words” list in Appendix D

Glue

Scissors

Construction paper

Procedure

I made a list of 33 birds in both English and Spanish. The words in English are written in plain text and the ones in Spanish are in italics. They are to cut out the words and match them up and glue them on a separate piece of paper. They may work with a partner for about 30 minutes. When they have exhausted their mental resources, they may use a Spanish/English dictionary for another 15 minutes to finish pairing the birds. Often there may be students in a bilingual class who only speak English. These students may be given the same list of words and cut out only the English words. Pictures of various birds copied from the Internet should be provided, and students can match up the words from the list with these pictures.

Lesson Three – Grouping Organisms

It is up to the teacher whether to teach the taxonomy system, but the general purpose of this lesson is to teach the students to be able to group animals – specifically birds – according to their similarities and differences.

Materials

Copies of teacher-made creatures
Glue
Construction paper
Markers

Procedure

The teacher will prepare sketches of creatures that can look either like animals, robots, or space aliens. Make a copy of them for every two students. It really doesn't matter what they look like, but they need to have some features in common and some differences. No two creatures will share the same features. The purpose of this is to be able to classify the creatures according to similarities and differences. Some features of these so-called creatures may include tentacles, horns, hair, number of legs or heads, number of eyes, tails, body shape, and external body patterns. The students are to separate the creatures into two groups, and then separate those into two more groups, etc., until each creature remains alone. These would be considered the species.

Lesson Four – Bird Interview

One of the final products of the unit is an “interview” between the student and the specific bird they have chosen to do their research on. They can do this any way they want as long as the information is disseminated. The information should include the habitat, diet, range, and lifestyle of the bird. Other important features should include how they raise their babies, the population of each bird, and unique characteristics that have helped them adapt to the environment. The following is a sample that I created about the northern eagle owl. Most of the information that I used to create the following interview was found in the book, *Owls*, by Markus Kappeler:

Owl: Whooo! Whooo!

Me: Who is that?

Owl: It's me, Gretchen, the northern eagle owl.

Me: A northern eagle owl. You must be from a northern part of the world.

Owl: Owls, like me, live in Europe, Asia and North Africa, so we are spread over a broad range. Personally, I raise my family in Germany.

Me: Gretchen, I've noticed that you are quite large.

Owl: I am the largest of all the owl species. I have a wing-span of almost six feet.

Me: That's as wide as I am tall. How much do you weigh?

Owl: About four to seven pounds.

Me: That doesn't seem very heavy.

Owl: Well, the bones of most birds are very light because we have to fly. If we weren't, we wouldn't be able to lift off of the ground.

Me: There is an expression: "Wise as an owl." Is it true that owls are really smart?

Owl: People may think we are wise because our eyes are set at the front of our faces like people instead of at the sides of our faces like most birds and animals. Moreover, our eyelids blink downward like yours, instead of upward like some birds. We also rest during the day giving us the appearance of being deep in thought.

Me: That's something that I know about owls. You are nocturnal.

Owl: That's right. We do most of our hunting and activity at night.

Me: I have a lot of trouble seeing at night. How do you do it?

Owl: My large eyes take up about a third of my face. They let in ten to twenty times more light than yours. We also have a milky white flap that closes when we hunt, so we don't have to blink. But our eyes can't roll like yours, so we have to turn our heads in the direction of where we want to look.

Me: That must be why you are always turning your head?

Owl: I can turn my head 270 degrees, that's almost three-fourths of a circle. If I turn my head toward the left, I can almost see over my right shoulder.

Me: Ouch! That must hurt!

Owl: Not really. Owls have twice as many bones, called vertebrae, in our necks than humans do.

Me: Do you hear well?

Owl: Scientists believe we hear better than any other creature. Our ears are set next to our eyes and are part of the facial disk that absorbs sound.

Me: Just the way a TV dish is shaped to absorb signals! You must rely on your good hearing when you hunt.

Owl: Yes! My right ear is actually higher than my left. This helps me pinpoint the location of sounds that I hear.

Me: Do your feathers make a lot of noise when you flap?

Owl: If I made too much noise when I flapped my wings, I would scare off the animal I was trying to catch. My feathers are soft and fluffy and therefore help me to fly almost soundlessly.

Me: Let me see your claws. Wow! They are as big as my hand. They must be great for hunting. What do you catch with your claws?

Owl: Oh, I'm not too picky. There are many things I can catch with these claws. I may grab beetles, frogs, shrews, fish and snakes. I have even been seen catching wildcats and buzzards (Kappeler 19).

Me: I watched a TV special on owls, and I saw one gulp down a whole mouse.

Owl: That's true. We don't chew our food. We swallow the whole thing. Since our stomachs can't digest the bones, hair, feathers, and fur, we have to throw up that part. You could even look at these owl pellets to find out what we eat.

Me: Sounds like a great science experiment! Tell me, Gretchen the northern eagle owl, how many eggs do you lay at one time?

Owl: Between the middle of March and the middle of April I will lay two, three, or four eggs. It takes me two to four days to lay the eggs. My nest is in the hollows of a rocky cliff. I must keep them warm for five weeks before the first one hatches.

Me: That's a long time for a bird!

Owl: Well, it's worth it when you see those cute little faces. When they're ten weeks old, they can fly and join their dad and me on hunting trips. In the fall, they can hunt for themselves and will leave us and take care of themselves.

Me: I'm sure you are wonderful parents! I was wondering how many northern eagle owls there are in the wild.

Owl: Oh, maybe only one or two thousand. In some areas we are extinct because of hunting.

Me: I'm sorry to hear that.

Owl: Conservationists, the people who take care of the environment, have raised several thousand northern eagle owls and set them free.

Me: Well, I hope that helps. Gretchen, it was nice talking to you.

Owl: You too, whoo whoo!

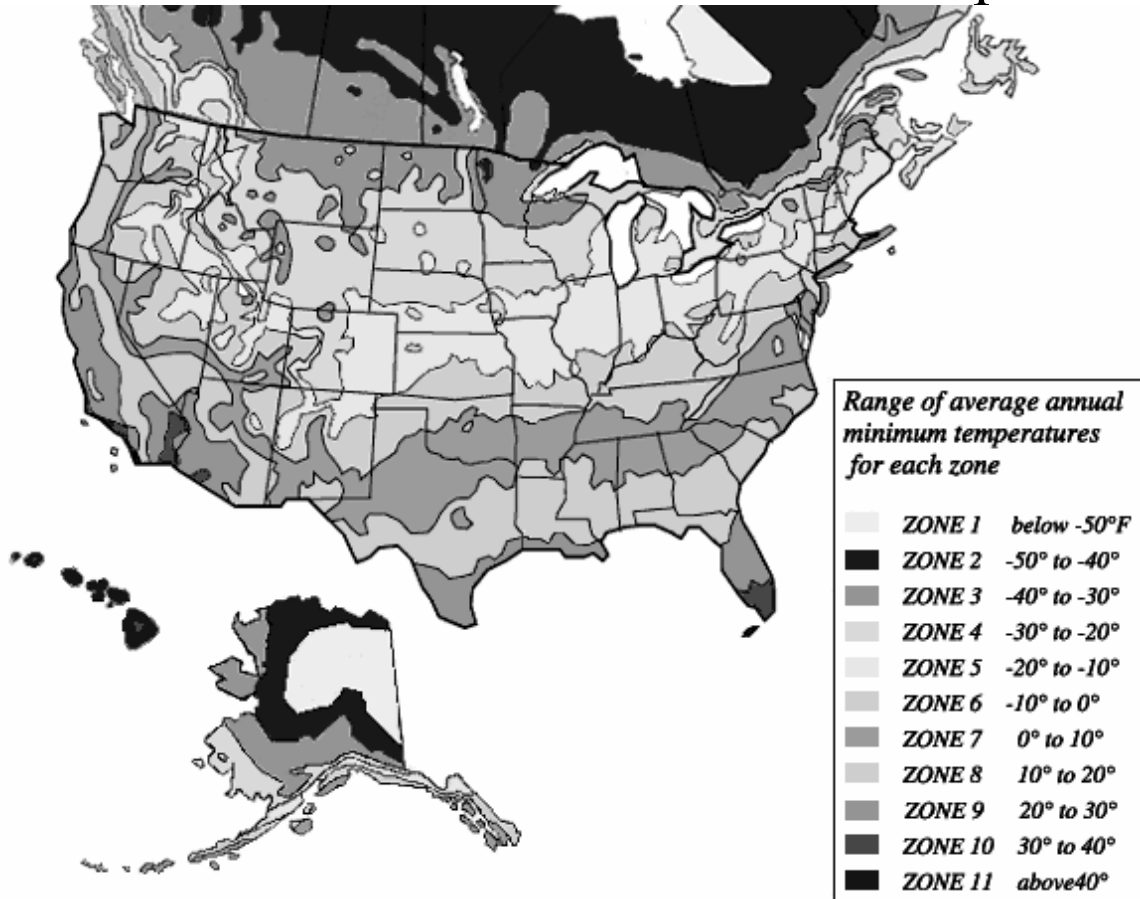
Lesson 5 – Appreciation

The teacher will read the story, *She's Wearing a Dead Bird on Her Head*. This is a true story of two women – Harriet Hemenway and her cousin, Minna Hall – that takes place around the turn of the century. During this time, it was fashionable for women to wear hats decorated with dead birds. Usually the birds were the rarer, more beautiful birds. (I doubt any self-respecting woman wore a grackle on her head!) Harriet and Minna eventually succeeded in helping to end this practice of killing birds for ornamentation and began the Massachusetts Audubon Society.

The reason I chose to read this book is because it is written for elementary-aged children and addresses the issue of how to appreciate and protect birds. It lets the children know that it only takes one or two people to make a difference in bettering society. After the book is read, the class will discuss its significance. Finally, the children will write about what steps they can take to care for the environment, and in particular birds.

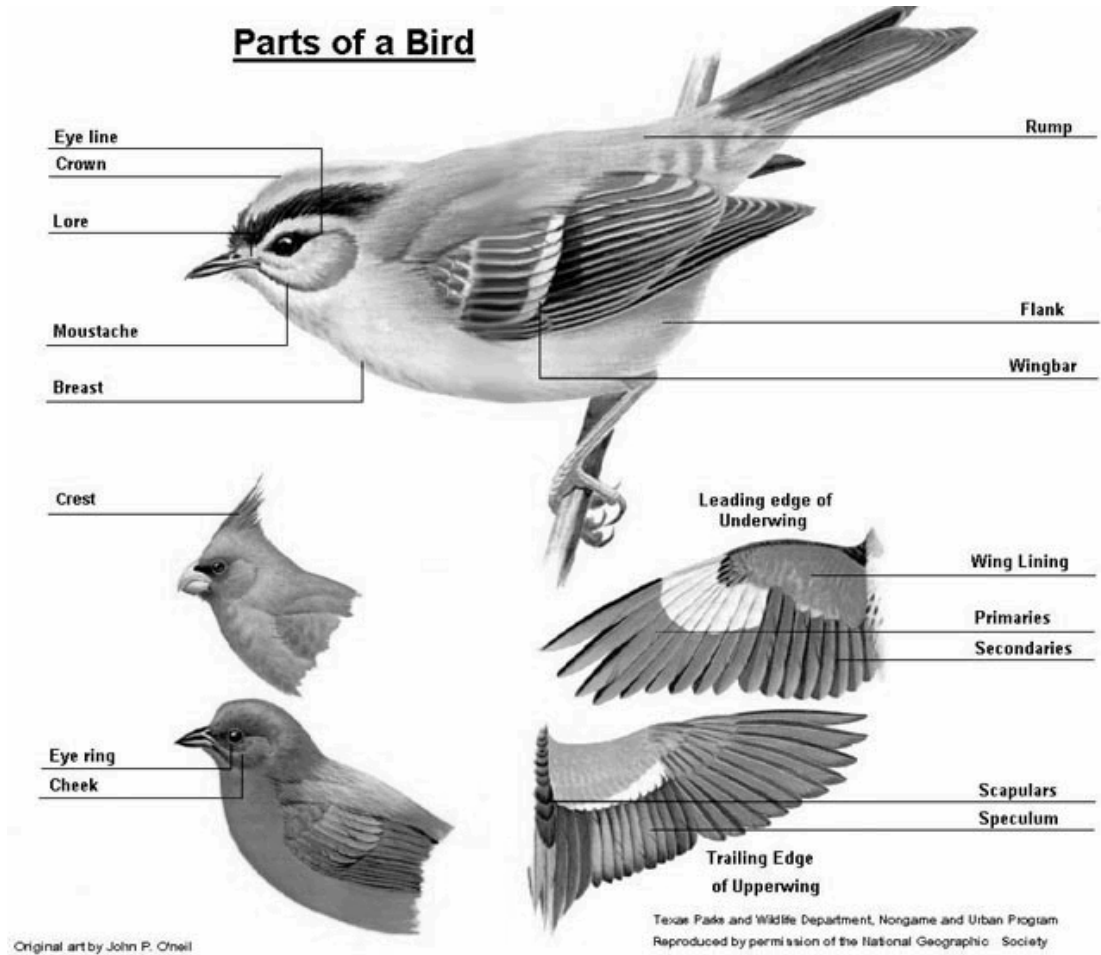
APPENDIX A

USDA Plant Hardiness Zone Map



(From: <http://www.prairiefrontier.com/pages/hardiness/zone.html>)

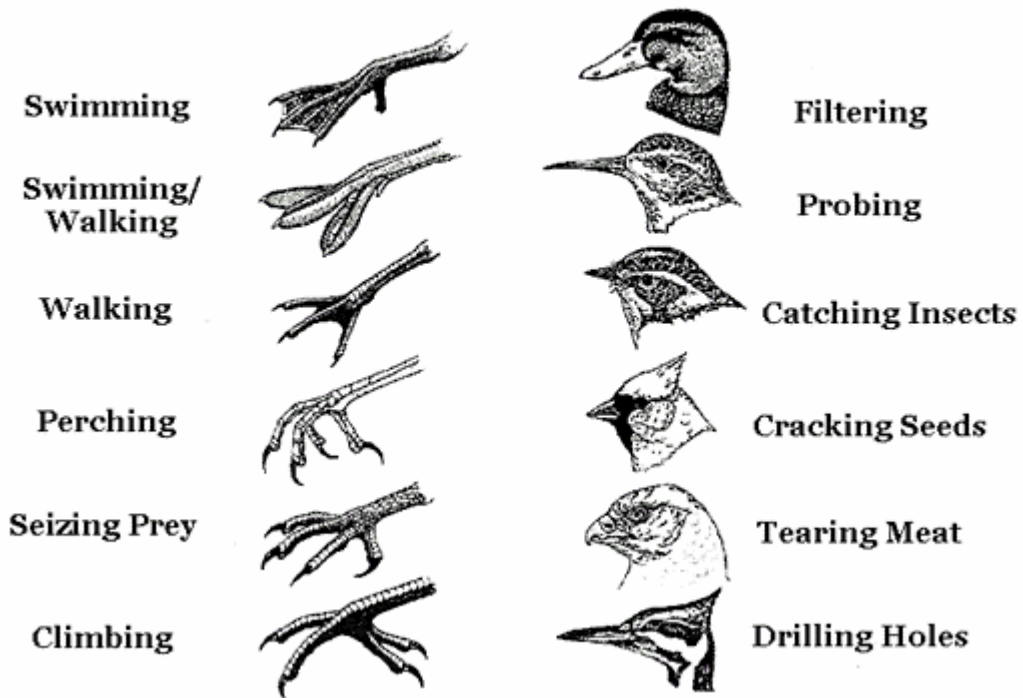
APPENDIX B



(From: <http://www.tpwd.state.tx.us/adv/birding/beginbird/birdpart.htm>)

APPENDIX C

Bird Beaks and Feet



(From: <http://www.tpwd.state.tx.us/adv/birding/beginbird/kidbird.htm>)

APPENDIX D

Birds and Words

| | | |
|-----------------------|-----------------------|------------------------------|
| ostrich | cardinal | crow |
| hawk | grackle | swan |
| duck | goose | chicken |
| rooster | turkey | parrot |
| penguin | stork | emu |
| bluebird | flamingo | peacock |
| woodpecker | pigeon; dove | owl |
| eagle | vulture | sparrow |
| blackbird | mockingbird | roadrunner |
| hummingbird | robin | canary |
| macaw | toucan | bird of paradise |
| <i>àguila</i> | <i>graca</i> | <i>tucàn</i> |
| <i>halcòn</i> | <i>pavo real</i> | <i>gallo</i> |
| <i>guacamayo</i> | <i>sinsonte</i> | <i>bùho ò tecolote</i> |
| <i>avestruz</i> | <i>cardenal</i> | <i>colibri</i> |
| <i>canario</i> | <i>cuerva</i> | <i>carpintero</i> |
| <i>paloma</i> | <i>pato</i> | <i>azulejo</i> |
| <i>emù</i> | <i>cisne</i> | <i>gorriòn</i> |
| <i>buitre</i> | <i>correcaminos</i> | <i>petirrojo</i> |
| <i>mirlo</i> | <i>ganso</i> | <i>pajaro de paraìso</i> |
| <i>arrendajo azul</i> | <i>pavo</i> | <i>ciguena</i> |
| <i>pinguino</i> | <i>loro; papagayo</i> | <i>flamenco</i> |

ANNOTATED BIBLIOGRAPHY

Works Cited

- Arnold, Caroline. *Birds: Nature's Magnificent Flying Machines*. Watertown, MA: Charlesbridge Publishing Co., 2003.
This book deals with the more technical aspects of feathers, wings and flying.
- Burnie, David. *Eyewitness Books: Bird*. New York: Random House, Inc., 1988.
This book has beautiful pictures and text that covers all aspects of birds including their anatomy, flight and food. There is an extensive section on nests and eggs and has wonderful photographs.
- Hornblow, Leonora and Arthur Hornblow. *Birds Do the Strangest Things*. New York: Random House, 1965.
Even though this book is older, it has very interesting information about weird animal characteristics that will be very helpful when the students make their oral presentations
- Jensen, Brennen. "Poop Dreams." *Baltimore City Paper Online* (21 Feb. 2001) 20 June 2004. <<http://www.citypaper.com/news/story.asp?id=3517>>
This article is about an island that is rich in bird excrement and the man who is trying to reclaim the island.
- Kappeler, Markus. *Owls*. Milwaukee, WI: Gareth Steven's Children's Books, 1991.
There is great information on individual species of birds and a world map at the back that shows the location of each. This is a must read!
- Kress, Stephen W. *National Audubon Society Birder's Handbook*. New York: Dorling Kindersley Publishing, Inc., 2000.
This book teaches the amateur bird watcher how to locate, observe, identify, record, photograph, and study birds.
- _____. "The Winter Banquet." *Audubon* (Jan.-Feb. 2000).
Tells the reader how to care for wintering birds.
- Lindsey, Terence. *National Geographic, My First Pocket Guide: Garden Birds*. San Francisco, CA: The National Geographic Society, 2001.
This is a children's version of a bird guidebook. It has nice photos and interesting facts that help with remembering things about the birds.

Peterson, Roger Tory. *Feeder Birds: Eastern North America*. Boston, MA: Houghton Mifflin Company, 2000.

The author explains how to attract and identify backyard birds. There is a field guide with drawings at the back and a section on anatomy.

Robbins, Charles S., Bertel Bruun and Herbert S. Zim. *Birds of North America*. New York: St. Martin's Press, 2001.

This is one of the most popular field guides used by bird watchers, or birders. It is very comprehensive and includes drawings of all species of North American birds. Some special features include sonograms of bird calls and range maps.

Roth, Sally. *Attracting Birds to Your Backyard*. Emmaus, Pennsylvania: Rodale Press, Inc., 1998.

This book has a little bit of everything on attracting birds to your backyard. It is similar to the next book by the same author.

_____. *The Backyard Birdfeeder's Bible*. Emmaus, PA: Rodale Press Inc., 2003.

This is an A-to-Z guide to feeders, seed mixes, projects, and treats. There is also plenty of information on and photos of different kinds of birds.

Stokes, Donald & Lillian. *Stokes Bird Gardening Book*. Boston, MA: Little Brown & Company, 2002.

Here is a complete guide to creating a bird-friendly habitat in your backyard with an emphasis on attracting birds naturally via trees, shrubs, and flowers. There is an ample section in the back with beautiful photos of bird species.

Texas Parks and Wildlife Department. 2004. Texas Parks and Wildlife Department. 16 June 2004. <<http://www.tpwd.state.tx.us>>

This is a great web site, but it is a little difficult to navigate. There is a lot of information on Texas birds. There is also a good children's section.

Wells, Diana. *100 Birds and How They Got Their Names*. Chapel Hill, NC: Algonquin Books of Chapel Hill, 2002.

There is a lot more than the title suggests. This book will provide unique information for the student's presentations.

Children's Resources

Biel, Timothy Levi. *Hummingbird*. Mankato, MN: Creative Education, Inc., 1991.

This book gives a good general overview of hummingbirds. Much attention is given to the flight of the bird and its ability to fly in all directions.

- Brust, Beth Wagner. *Seabirds*. Mankato, MN: Creative Education, Inc., 1990.
I loved the drawings and the text in this book. There is a special emphasis on how seabirds survive in the water. There are activities at the end of the book.
- Collard, Sneed B., III. *Beaks!* Watertown, MA: Charlesbridge Publishing, 2002.
Here is a beautifully illustrated book that describes the function of beaks.
- Elwood, Ann. *Ostriches, Emus, Rheas, Kiwis, & Cassowaries*. Mankato, MN: Creative Education, Inc., 1990.
The five birds listed in the title are all part of the same family. The author describes their similarities and differences. He relates birds and dinosaurs and makes a compelling case for how they may be descendants.
- Gill, Shelley. *The Egg*. Watertown, MA: Charlesbridge Publishing, 2001.
This books gives information on all kinds of eggs and can be used to compare the eggs of birds with those of other animals.
- Goldin, Augusta. *Ducks Don't Get Wet*. New York, NY: Harper & Row Publishers, 1989.
As the title suggests, this book is about how ducks stay dry since they spend most of their time in water. It is a delightful book that is great for young readers or those who are not fluent English speakers.
- Hoffman, Mary. *Bird of Prey*. London: Raintree Steck-Vaughn, 1992.
Many birds are included, such as eagles, ospreys, hawks, falcons, vultures, and secretary birds.
- Lasky, Kathryn. *She's Wearing a Dead Bird on Her Head*. New York: Hyperion Books for Children, 1995.
This true story is about two women who help end the practice of killing birds to place in hats.
- Markert, Jenny. *Penguin*. Chicago, IL: The Children's World, 1991.
A good book for younger children about penguins.
- O'Connor, Karen. *The Feather Book*. Minneapolis, MN: Dillon Press, Inc., 1990.
Older children will enjoy reading this book that gives details about the structure, use, and color of feathers.
- Pallotta, Jerry. *The Bird Alphabet Book*. Watertown, MA: Charlesbridge Publishing, 1986.
This well-illustrated, simple book names at least 26 species of birds.

- Parsons, Alexandra. *Amazing Birds*. London: Dorling Kindersley Limited, 1990.
This book is loaded with interesting facts, photos, and drawings about all kinds of birds.
- Potter, Tessa. *Ducks and Geese*. Austin, TX: National Education Corporation, 1990.
Young children will get information on ducks and geese.
- Serventy, Vincent. *Animals in the Wild: Parrot*. Austin, TX: Raintree Steck-Vaughn, 1992.
Beautiful photographs adorn this book. It deals with a wide variety of parrots, such as the macaw, cockatoo, parakeet, cockatiel, lorikeet, etc.
- _____. *Animals in the Wild: Kookaburra*. Milwaukee, WI: Raintree Publishers, 1989.
The Australian kookaburra is depicted here in photos. This bird's habitat, meals, lifestyle and enemies are all described.
- Wexo, John Bonnett. *Ducks, Geese, and Swans*. Mankato, MN: Creative Education, Inc., 1989.
This book compares ducks, geese, and swans, explains their similarities and differences, and shows how they have adapted to life in water.

â€”The feathered friends, including the water birds, which spend most of their time on the lake inside the zoo, are most vulnerable.â€”
â€”Consistently fill the bird feeder so our feathered friends can count on you for food.â€”
â€”But while most of us settle in, bundle up, or bed down for the winter, a multitude of our fair-weather, feathered friends are already on the wing, making their way to the Neotropics.â€”
â€”This measure would ensure that, for one day a year, the citizens of this great country would extend the hand of friendship to our feathered friends.â€”
â€”As angry as bird lovers might become, they wouldn't shoot at cats with airguns; some defend their feathered friends with nothing more lethal than water pistols.â€”
Feathered Friends is a boutique down specialist birthed out of Seattle's climbing scene in the 1970s, and they still lead the pack in down outerwear construction and design. The company is known for making high-quality, unflashy products for people who use them the most, and the Eos is no exception. On a recent trekking and biking trip through the Peruvian Andes, this lightweight down jacket was the only insulation piece that I brought.â€”
In the world of lightweight down jackets, the Feathered Friends Eos is one of the warmest models per ounce. First, it uses 900-fill power goose down, which along with Montbell's premium offerings, is among the highest on the market. This down has even more loft and warmth for the weight than high-end competitors like the Arc'teryx Cerium LT (850-fill).