4-H Birdwatching Project

Reference Book

March 2012

4-H MOTTO

Learn to do by doing.

4-H PLEDGE

I pledge

My HEAD to clearer thinking,
My HEART to greater loyalty,
My HANDS to larger service,
My HEALTH to better living,
For my club, my community and my country.

4-H GRACE

(Tune of Auld Lang Syne)

We thank thee, Lord, far blessings great
On this, our own fair land.
Teach us to serve thee joyfully,
With head, heart, health and hand.

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Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada
Growing Forward | Cultivons l'avenir
4-H CANADA

TABLE OF CONTENTS

4-H Birdwatching Resource Book: Introduction

OBJECTIVES

Upon successful completion of this project, members should be able to:

- Carefully observe and identify local birds
- Distinguish general types of birds
- Have a basic working knowledge of birds, their habitats, and their biology and ecology
- Understand the roles birds play in the ecosystem
- Understand the relationships (both good and bad) between birds and people
- Show patience when waiting for birds to appear
- Think and plan before going outside to observe wildlife
- Develop skills in observing wildlife in a safe and respectful manner
- Engage with other club members about different types of birds and habitats
- Work cooperatively with others
- Use feedback and advice from other members to enhance their projects
- Have fun while watching birds!

REQUIREMENTS

- Binoculars: a good, basic beginner's pair will do; look for 7, 8, or 10 x 35 power with coated lenses and a comfortable central focus knob
- A good beginner's birdwatching guidebook like "Stokes Beginner's Guide to Birds", or the "Peterson Field Guides". Make sure the book is applicable to the birds in your region before you buy it!
- A journal to keep track of your activities, sightings, and sounds; a small notepad will do.

GETTING THE MOST FROM THIS PROJECT

- Attend club activities regularly
- Listen and ask questions. You will learn from other members as well as your leaders.

- Keep your binoculars with you whenever you can. You never know when you will see an interesting bird!
- Discuss birds and their habits with your friends, family, and fellow club members. Birds are very interesting, so sharing your knowledge and enthusiasm might rub off on others!
- Take note of your surroundings. Some birds are very private and cautious. Be still and patient and you may see some of the more secretive species that not everyone gets to see.
- Practice may not make perfect, but it certainly makes you better. Get out there to a variety of different places with your binoculars, and experiment by trying to identify different birds by their appearance, habitat, or song. "Learn to do by doing"!
- Keep organized notes in a journal about birds you have seen, what they were doing, and in what kinds of areas and habitats you saw them. It might be useful to revisit your journal later.
- Pay attention to other wildlife you see when you are out looking for birds. Because everything in the ecosystem is connected, consider how the habits of other animals affect those of the birds you see.

ACHIEVEMENT REQUIREMENTS FOR THIS PROJECT

- A completed record book.
- A bird feeder that you made out of recycled objects.
- A bird journal with observations, sketches, and lists of birds you've seen and properly identified.
- In-depth knowledge of the appearance and habits of at least 5 bird species.
- In-depth knowledge of the migratory journeys of at least 2 bird species.
- An example of a bird's nest you made yourself, and an explanation of what bird's nest it's modeled on and what it's made of.
- Either a pedestal or hanging birdbath.
- Knowledge of your province's provincial bird and why it was chosen.

- Knowledge of at least one extinct bird species, one endangered bird species, and one threatened bird species, and a list of what you can do to help threatened and endangered birds.
- At least two other projects from the Activity Guide.

SAFETY AND BIRDWATCHING

Birdwatching is fun and easy and can be done anywhere at any time. But before we get to it, there are a few general rules you should always remember. Sometimes you may get so excited about seeing a new bird that you stop thinking about where you are or what is going on around you. Sometimes you may get so wrapped up in what you see in the binoculars that you keep going even though you are tired and hungry. These are the critical times that separate dangerous from safe behaviour.

Think about the places you might go when birdwatching and the hazards associated with them. The following are a few situations that could have been better dealt with. What do you think the best way would have been for preventing them?

- "I see a really neat looking bird sitting on that post in the cattle pen. If I just climb over this fence I could get a better look."
- "That sign says 'No Trespassing' but I swear I saw a bohemian waxwing fly in there. It probably won't matter if I go in just this once."
- "It's starting to get dark out and I know I should head home, but the birds are so active right now."
- "Oh, I think I just saw a rare warbler. I don't need to bring my pack with water and food; I'll just be out for a few minutes."
- "I think I hear a wood thrush singing right beyond this stream but I can't see it. I don't want to risk missing it if I go back to the bridge. That log looks safe, maybe I can walk across it."

I'm pretty sure you understand where I'm going with this: no bird sighting is worth risking life and limb for! You always want to respect all wildlife, habitat, and other people's property, so make sure you remember that you pledged your "head

to clearer thinking" and make smart decisions. The great thing about binoculars is that they give you a close-up view even when you're far away. Use them well and you won't have to take unnecessary risks! Here are a few tips:

- Think and plan before you head out birdwatching and, above all else, you need to make sure that you and anybody with you is safe.
- Always tell someone (preferably an adult) where you're going, when you're leaving, and when you should be back. Consider bringing a friend with you!
- It's VERY important to be respectful of wild places. Try to walk softly. If you are with friends, speak in quiet voices. As with any outdoor activity, it's not ok to leave nature in worse condition than how you found it.
- If you are planning to be out for a while, bring a backpack filled with plenty of water, food, and appropriate clothing (a rain jacket is a good idea!).
- Also consider bringing sunscreen, a first aid kit, a cell phone in case of emergencies, and a map of the area you're heading to (especially if you're unfamiliar with the area).
- Make sure to be aware of your surroundings and ask permission if you want to go on someone else's land. If you don't think you should be going into a given area (because it belongs to someone you don't know) then don't!
- Try not to disturb any wildlife if you can help it. Leave nests alone unless they have been abandoned, don't try to feed birds out of your hand, and never try to handle an injured or abandoned bird. Remember most wildlife will be very scared of you already – there's no need to make things worse! If you do come across an injured or abandoned bird, remember the spot and call your local nature society when you get home. They will know what to do.
- When birdwatching with younger enthusiasts, be sure to set an example and teach them safe and respectful practices, and a respect for nature.

No bird sighting is more important than the safety of people, property, or wildlife!

- Do not endanger yourself, your friends, wildlife, or property when out birdwatching. This is an important responsibility for everyone who wants to enjoy wild places and the wildlife that lives there. If you value nature, you have a responsibility to set a good example for others and treat the great outdoors with the utmost respect.

SAFETY WHILE ONLINE

The Internet is a great resource when you start learning about birds. You might find interesting forums where enthusiasts share sightings, theories, and discuss everything about birds. You may find local birdwatching groups on social media sites like Facebook. These places can be very helpful to you with the activities in this project. Use the following guidelines at all times when online:

- NEVER attach any personal information (names, addresses, phone numbers, date of birth, what school you attend, etc.) to the questions you post online. ALWAYS REMEMBER the person you are talking to in a forum may not be the person they claim to be.
- When using social networking sites like Facebook or MySpace, set your on-line profile to private. That way, only people that will be able to see your profile will be those that you approve. Don't give out your passwords to anyone but your parent or guardian and never meet anyone in person that you just met on these sites.
- If anything happens on-line that makes you feel scared, uncomfortable, or creeped out, ALWAYS tell your parent or guardian. Report any inappropriate comments or messages if they violate the terms of service for that site.

RESOURCES FOR LEARNING

People

- Local birdwatching enthusiasts (they could be your neighbours!)
- Local naturalists and birdwatching guides
- Zookeepers
- Other 4-H members or leaders

Resources

- Books or magazines about birds and birdwatching
- Television shows and documentaries about birds and wildlife
- Websites dedicated to discussing, cataloguing, photographing, and watching birds

Places, Events, and Organizations

- Local birdwatching clubs or nature societies
- Local IBAs (Important Bird Areas) or wildlife refuges
- Cities and towns that have birdwatching events (e.g., the Christmas Bird Count)
- Zoos or nature centres that organize events to educate people about birds and wildlife ecology
- Colleges or universities that offer biology, ornithology, or ecology classes
- Local conservation groups
- National conservation groups (Nature Canada, Bird Studies Canada, BirdLife International, etc.)

WEBSITES

There are many websites where you can find information about the wide variety of birds and their habitats throughout the world. At the end of this manual there is a list of websites you may like to visit, but Google is a great tool for locating any and all websites devoted to birds and the natural world. Just type "birds of Canada" or "birdwatching [your home province]" if you are curious about some of your local birds, or just about anything else. The web is also a great resource for future learning after you have finished this project, to find a group of people who share similar interests, or to find out how you can get involved.

BIRDS: AN INTRODUCTION

Why do we love birds so much? What is it about birds that arouse our curiosity and imagination? Well, they can fly, of course! Who hasn't imagined soaring above the ground, watching as everything grows smaller and smaller, and feeling the wind ripple through their outstretched wings? Everyday we see birds flying around and above us and we marvel at their agility and grace. And who hasn't stopped to listen to beautiful birdsong? Humans aspire to sing like that! Birds are everywhere on earth, from the tallest mountain ranges to the most remote corners of the ocean. Some are huge, like the massive Andean condor, and some are small, like the tiny bee hummingbird. Some are colourful, like the vibrant blue-throated bee-eater, or drabber, like many sparrows. Yet they are all worthy of our interest, study, and respect, and that's what this 4-H project is about!

This project is an introduction to birds and birdwatching, and will help to teach you about the world of birds. From how to find and identify different types of birds, what kind of habitats birds frequent, and what kinds of food they prefer, to how to understand and protect them, this manual should set you on the path to becoming a respectful birdwatcher with an impressive list of sightings. So, grab your binoculars and let's get started!

UNIT 1 - The Basics of Watching Birds

WHAT IS A BIRD?

Of all the animals living today, birds may be the easiest to identify (other than humans, of course!). I bet if I showed you a photo of an animal you could definitely tell me whether or not it's a bird, right? Why is it so easy to recognize birds? Is it because birds have wings and can fly? Maybe, but can you think of any other types of animals that have wings and fly but aren't birds? The two that come to my mind are bats and insects. Bats are mammals, and belong to the same taxonomic group (called a "class") to which humans belong.. Mammals, insects, and birds are all in different classes. Also, not all birds fly. Can you think of a bird that doesn't fly? The bird I'm thinking of has a long neck and lives in Africa: the Ostrich! Ostriches have wings, but they don't fly. So, not all animals that have wings and fly are birds, and not all birds fly.

So, we need to find some other characteristics that help us easily define what makes a bird a bird! What other characteristics do birds have? You're probably saying "feathers", and you're right! This characteristic is probably the most easy to recognize because all birds have feathers. Feathers keep birds warm and protected from the elements and, in many species, it helps make them aerodynamic so they can fly. But are feathers the only characteristic of birds? Can you think of anything else that birds have that other animals don't? Does a bird's mouth look like ours? A bird has a bill (also called a "beak") – do any other living animals have a bill? Nope! So a second characteristic that defines a bird is that they have a bill. There are other characteristics that help define what is and what is not a bird, but the two we've mentioned here are the biggest and easiest to see.

We've already covered a few parts of a bird: wings, feathers, and a bill. Birds also have a head and a tail, just like many other animals. The tail can be really small in some species and can be huge and extravagant in others (ever seen a peacock's tail?!). Birds also have legs and feet that they use for perching, walking, and (in some species) catching prey and even paddling. Just like you, your dog, my cat, and me

birds also have a back, chest, and belly. Knowing these parts of the bird will make recognizing and identifying birds easier because field guides refer to the colour and shape of these parts.

WHAT IS BIRDWATCHING?

If you were asked what birdwatching is, you would probably answer "watching birds" or "looking at birds", right? You would be right…almost! Sure, looking at birds is a huge part of birdwatching, but this doesn't mean that people who lack sight can't be birdwatchers too. In fact, some blind people have developed amazing hearing and "see" birds in a different way: they listen to the sounds birds make. So, birdwatching is probably best defined as *observing* birds, and this can be done in ways other than just looking at them. In addition to observing birds, birdwatchers learn to *identify* birds by group or by species. Whatever senses you use, what's most important is that you develop an *appreciation* for birds, and the best way to do this is to get out there and just start birdwatching! It's easy and fun and you can even birdwatch from your window, but the best part about birdwatching is that you don't need any special equipment. Of course, using tools like an identification guide (book and/or website), binoculars, or a telescope can help you see birds better (and we do recommend that you at least a pair of binoculars for this project), but just by looking and listening, anyone can be a birdwatcher!

WHY BIRDWATCH?

Types of birdwatchers

People birdwatch for three main reasons, and for some people it's a combination of these reasons that draw them to birdwatching. Probably the most popular reason that people birdwatch is for recreation. For the same reasons that you might go to a sports arena to see you favourite team play, go to a concert to see a band perform, or just go for a walk to be outside, some people birdwatch just for fun. In fact, birds can be athletic, exciting, creative, and entertaining (just like people!) and birdwatching can be good exercise. The great thing about birds is that

they can be found all over the world, and different places have different kinds (or "species") of birds. *Recreational birdwatchers* (also called "*birders*") go to different places to see new species, or to see species they already know but experience them in new environments. Recreational birdwatchers enjoy seeing birds anywhere and anytime – even at night!

A second reason that people watch birds is to hunt them. Depending on where you live and who you know, you may not be familiar with bird hunting. In some places, certain types of birds like ducks, geese, grouse, and quail (called "game birds") are allowed to be shot for sport or for food, but only if the hunter has a license. Hunters will often go birdwatching first to find game birds, and many visit several areas regularly to learn how the birds move throughout the day. By better understanding where the birds are and how they act, hunters can improve their rate of success. This manual isn't about hunting birds. For more information about that, search online, or talk to your fellow club members or leader.

A third reason that people birdwatch is to study them scientifically. Some people study birds because they find them interesting and are simply curious. Others study birds to learn more about humans. It may seem weird, but there are several ways that birds are similar to humans, so by studying birds and their behaviour in their natural environments we can learn more about ourselves. The branch of science devoted to studying birds is called "ornithology", and there are many different aspects of birds that ornithologists study. Have you ever wondered how birds fly? Ever been curious about what birds eat? Ever seen a nest and wondered what bird made it? Ever thought about why some birds look colourful and others drab, or wondered why some birds live in cities but other birds don't? Or maybe you've been interested in something else about birds. If you've ever asked yourself *anything* about birds, then you're already on your way to being an ornithologist!

Benefits of birdwatching

Regardless of your reasons for birdwatching, there are several ways that you will benefit from this activity and all these benefits will extend to other parts of your

life. First, birdwatching will teach you to be aware of what's going on around you, and you will learn to be a keen observer of your surroundings. Second, birdwatching will teach you to be patient (we can all use a little help in *that* department!). Third, by watching what birds do in their daily lives, we can learn about ourselves. For example, once you see just how much time and effort it takes to raise a baby bird (called a "chick"), you'll probably appreciate your own parents or caregivers even more! Fourth, birdwatching will help you appreciate the diversity of life on earth. When we observe other life forms (like birds) doing what they do in their natural environment, we better understand them and learn to respect them. Remember, humans are only one piece of nature's puzzle. By looking around and appreciating how many other species we share this earth with, we can learn to get along better with all of them. In return, they'll be happy that we're willing to share our home with them. Enough about the benefits – let's get birdwatching!

HOW TO BIRDWATCH

Stop, look, and listen

The wonderful thing about birds is that they are generally always around. Outside, no matter the temperature or time, birds are likely active somewhere nearby. Sure, just like you, they are less active at night, but there are some birds (just like people) that prefer to sleep during the day and do their activities at night (we call them "nocturnal"). So there really isn't a bad time to go watch birds. Ok, so 2 AM probably isn't a great time to be outside without your parents, so use common sense when birdwatching, but generally if you're birdwatching any time during the day you can't miss!

You can birdwatch from inside, if you don't have access to natural spaces, but your chances of seeing and hearing birds is much better if you go outside and walk around. You can start right in your backyard, outside your building, or at a nearby park. You could also ask your parents, friends, or 4-H Leader to go with you to a place that has very few people or vehicles and is quiet. This will vary depending on where you live. If you live in a small town or in the country, this may be easy to find.

If you live in a bigger town or city, you may need to go to a local park or natural area like a river, but even city streets have birds! Once you've chosen your location, even if that's right outside your front door or from your balcony, plan to be there for at least 15 minutes. Now you're ready to birdwatch!

The basic idea is to observe birds. How do we do that? Just remember to *stop, look,* and *listen*! First, *stop* where you are and *look* around. What do you see? Do you see any movement (other than vehicles, people, and the like)? Many birds are small and blend in really well with their surroundings (how else would they avoid predators?), so look carefully. Birds can fly, so start with the sky! But many birds also walk; so check the ground and any bushes or shrubs. Did you look on rooftops as well as treetops? And of course, don't forget in the trees themselves! If you live near a pond, lake, or ocean did you look at the water's edge as well as offshore? Remember, some birds are really small and can easily fit in the palm of your hand, so make sure you're looking for small things moving around. Sometimes, if you look in one direction and soften your eyes, you may notice tiny movements in the corner of your eye (your "peripheral vision"). Don't forget that many birds are stealthy and don't *want* to be seen. A little patience goes a long way. The whole time you should also *listen* closely. Try to filter out the "normal" noise of the place where you are (cars, planes, water, wind, voices) and listen for bird songs and calls. Calls are frequently heard in fall and winter, and more pleasant sounding songs are generally heard in late spring and summer.

Now that you know how to birdwatch, here are some tips on how to improve your success of seeing and hearing birds. Remember to be stealthy (just like the birds): move slowly, be as quiet as possible, and stay focused! If birds can't see you, they tend to be far less scared. So try to peek out from behind objects (like trees or big rocks) or look through vegetation (like bushes) – that way you'll be more hidden to the birds. Look all around (including behind you!), and look at things for at least a few seconds. If something catches your eye, quickly look at it because it may be moving! And be patient – sometimes the best things come to those who wait!

When and where to birdwatch

The great thing about birdwatching is that you can do it anywhere and anytime! Birds generally move around throughout the day, so sometimes it can take time before they arrive at the place where you're watching. Although there really isn't a bad time to go birdwatching, early morning (just after sunrise) and late afternoon/early evening (just before sunset) are the two best times. Birds move around and sing the most at these times, making it easiest to see and hear them. In the summer, these are also some of the cooler times of the day. When it's hot out, you probably want to relax in the shade, right? Birds are the same: in the middle of a hot day, many birds rest and are much less active. The same goes for bad weather: just as we don't appreciate getting wet or very cold, birds tend to take shelter during bad weather. Night time can be a great time to hear and, if you're lucky, see nocturnal species of birds, like some owls. But as we discussed above, if you're going to be outside after dark, it's best to go with a parent, other adult, or group.

Just like people, birds are often attracted to the things that make their lives easier: food, water, and shelter. So look for areas that have one or more of these elements. Because different bird species eat different things, it's not easy to generalize about what areas will have food for birds. But backyard bird feeders are an obvious food source, so you can be sure that you'll see birds near feeders. Look on the feeder itself, look on the ground under the feeder, and look in the trees and bushes around the feeder. If you don't have a feeder in your yard, ask a neighbour or friend who has one if you can birdwatch in their yard. If you live in a city, you may see people feeding birds in a park; that's a great place to birdwatch. It sounds strange, but municipal landfills often have many birds on and around them (they come to eat the food we throw out), so you could try there too. If you do go to a garbage dump, remember to be careful and aware of your surroundings. People are working with large machinery and some garbage can be dangerous, so ask someone where you can stand at a safe distance.

Birds are often attracted to water sources like creeks, rivers, ponds, and lakes, so looking for birds near water may increase your chances of seeing new

birds. Although some birds will drink from, and bathe in, very shallow water, some won't. But what many birds love is vegetation (bushes and thick trees) in which they can find food and shelter and protection from predators (sometimes called "cover"). When there's water, there's often abundant vegetation (remember plants and insects need water to thrive) and therefore food and cover for birds. Just remember to look carefully along the edge of water because many birds will hide in and amongst the vegetation at the water's edge.

Although water is important, birds live in all sorts of different places, just like people. By visiting a variety of *habitats* – like woodlands and forests, open fields and farms, backyards and gardens, lake and ocean beaches – you will increase your chances or seeing more and different species of birds. There is one other thing that makes birds' lives easier: not being disturbed by people. Although there are some bird species that tolerate human activity well, like the ubiquitous American Robin, many do not. Make sure you try to visit more "natural" places (places with as little human disturbance as possible) because these may be more likely to have a greater diversity of birds.

If there are birds about where you're birdwatching, remember that they will be very cautious and even scared of you (you're very big compared to them!), so it may take time before birds feel comfortable enough to move around freely. Also, some birds are easy to see, but others are not. Only by paying careful attention to all the details of your environment will you see everything that's there. And remember to be patient – it's ok if you don't see many birds. Many factors determine how many birds are present in an area --such as habitat, season, and food availability -- so don't get frustrated. Come back to the same place another day (especially when the weather is better!) and try different places. Remember that even if you don't see a lot of birds, spending time outdoors and getting fresh air is always good for you!

HOW TO USE BINOCULARS

A good set of binoculars is the most important tool to have when you start birdwatching. It can be pretty frustrating if you see a bird in the distance and only have your naked eyes for viewing. Binoculars allow you to see the bird "close-up" without actually disturbing it too much. Don't worry; you don't need the "best of the best" binoculars. A good beginner's pair will do, and you may even be able to borrow a pair from a family member or friend. Binoculars are named by two numbers (for example "8 x 35") that determine their power and brightness. Any pair of binoculars is better than none, but if you are able to choose amongst different types, select binoculars with a first number that is between 7 and 10 and a second number that is between 25 and 50. Pairs with coated lenses and a comfortable central focus are best. You'll be playing with the focus a lot, so you want something that is easy to adjust while you are holding the binoculars up to your eyes. Also consider that a really heavy pair might be uncomfortable for a long day outside birdwatching. Make sure your binoculars have a comfortable strap that can be adjusted so they fit nicely on your chest and are easy to grab in a hurry. Wear the strap either around your neck (for lighter pairs), or over one shoulder and under your arm (for heavier pairs).

Now that you have your binoculars, you will have to adjust them so that the focus is set to your individual eyesight. When looking through properly focused binoculars, it should feel natural and should never feel like it's straining your eyes. Don't force your eyes to focus – that's what the focus knob is for. You want your view through the binoculars to really pop and be vibrantly in focus and clear. To do this, start by following the instructions below:

1) **Begin by putting the binocular strap around your neck.** You don't want to drop your binoculars because the glass inside can shatter and you don't want that! Always keep the strap around your neck so that the binoculars rest on your chest. They will be easily accessible, safe, and keep your hands free for pointing out the birds you spot for your friends and fellow club members!

2) You now need to **adjust the distance between the two barrels of the binoculars** so that your eyes can look comfortably out of both at once. Take the binoculars in both your hands. Feel how you can "flex" the two barrels? If they are too far apart or too close together, you may have black smudges obscuring your view when you look through them. Flex the barrels so that they line up comfortably with your eyes. Although you're looking through two separate lenses, they'll be at the perfect distance when you can see the image as one unobstructed circle (or nearly so).

3) Now you need to **calibrate your binoculars.** This will cater them to your vision – it's like having your own personal fit! Start by finding something to focus on. Find a stationary object that is clear and visible in the distance, but not too far away (around 25 feet is good).

4) **Now look at your binoculars.** See how there's a big knob between the two barrels of the binoculars? This is called the main *focus-adjusting knob*. See how one of the eyepieces (often the right-hand side) has calibration markings on it and is moveable? Good! Now look through the binoculars at the object and close your eye on the side that has the moveable eyepiece. Slowly turn the main focus-adjusting knob in one direction until the object comes into sharp focus. If the knob stops rolling and you still don't have the object in focus, slowly roll it the opposite way until the object comes into focus. Make sure it's really crisp and clear to your eye. Now close your other eye, and open the eye on the side with the moveable eyepiece. Slowly turn the adjustable eyepiece in one direction until the object in that eye comes into sharp focus. If it the eyepiece stops moving and you still don't have the object in focus, slowly move it the opposite way until the object comes into focus. Make sure it's really crisp and clear to your eye.

5) **Open both eyes.** Your view should be perfectly focused. If it isn't, repeat the process above until you can see clearly. Once you can, you've perfectly calibrated your binoculars to your eyes and you're ready to get started!

Caring for your binoculars

The lenses on your binoculars are just like camera lenses. Never touch any of the lenses because you'll leave fingerprints, which will smudge the lens. Lenses are made from very sensitive glass, and if you use the wrong material to clean them (like your t-shirt sleeve), you risk scratching them, which can reduce their clarity significantly. Whether your binoculars cost $50 or $500, if you care for them well, they can last you a very long time. Follow the steps below to clean your binoculars periodically:

1) Use a **soft camera brush or compressed air** (you can find these at camera shops or you may find one stored with your family camera) to gently sweep or blow dust particles away. Like any lens, you don't want to blow the compressed air directly at the lens (this can damage it), blow the air at an angle to the lens. Never use your fingers to brush off dust or dirt from lenses – this can leave permanent scratches!
2) Now use a **soft lens cloth or paper** (also available at camera shops) to gently wipe the lens clean. Make sure you use a material meant specifically for camera or binocular lenses. This will prevent permanent scratching.
3) Now **hold the lenses up to the light** and see if you can see any smudges. If you can, wipe the area with your soft lens material until all the smudges are gone. Now you have perfectly clean lenses and nothing should stand in your way to identifying every bird you see through your binoculars!

UNIT 2: From Egg to Old Age: The Life Cycle of Birds

WHERE DO BIRDS COME FROM AND WHERE DO THEY GO?

Have you ever noticed that there are far fewer birds around in winter than in summer? In summer, the mornings and evenings are filled with bird song, and it seems that trees are overflowing with birds. By the time autumn comes around fewer birds are seen, and by winter the days seem very quiet and birds are seen far less regularly. Once winter ends and it starts getting warmer, more and more birds appear, and then it's back to summer. Why is summer so busy for birds? Where do birds go during winter? What happens in between?

Many birds in North America are *migratory*, which means that they live in one area during the warmer summer months, but then *migrate* (or move) south during autumn to a different area where they spend winter. Once the days start to get longer again and it starts to warm up, the birds migrate back north in spring to return to their summer grounds. In fact, the distance that some birds travel during *migration* can be extraordinary. So, some birds are like world travelers, spending summer and winter in different places that can be far apart. You might know some people who do the same thing. Not all species are migratory though, some are *non-migratory* (also called permanent residents) and spend their summers and winters in the same general area. Regardless of whether or not they migrate, the series of events that occur over a year in the life of a bird (or other animal) is called the *annual cycle* – "annual" because the events take place over roughly one year, and "cycle" because the same pattern of events repeats from year-to-year. Let's find out what birds do throughout the annual cycle!

A YEAR IN THE LIFE OF A BIRD

Let's spend some time with a few birds to see what they do throughout the annual cycle. We'll start in spring because it seems like things really come to life then. Once the weather is warm enough, migratory birds make their journey north and eventually arrive in Canada. At this point, our backyards, forests, and fields are starting to host more and more birds, and there's lots of activity. It seems like all the

birds are excited and getting ready for something, but what is it? In Canada, late spring and summer is the time when birds mate and raise their young, and this is called the *breeding period*. The area where birds eventually settle down to raise their young is called their *breeding grounds*. Several important requirements have to be met during the breeding period in order for birds to successfully raise their young (baby birds). Not all birds meet these requirements every year, so some birds won't raise young in a given year, but if you look around during late spring and summer, you'll see that the majority of birds do. The order in which the first two requirements are met is different between species, but eventually all birds must complete these steps in order to successfully raise their young.

The first requirement is that birds need to find a *mate* – another bird to raise young with. This means that a male needs a female, and a female needs to find a male. There are a few different ways that this can happen, and in some species (like ducks and geese) the process can occur before the birds even arrive on their breeding grounds. For many of the typical birds we see in our backyards and parks, birds find a mate shortly after arriving on the breeding grounds. As we'll learn in Unit 3, both the bird's behaviour and the way it looks to the opposite sex play an important role in how birds find and attract mates.

The second requirement is that birds find a *nesting site* – a safe place to lay and *incubate* eggs (keep them warm), then care for the growing young. The specific details that determine what makes a good quality nesting site differs between species, but generally nesting sites must be hidden enough that predators don't easily find the birds, sheltered enough to keep the birds out of the elements, and near enough food that the parents can provide for themselves and their young. This is like newlyweds choosing a house or apartment in which to live: they want to pick a safe neighbourhood near enough to a store that sells food because they're going to be raising children there (and you know how much you like to eat)! Once birds have selected a good nesting place, they then usually make (or refurbish) a specific structure called a *nest*, which will hold the eggs and eventually the growing young. Nests vary dramatically in size, shape, materials from which they're made, and

placement – all based on species preferences. We'll get into more details about nests in Unit 3.

Once a pair of birds has established a nesting site, they'll mate and, if all goes well, the female will lay eggs. One or both parents will incubate the eggs, and one or both parents will raise the young (more on that in Unit 3). But this can only happen if another requirement of the breeding period is met: the birds must be in good enough *condition* (healthy and fed well enough) to be able to breed. Producing eggs, just like giving birth for other animals, really takes it out of the female! Eggs take a lot of energy to produce, so the female has to be in good condition before she can lay them. In order to get enough energy to produce eggs, the mother has to be well fed. She can feed herself, and her mate can also bring her food, but if food resources aren't plentiful enough at the time, if her mate dies, or if she becomes injured, then she may not be able to lay eggs and will have to wait for next year. But if she is in good enough shape to lay eggs, then it's time to incubate them! Depending on the species, one or both parents will do this, often by taking turns. In most species, the parent uses its body to keep the eggs at a perfect temperature for the chicks to develop inside the eggs. Eventually, after several days to weeks (again, depending on the species), the chicks will hatch. Now things get really busy for the parents!

Just as raising human children is expensive and takes a lot of time, attention, and feeding by parents, it similarly takes a lot of energy and resources to raise young birds. This is the final requirement that must be met in order for birds to raise young: parents must have the skills and ability to feed and protect their chicks until they are big enough to do those things for themselves. This includes keeping the chicks at the perfect temperature, protected from predators, and, above all, well fed. All these activities take energy and cooperation between the parents, and if the parents can't keep up – because one parent dies, or there isn't enough food in the nesting area, or the parents just aren't very good at finding and delivering food to their chicks – then one or more chicks may die. Constantly finding food and delivering it to their growing chicks takes a lot of effort on the part of parents, and this is why birds seem so busy during the summer – because they really are!

Once the chicks are big enough, they leave the nest (called *fledging*). The young birds learn how to find food for themselves, often with the help of parents. But once parents stop feeding the chicks, the chicks are on their own and they have to face the wide, wide world by themselves! Although many birds tend to keep to themselves and their families during breeding, once the breeding period is finished they start forming *flocks* (groups of birds that move around together). You've probably seen small and even large flocks of birds landing or taking off from telephone lines, tree tops, or lawns in yards and parks. If you live near a bigger pond or lake, you may have seen flocks of ducks on the water or flying in the sky in a "V" pattern. Non-migratory species tend to spend winter in the same general area that they spent the breeding period, like magpies or chickadees, but may remain in flocks throughout winter. But as the days start getting shorter, the weather cooler, and late summer approaches, migratory birds are getting ready to make their journey south for the winter.

Migrating birds can spend their winter hundreds to thousands of kilometers south of their breeding ground, depending on the species. Migration can take days to weeks, depending on how far the species migrates. During their trip, migrating birds usually stop to take breaks and refuel – you can imagine that they need it after hours and hours of flying! But some species don't stop while on migration. The record holder is the Bar-tailed Godwit, a shorebird that spends its summers in northern and western Alaska, and then migrates 11,000 km by flying nonstop to parts of Australia and New Zealand. Now that's exhausting! Once they arrive on their *wintering grounds*, migrants go about the daily business of finding food and trying to avoid being eaten by predators. But compared to the tiring migration that they have just completed – and don't forget that adults completed an energetically demanding breeding season before migration – spending winter in a relatively warm climate with no young to take care of must feel like a real holiday! But, like any holiday, eventually the relatively calm winter period ends. Once the days start getting longer again and spring approaches, migratory birds get ready to make the journey north back to their breeding grounds. The non-migratory species that spent the winter up

north are also getting ready for the coming spring. Although they don't have to migrate, they still go through the same changes that prepare them for the upcoming spring and breeding season.

There's one more thing we need to talk about: feathers. Feathers are very similar to our clothes: feathers keep birds protected from the elements, so it's important that birds keep their feathers fresh and in good condition. Day-to-day, birds use their bill to make sure their feathers are clean and in good shape. This is called *preening* and is an important daily activity for birds. You may have seen a bird doing this: the bird ruffles and gently picks at its feathers, it may run a feather or two through its bill, and it generally gets its feathers into the right position. It's like how we might tuck in our shirt, or make sure that our socks are pulled on right, and do our hair – generally birds are trying to keep their feathers clean, comfortable, and looking good. But just like clothing, over the course of a year feathers get dirty, can be torn, and eventually wear out. Because feathers are so important, they need to be replaced at least once a year, depending on the species. Birds replace their feathers by *moulting*, which is a natural regrowth of fresh feathers that replace the old ones. In some, but not all, species this *moult* results in a different "look". We don't wear the same clothes all year, right? When spring and summer comes, we start wearing clothes that are better suited to the season. Many male birds want to look their best during the breeding season, for reasons you'll learn about in Unit 3, and their moult results in brighter, more colourful plumage for breeding. Once breeding is over, then they may moult in more drab browner plumage. Different species have different moult patterns, but it's important to remember that the same bird can look very different depending on when you see it! Your bird guidebook should have photos of birds in both their colourful breeding plumage and their more drab non-breeding plumage.

That completes our year with a bird! I hope you've learned how much a bird does throughout the year, and just how demanding its life can be. Thankfully, birds are well adapted for all these activities. In the next two units, we'll learn more about the skills, behaviours, and features that help birds thrive in the diversity of places where they live!

UNIT 3: Bird Behaviour

Now that you know what birds generally do throughout the year, let's talk about the details. After all, I might describe an average year in your life as "going to school during the fall, winter, and spring, with summers off;" but we both know that your life is way more complex than that, right? It's the same with birds: although their annual cycle is composed of a few phases (breeding, non-breeding and, depending on the species, migration), there's a lot more to their lives if we take the time to look.

COURTSHIP

Not all birds breed every year, and in some species it takes a few years before birds can breed at all. But eventually the time comes when a bird must find a mate and, as you already know, this is a very important part of the breeding season. When humans are looking for a partner with whom to raise children, what kinds of things are important to consider? Do the prospective partners like each other, how good a parent will each partner make, and how well each partner can provide for the kids are all important questions to ask, right? Even before all that, it's important that both people are available ("single"), want kids, and are interested in getting to know each other! Normally, this all happens during *courtship*, but these days we call it "dating". Of course, this type of stuff is much easier for people to work out because they can ask questions of each other. But how do birds figure it out?

Birds also have courtship, but it's not quite like the human version! Although birds can't actually speak to each other, they can communicate important information during courtship through *vocalizations* (songs and calls), the quality and colour of an *ornament* (typically specialized plumage or other structures, such as a rooster's comb), and other behaviours. Depending on the species, birds combine one or more of these into *displays*, which can be pretty elaborate. When it comes to courtship, birds have evolved some really creative ways to impress each other! In many bird species, like those you can probably see in your backyard or local park, it's the female who chooses the male, but this isn't always the case. Just

like in people, there are a number of different ways that birds can get together and raise a family!

You've probably seen American (or Canadian) Idol, right? Ever seen the auditions where some people's singing is just awful but others sing like professionals? The judges use the quality of the singing to determine how well the person might do in the overall competition, and only the best are chosen. In many (but not all) species of birds, the females do the same thing when trying to find a mate. When females arrive on the breeding grounds, they listen to the songs of the males of their own species. The males are trying their hardest to attract a mate, singing their hearts out with the hopes that a female will choose them. This singing isn't just nice to hear; it has the important purpose of communicating to the prospective females, "I'm available to start a family" and shows other males in the area that they're not the only guys in town! Although our ears aren't attuned well enough to hear the subtle differences in the song quality, females can definitely tell that some males sing really well, but others aren't so good. The quality of a male's song communicates to the female how good a mate he might make (how good a dad he's likely to be) and it's the best singers that attract a female and gain the ability to mate with her. Once a female has made up her mind, she lets him know through her behaviour that she has "chosen" him to be her partner. So, in late spring and summer, when you hear all the beautiful bird songs that fill the air, it's like you're listening in on the available males "auditioning" for the prospective females! But, as we'll see in a little bit, the male's song does more than just attract a mate.

Bird song isn't the only way that males can attract a mate, and some birds have pretty boring vocalizations and no real song at all. How do these males communicate to females just how good they are? Some males have showy, striking, or elaborate plumage or other ornaments that look especially handsome in the best quality males. Depending on the species, these can be small or even as big as the overall colour of the entire bird. Every species is different with regards to what looks good – remember that beauty is in the eye of the beholder! In some species, in addition to looking good, the males really know how to show off. A great example of

this is the male Indian Peafowl (you probably know him as a "peacock"), which you may have seen walking around at a local zoo. Not only does his tail look striking, but also the way he holds it up and shakes it and struts around makes for a beautiful display. Although to our eyes all peacocks' displays are gorgeous, the female peafowl can tell that some displays are definitely better looking than others, and the males with the best looking displays are most likely to get a mate. Another example of a display can probably be found closer to your home. If there is a pond, lake, or marshy wetland area nearby, look near the edge for red-winged blackbirds hanging off of tall reeds or rushes. Red-winged blackbirds are quite noisy when they sing, and they love to display their striking red shoulder patches to any females that might be nearby. Once a female has "chosen" her preferred mate, the pair may reaffirm their courtship bonds in some interesting and highly ritualized ways, but this depends on the species. Now, what becomes important for the birds is making sure that no other males try to attract the female or attempt to claim the nesting site.

ESTABLISHING AND MAINTAINING A TERRITORY

Once a breeding pair has selected a nesting site, they want to keep it and don't want other birds taking it over. It's kind of like how people build fences around their yard for privacy, to keep out their neighbours, and to say "this is the boundary of my yard". Similarly, many species of birds maintain and actively defend a *territory* (the birds are called "territorial") that is relatively little in smaller birds, but pretty big in larger birds like eagles. The owner(s) of the territory may patrol to look for potential "problems" like others who want to move in and take over, or predators looking for an easy meal. In many species of songbirds, the songs that males used to attract a female are now used for a different purpose: to advertise ownership of a territory. By singing from various points around and within the territory, a male can signal to other competing males in the area that "this territory is mine". Not all males heed the warning, though, and potential "competitors" are often actively driven away. The same goes for predators – you may have seen smaller birds noisily dive-bombing bigger birds to try to drive them away. These

territorial behaviours allow birds to defend *resources* like their mate, a place for their nest, and (eventually) their young, but also other important resources like food, water, and materials for building a nest. Although the territories of different species may overlap based on their need of different resources, it's by maintaining territories that many birds of the same species can all get along – just like human neighbours!

RAISING YOUNG

The nest is a bird's home and a place to raise young. Some species make their own nests, while other species only use previously made nests, and there are even species that don't really make nests at all; some reuse or refurbish old nests, and others will make a new nest each year they breed. In some species, the males make the nest, in other species it's the females. You've probably learned by now that so many details about birds' lives vary by species! It's these numerous differences that contribute to the amazing diversity of birds we see around the world.

Some species of eagles make their nests from sticks and add more and more each year. After years of additions, these nests can sometimes weigh several hundreds of pounds! Other species called "weavers" literally weave elaborate covered nests using nothing but grass and their bills. Some trees can contain so many weaver nests that they look like apartment buildings! Some species, such as black-capped chickadees and many species of woodpecker, nest in an enclosed space called a *cavity*. Cavities can occur on their own – by the natural rotting of a tree, for example – but some bird species, such as woodpeckers, actually excavate cavities themselves. When soft sand is exposed on the bank of a river or road cut, some species will excavate a cavity in the sand. Many human-made structures provide nice cavities, and species like European starlings and house sparrows are commonly seen in farmyards, towns, and cities flying in and out of small cavities in buildings. People even put up nest boxes to attract cavity nesters. The Peregrine Falcon doesn't even really make a nest; instead, it clears away a bit of the dirt and gravel to make a shallow depression and lays its eggs right on an area of a cliff ledge (called a "scrape")! But the group that takes the prize for the least amount of nest

building is the cuckoos – they lay their eggs in the nests of other species and rely completely on the unwitting hosts to do all the work of raising the young! This may seem lazy to you, or even smart, but it's just another way that evolution has solved the problem of how to raise young.

Once the nest is complete, it's time for the female to lay her eggs. Birds lay from one to over ten eggs, depending on the species, but in general smaller birds lay more eggs and bigger birds lay fewer eggs. A freshly laid egg contains the developing bird embryo and a supply of energy- and nutrient-rich yolk that provides it nourishment. The only thing that's missing: the temperature of the egg needs to be kept just right in order for the bird to develop correctly. In most cases, a parent sitting on the nest with its belly and feathers covering the eggs accomplishes this. The parent's body provides the perfect amount of warmth. But if the birds live in a very hot and sunny place, then the eggs are at risk of overheating, so parents may use their bodies and wings like a sunshade to keep the eggs from getting too hot. This process of ensuring that the temperature of an egg remains just right as it develops is called *incubation*. In some species, both the mother and father will incubate the eggs, in other species just one parent may do this, and in one group of birds (known informally as "mound-builders") neither parent incubates – the eggs are buried and the natural warmth of decomposing vegetation keeps them warm. Depending on the species, incubation can take from under two weeks to over two months – now that's a patient parent!

As any parent can tell you, raising kids is exhausting work! It's the same for birds. Once their young hatch from their eggs, the parent birds have to be especially attentive. Their young, now called *nestlings*, are relatively defenseless and especially vulnerable. Parents must invest a lot of time and effort to making sure that their nestlings are kept well fed, at the right temperature (not too cold, nor too warm), and safe from predators. But parents must also make sure that they themselves stay well fed, healthy, and safe from predators. As you can imagine, a parent that is sick, injured, or starving isn't able to do a very good job as a parent! Despite this, parent birds can take great risks defending their nestlings, sometimes putting themselves

in harm's way to ensure the safety of their young.

Usually, the majority of the parents' time is spent feeding their young. In many species, nestlings can't fly or feed themselves, so they must rely on their parents to bring food to them at the nest. Think about how much effort it takes to fly away from the nest to collect food, then fly back to the nest to deliver that food, only to have to repeat that process over and over for days or weeks – pretty exhausting, right?! In some species, parents fly shorter distances to do this, but for some larger birds parents have to travel far greater distances to collect food. In some seabirds, the parents can travel hundreds of kilometers to find food for their nestlings! In other species, such as ducks and geese, the ducklings are able to move around at a young age, and they leave to the nest to follow their mother on feeding trips.

Regardless of the way the parents help feed their young, the nestlings will depend upon their parents until they are big enough, strong enough, and have learned enough to be self-sufficient. As they start nearing this age, they start to exhibit adult-like characteristics. Depending on the species, nestlings gain the ability to walk, fly, and/or swim; and in all species, they learn to find food for themselves. This doesn't happen overnight; it happens gradually. But in time the nestlings will be ready to leave the nest, a process called *fledging*. Once they do, they are called *fledglings* and, in many species, will continue to be partly dependent upon their parents as they transition to being fully self-sufficient. In some species, the fledglings may linger near the nest and progressively move farther and farther away, but in other species (for example, some seabirds) once the young leave the nest they do not return. Fledglings are kind of like human teenagers: as they become more and more independent, they are around the house less and may only come back to sleep – or may just move out completely!

Eventually, at the end of the breeding season, the parents will fully leave their young to fend for themselves. At this point, adults and their young are in the same boat. Whether or not they migrate, they all have to live somewhere, find

something to eat, and all the while need to avoid being food for some other animal! In the next section, we'll get into where birds live and how they find food.

UNIT 4: Making a Living

ADAPTATIONS

Have you ever wondered why some birds live in some places but not in others? Why don't we see every species of bird in every place we go? Similarly, have you ever wondered why birds don't just eat everything that's available? Why can't a bird eat anything it wants? This is because birds, like every other organism on earth, are *adapted* to their environment. This means that birds (and all other organisms) possess special traits, called *adaptations*, that help them thrive in a particular environment, but those adaptations may not be suited to all environments. To illustrate what I mean, let's consider a made-up analogy using humans. You're from Canada, so you're probably accustomed to cold winters, right? During winter you bundle up, and wearing warmer clothing helps you live comfortably in cold temperatures. Now imagine that you live at the North Pole where it's always really cold. You'd need to wear very warm winter clothes all year round, and by doing so you are able to thrive, but let's say that you could never take off those really warm winter clothes because they're so important that it's like they're a part of you. What would it be like if you took a trip to the desert where daily temperatures are over 40°C? Remember, you can't take off those warm winter clothes! Do you think you'd be happy and able to thrive? I'd bet that you would be really hot and sweaty, you'd get dehydrated, and you may even overheat – that's not what I'd call "thriving"! We could say that you are better adapted to cold temperatures than you are to hot ones, and that your clothes are the adaptations that help you thrive in some, but not all, environments. This is what it's like for birds too, but their adaptations are numerous and diverse and go beyond just being accustomed to temperature, like in our analogy. Some of the most obvious adaptations of birds relate to where birds live and what they eat – what we might call a bird's "lifestyle" – so we'll focus on those because they're what you might see when birdwatching. Recognizing these adaptations will help make you a better birdwatcher because you'll understand why certain birds look the way they do.

SURVIVAL 101

No matter where birds are in the world, they are constantly facing two challenges: they have to live somewhere and they have to find something to eat – two interrelated activities that are essential to survival. You might even say that these are the most important things in life: no matter what happens to us, no matter what we do with our lives, living safely somewhere and finding food are huge priorities, and the same goes for birds. There are many places to live and many things to eat in the world, but only with the appropriate adaptations can birds take advantage of these opportunities. Recognizing and appreciating these adaptations will make birdwatching more enjoyable because you'll be able to understand why birds look the way they do and are found where they are!

The world is full of extreme environments and birds have found ways to adapt to most every place on earth. From the cold of the Arctic and Antarctic, to the extreme heat of the desert, and even living on the open ocean, birds live in an amazing diversity of places. Can you imagine living in the snowy, icy, cold of the Antarctic? What would you eat? Birds such as penguins have cracked the problem by taking to the sea. Their wings act like flippers and their feathers, which are reduced in size and much more bristly than other birds' feathers, trap air to help them stay buoyant and streamlined while swimming. Penguins can't fly, but when they swim underwater it sure looks like flying! These adaptations help them swim fast enough to catch their fast-moving prey underwater.

Moving from an extremely cold environment to an extremely hot one, let's talk about birds that live in the desert. Believe it or not, there is food in the desert, but the heat presents a real problem to birds living there. Remember how we discussed in Unit 3 that nestlings of many species can't fly? Water is often far away in deserts and although parents may be able to fly to get to it, their nestlings cannot. How do parents get their chicks enough water to keep them from overheating? Some species of sandgrouse solve this problem by "carrying" water back their nest. When they fly to waterholes, they dip their belly feathers in the water. These feathers soak up water like a sponge, so when the parents fly back to their nest, they

carry water with them in their feathers. Once back at the nest, their nestlings can actually drink water from the water-soaked feathers – how cool is that?

Some birds live a lot of their life "on the wing", meaning that they are frequently flying or soaring on the wind (not necessarily actively flapping their wings). The prize for "most aerial" bird could easily go to the frigatebirds, a group of several species of seabird. Unlike most seabirds, frigatebirds cannot walk or swim (their feathers aren't waterproof), and they never land on the water, so if they are not perched or on their nest, they are in the air. They catch their food by grabbing it from the surface of the water with their bill, or they harass other seabirds and pirate food from them – this is all done on the wing! In fact, frigatebirds are such efficient flyers that they don't even need to land at night to roost – they can just keep on soaring through the night!

MAKING A LIVING

Although examples of birds living in extreme environments are interesting, we don't have to go so far from home to see how adaptations help birds live and exploit the abundance of food that's around them. One of the most important tools a bird has to help it get food is its bill. For birds, the bill is kind of like a knife, fork, and a grocery bag combined. Imagine if you could only use your mouth to pick an apple from a tree, remove any inedible parts, cut the apple into manageable pieces, and then carry those pieces to your friend. Talk about a mouthful! Not easy, right? Well, that's exactly what many birds have to do in order to feed their nestlings: they can't rely on their feet or their wings, so they have to collect, manipulate, and deliver food to their nest using their bill. There are many types of food available in the environment, and birds have evolved bills to be able to exploit them. When you're out birdwatching, pay special attention to the shape of the bird's bill because it can tell you something about how the bird makes its' living.

Have you ever seen a woodpecker? There are several species of woodpecker that live year-round in Canada. Even if you haven't seen one in real life, you may have heard one, and you probably know how they cling to and use their bill to hammer on trees. Their bills are adapted for chiselling, and they use them to chip

and pry so that they can get to and eat the insects that live in the tree bark and wood. Can you imagine what that must feel like to slam your head into a tree all day? Ouch! Don't worry – woodpeckers have a special skull design that is well adapted to take that kind of force, so they don't hurt themselves. Depending on where you live you may have seen several sizes of woodpecker, each with a different sized bill. The bigger-billed species can chisel out some pretty big holes! This gives the bigger-billed species access to different food than the smaller-billed species. This way, each species finds something different to eat and they can all coexist. When you're birdwatching, keep an eye out for holes in trees that have been excavated by woodpeckers. You may even see another bird living in there!

Warblers are a group of birds that have very thin, delicate bills. Warblers are small songbirds that glean insects from amongst the vegetation of trees and shrubs (and sometimes the ground). You may have seen (or likely heard) the yellow warbler, which is a type of warbler that breeds all across Canada. Because their insect food is pretty soft, all they need to do is catch it, so they don't need a big, heavy bill. The warbler's bill is great for insects and even soft fruits, but can you imagine such a delicate bill cracking open tough seeds? It would probably take days! If a bird wanted to crack seeds, it would need more power and something more like a tiny vice grip, right? The stout, cone-shaped bill of birds like sparrows and finches is adapted for holding and cracking tough seeds. Plus, some seed-eating birds have a specialized tongue that helps them steady and manipulate the seeds to get at the nutritious kernel. Not all seed-eating birds have a conical bill, though. As its name suggests, Clark's Nutcracker, a western Canadian bird related to the crow, has a different approach to cracking into the tough pine nuts that make up the majority of its diet. The nutcracker perches and grasps the nut in its feet, then hammers at it repeatedly using its bill to crack the tough shell. Nutcrackers aren't the only species that use this approach. If you've been watching the birds at your feeder, you've likely seen Black-capped Chickadees taking seeds and flying to a nearby branch to crack into them in a similar way. To help them hold the seed while cracking it, they sometimes even wedge seeds in the bark of a tree. But seeds aren't available all year

in some places. What do non-migratory species that eat seeds do when winter comes? Some species, such as Black-capped Chickadees and Clark's Nutcrackers, have "cracked" this problem by storing extra food, a lot like squirrels do. By making food caches when seeds are plentiful, they use their excellent memory to later recall the locations of the seeds.

Some birds make a living by eating the flesh of other animals and we call this group of birds *raptors* (also "birds of prey"). Birds like eagles, hawks, falcons, owls, and vultures are part of this group. If I asked you to draw an eagle, I'm pretty sure you would draw it with a hooked bill, right? This is a characteristic of raptors because they need a way to tear the tough skin and flesh of the animals they eat. Many species of raptors hunt live prey and so they need to be able to attack, capture, and kill other animals. It's their strong, grasping feet and sharp talons that help them do this, not their hooked bill. Their feet also hold onto their food while they tear at it – kind of like how we use a fork! Some raptors specialize in certain types of food. Ospreys feed almost exclusively on fish, and their feet have an extra rough surface to help them grasp their slippery prey. Vultures are raptors that don't kill their own prey, but instead rely mostly on scavenging recently dead animals (called "carrion"). Because they don't need to attack live prey, their feet lack the grasping strength and their talons aren't as sharp as other raptors'. Vultures "hunt" by soaring around and using their eyesight to spot potential meals. But a few species of vulture, like the Turkey Vulture that we can see in parts of Canada, also have an exceptional sense of smell and can smell carrion from very far away. We tend to avoid smelly things like carrion, but turkey vultures are attracted to the smell – it takes all kinds! Owls are a unique group because beyond specializing on *what* they hunt, many owl species specialize on *when* they hunt. Many owls are *nocturnal*, meaning that they are most active at night. But hunting in the dark is problematic because it's hard to see. Owls have overcome this problem by evolving amazing hearing. They use their extra sensitive ears to listen for the faint sounds their prey make. Owls have specially structured feathers that help reduce the noise they make when flying. Between their hearing and their feathers, they're the nocturnal silent

stalkers of the bird world!

What about birds that drink most of their meals? Hummingbirds have long, thin bills specialized for accessing the sugary nectar found within flowers. If you watch hummingbirds closely for long enough, sometime you can see their long tongue flick out from the end of their bills! What other adaptations do hummingbirds have that help them get to the nectar in delicate flowers? They can hover! Hovering is a special type of flight that helps hummingbirds stay stationary while feeding from flowers. Those little wings flap amazingly fast: many species flap their wings over 20 times per second!

Birds that live on or close to water are called *waterbirds* and they have evolved amazing ways of finding food in and around aquatic environments. One of Canada's most easily recognizable waterbirds is the Common Loon, and if you've ever spent any time near bigger lakes, you've probably seen and heard this symbol of the northern woods. Loons are amazing swimmers and can dive very deep for up to minutes at a time. But rather than using their wings the way penguins do, loons use their feet like paddles to propel them through the water. Their feet are well adapted to swimming because they are webbed, and their legs are placed farther back on the body, which makes them more efficient in the water (the same way a boat engine is placed at the stern of a boat). Unfortunately, this benefit comes at a cost because they're pretty awkward when walking on land!

There are several other groups of waterbirds that have webbed feet. You're probably most familiar with ducks, geese, and swans (collectively called *waterfowl*). They have webbed feet and are also completely at home on water. In fact, even though they nest on land, very soon after hatching young ducklings will follow their mother to water, where they learn to find food by watching their mother and trying things for themselves. Some species of ducks, called *dabbling ducks*, just "tip up" (ducking their heads under the water and tipping their tails into the air) to get at vegetation and small aquatic creatures in shallow waters. Another group, called *diving ducks*, actually dive underwater to find or catch food. Their bills have small serrations that help make sure that slippery fish don't get away. A third group,

called *sea ducks*, are found in marine environments (salt water oceans and seas) during the non-breeding season. Sea ducks dive to find food, and if you live near the ocean, you may be able to see sea ducks bobbing up and down beyond the waves. Other birds, called seabirds, spend their entire lives on or near the ocean. Some seabirds, like albatrosses, spend days at a time at sea collecting food for their nestlings. But once the breeding season is over, these birds spend every day on the open ocean until the next breeding season begins. You may wonder how these birds don't die from dehydration if they only ever drink seawater. They have a special gland that helps remove the salt from their bodies. It's like they have their own built-in desalination unit!

Some of strangest looking bills belong to shorebirds, a group of birds that live along shorelines and wetland areas. Shorebirds feed in very shallow water and exposed mud and soil, where they use their bills to probe for little creatures (like worms) that live below the surface. Some species, such as sandpipers, have shorter bills and they specialize on food that's closer to the surface. Other species have longer bills, which help them poke deeper into the mud to get at different types of food. But some shorebirds, like the Long-billed Curlew, have a very long, curved bill than can be up to 22 cm long! The Long-billed Curlew can really get deep into the mud with that bill! Different bill lengths help shorebirds feed on different types of food, so several different species can all feed at the same place, but on different types of food.

There are so many different types of birds, each with their own unique adaptations that help them thrive in their environment. Next time you're out birdwatching and you see a new bird, remember to pay attention to where the bird is, what it might be eating, and how the shape of its body parts may contribute to how *it* makes a living!

UNIT 5: Birds and Humans

BIRDS IN OUR CHANGING WORLD

You've probably heard a lot these days about climate change, pollution, deforestation and maybe overfishing (if you live near the coast). It seems like you can't watch the news, read a paper, or listen to the radio without seeing or hearing something about "environmental issues". Sometimes it's hard to know what's really going on and it can get a little overwhelming! But we live in a rapidly changing world, and there are some serious problems that humans must face if we want the world we leave to our children to be one that we'd want to live in ourselves. This idea – that it's important to take care of the world so that future generations can enjoy it – is the message of this unit. This unit is about understanding why birds (and by extension other organisms) are valuable –because of how they help humans, but also because of their value outside of what they do for us. But rather than just telling you that you should take care of the world, I want to show you why!

Think about what makes this world so wonderful. Sure, we humans have done a lot of cools things and invented a lot of amazing stuff. But don't forget that we're not the only species on this planet. We share our home with millions of other species, and we can't forget about all our "neighbours". We've talked a lot about birds in these units, and I hope that you look at birds in a different light now – maybe you notice birds more and recognize how they really are all around us. Isn't bird flight amazing? Aren't songbirds great to listen to? Isn't a perched eagle really impressive? Now imagine if all the birds disappeared. Would that make you sad? For a lot of people, it probably would because the world would be a lot duller without birds. But there's more to it than that. There are some very important things that birds do for us humans that you maybe don't know about because they're not so easy to see. In fact, these things are so important that a world without birds would start to look very different indeed.

BIRDS PROVIDE HUMANS WITH IMPORTANT BENEFITS

The natural world works as a system, and each organism – including humans, birds, and every other living creature – plays a role in how that system works. You may have heard the term *ecosystem* before. An ecosystem is an environment made up of all the living organisms and non-living components like rocks and minerals, water, air, sunlight. But when you start removing or changing parts of the ecosystem, it doesn't work the same. For example, when you see a bird snapping up insects, you may not realize just how many insects it eats. Here you are, looking at this one bird and it's eating dozens, maybe even hundreds of insects every day. But for every bird you see, there are many more that you don't see, and each of them is eating a lot of insects – and that's only in the general area where you're standing. Think about how many insects that adds up to across your neighbourhood, town, province, country, and the world. What if those birds weren't around? Imagine how overrun the world would be with insects! That doesn't sound too nice, does it? This example shows how birds benefit humans by keeping populations of insects under control. This is an example of an *ecosystem service* – when some part or process of an ecosystem provides a benefit to humans.

Birds perform several important ecosystem services (though there are many ecosystem services that don't involve birds). One of the biggest ways that birds help humans is to control populations of pest animals. Some species of insects and rodents (such as mice) can infest fields and damage crops and stored grain. These pests cause significant economic losses to farmers by reducing or even ruining their harvest. By eating these pests, birds keep these pests in check, and this helps alleviate the problems with which people have to deal. For example, some raptors eat insects like grasshoppers, and many raptors prey upon rodents such as mice, rats, and rabbits. Rodents such as mice can carry and spread disease through their droppings and bites, so by reducing rodent numbers, birds can also help improve human health. Vultures regularly perform a clean-up service by helping dispose of rotting carcasses.

Birds also provide people with important sources of food. Although you may buy eggs from a store, some people raise their own. In Canada, most of us eat chicken eggs, but duck and goose eggs are also available in some areas. These birds are also eaten as meat, and although many people get their meat from stores, others raise or hunt their own. In some places it is legal to hunt some types of birds (called *game birds*), but only if you have a license. There are many species of game birds, including numerous species of waterfowl and some species of grouse, quail, and partridge. Some people hunt purely for recreation, but others depend on the meat that game birds provide.

The roles that birds play in ecosystems don't always directly benefit people, but instead are indirectly beneficial. How do plants get to be where they grow? They often grow from seeds, right? But how do seeds get transported to different places? Sometimes they fall to the ground or get blown by the wind, but birds also help with this process (called *seed dispersal*). When birds eat fruits with seeds, such as berries, they often don't digest the seeds. Instead, the seeds pass through the bird's digestive system and are expelled with feces and urine (unlike humans, birds have only one opening through which both waste products pass). When the bird eats in once place, but then flies somewhere else, it disperses the seeds! Bird droppings also help fertilize plants because the droppings are high in phosphorus and nitrogen, two nutrients that help plants grow. You probably know that insects like bees and butterflies help pollinate plants, right? Did you know that several species of birds, hummingbirds among them, also help pollinate plants? It's true! Overall, birds play an important role in helping plants thrive all around the world. In return, plants provide birds (and humans) with nutritious products like fruits and seeds, as well as an essential clean air. It's an intricate and important relationship!

Hopefully these examples have shown you just how important birds are in our world. By playing important roles in ecosystems, birds help improve our lives so they deserve our respect. We should really give birds a big "thank you"!

THREATS TO BIRDS AND WHAT YOU CAN DO TO HELP

I'll give you the bad news first. Unfortunately, birds face numerous important threats around the world, and if these issues aren't addressed eventually there won't be any birds left. The good news? All these issues are caused by humans. That may sound like more bad news, but it's actually good news because it means that we can really do something about the problems! In this section, you'll learn about some of the major threats to birds and how you can help improve the situation.

Everybody needs a place to live

The biggest threat facing birds (and all wildlife) today is the loss of their habitat. As the human population gets bigger and bigger, people need places to live and food to eat, and both of these require that land be developed. To make land better for building or growing food, it often has to be converted into a more usable form, which means that most of the trees and other vegetation have to be removed. Although this is good for people because more houses and stores can be built and more food can be grown, this results in *habitat destruction* for many of the birds and other wildlife that live there. In some cases, the habitat isn't completely destroyed, but instead is changed for worse, but not completely. This is called *habitat degradation* and can eventually add up over time to complete destruction.

Although it's relatively easy for people to adapt to new or changing environments, it's much more difficult for birds. They are forced to deal with changes to their habitat and can't speak for themselves, so in most cases they just have to move and try to find new places to live. For many bird species, the increasing degradation or destruction of their habitat over the past few decades has resulted in fewer and fewer individuals surviving – called a *population decline* – because there simply isn't enough land for them and as a result they die. For bird species that have very specific habitat requirements, the situation is worse because finding a new place to live is very difficult or nearly impossible. As a result, their populations decline so badly that the species can become *endangered*, meaning that there are so few individuals of their species left that they are at risk of becoming

extinct. When a species is extinct, there are no more living representatives of that species and it's lost forever. Isn't that sad?

Because habitat destruction is the biggest threat to birds, it's also one of the hardest to combat. Obviously, we can't just stop building new places for people to live and grow food. But we can be smarter about how and where we develop land. If we take into consideration that birds and other wildlife need places to live too, then we can set aside land for *preserves* – protected areas that are deliberately left alone as refuges for wildlife. This kind of action can require whole communities, towns, cities, and even countries to act and can take some time to complete. What can you do now? Although preserving land is best, you can take steps to improve land that has already been degraded. Start in your own backyard! There are many activities in this project that benefit birds. Make your yard a mini-refuge by planting trees, shrubs, bushes, and other plants that wildlife love. Talk to someone at a local greenhouse or nursery about the different kinds of naturally occurring plant species (called *native plants*) in your area. Putting out bird feeders, especially during winter, will give the birds something extra to eat during the coldest months. Providing a birdbath is another great way to improve your local backyard habitat. For those birds that use cavities, installing a nest box or two around your yard will give them a few extras places to live. Remember to always ask for permission before doing any of these things!

Collisions

The next biggest issue facing birds probably isn't one you'd think of immediately as a problem. Have you ever seen or heard a bird hit a window? It probably doesn't seem like it happens too frequently, but in fact *collisions* are the second biggest threat facing birds. Birds collide with all kinds of objects: windows, cars, communication towers, power lines (which can electrocute birds), and others. Windows are especially bad because the reflection in glass looks to birds like a place that they can fly to. When they crash into windows at high enough speeds, birds can knock themselves out or receive fatal internal injuries. There are so many houses and buildings all around the world that have windows – it really adds up. Collisions

account for the deaths of as many as 1 billion birds every year. That's right, 1 billion birds! It's a BIG problem!

Thankfully, it's a little easier for you to do something about the collision problem. Simply closing the drapes, blinds, or other window treatments reduces the reflection and can definitely help. Also, putting something in or on the window, like a decal or even strings or ribbons, can help. By breaking up the reflection in the window, birds may be less likely to want to fly "through" it. If you have bird feeders in your yard, then move your feeder within a few feet of a window so the birds can't fly fast enough into the window, or move feeders far enough away from windows (over 30 feet should work) that birds aren't likely to fly towards a window for safety. These simple and cost-effective preventative measures will help save birds' lives!

Cats

If you have a house cat that goes outside, chances are it has occasionally left little "presents" for you, like a dead bird or mouse. And if you have a cat in your barn, you probably know that it's a pretty good hunter. But did you ever think that cats kill hundreds of millions of birds every year? There are a lot of domestic and feral cats ("feral" means that the cat was born and is living in the wild) in the world, so you can see how they all add up. The best thing you can do to reduce the number of deaths from cats is to keep your cats indoors. Keeping cats indoors is good for the cats too because it reduces the dangers they face such as attack from other animals, poisoning, and being hit by cars. In fact, it's been shown that cats that live indoors live significantly longer than cats that live outdoors. Isn't having your cat around longer reason enough to keep it indoors? Considering it has the added benefit of saving many birds' lives, I think the birds would agree!

Poisoning

You've probably heard of the Exxon Valdez oil spill in Alaska or, more recently, the Deepwater Horizon spill in the Gulf of Mexico (which was almost 20 times greater in volume). You've probably seen the photos and videos of seabirds

covered in oil, and you may even know that when birds (and other animals) consume the oil, it causes some nasty toxic effects. Although isolated incidents like oil spills poison and kill many birds when they occur, there is another bigger and less obvious poisoning problem affecting birds every day, and it's even happening right in our backyards: *pesticides*. Pesticides are poisonous chemicals that humans apply (typically as a spray or a food bait) to kill pest animals like insects and rodents. The problem is that the pesticides affect animals other than the intended target species, and unfortunately birds get caught in the crossfire. Up to 70 million birds die each year as a result of pesticides! In many cases the pesticides kill birds outright, but in other cases the pesticides make the birds sick and weak and unable to breed successfully, which has led to population declines. Weak and sick birds are the ones that predators often kill because they are easier to catch. But when the predator is a raptor, and it eats a bird that is already poisoned by pesticides, then the raptor is also poisoned by the pesticide. That's poisoning two birds with one pesticide, which is twice as bad! Now you can see how so many birds can be affected by pesticides, and they aren't even the intended targets. Doesn't that make you mad?

So what can you do about the pesticide problem? There are three easy steps that you can pass along to your parents, other family members, and friends that use pesticides. First, be sure that there is actually a pest problem. Many people use pesticides as preventative measures without actually having a pest problem. Considering so many birds are vulnerable to pesticides, people should properly identify the pest problem before taking action. Second, know what pesticide is being used. Be sure that the person using the pesticide actually knows what poisons it contains and is aware of the effects to non-target species such as birds. They may be affecting birds and not even know it – maybe if they read the pesticide label carefully and knew it was harmful to birds, they'd be more careful when using it. Third, choose the least toxic (poisonous) option available. There are many solutions to pest problems that don't involve poisonous pesticides. Discussing all the options before using a harmful pesticide is a smart idea.

THE FUTURE OF BIRDS: EVERYONE'S RESPONSIBILITY

Hopefully after finishing this unit you have a better appreciation for how important birds are to us, and you are aware of the major threats facing birds in the world today. Of course, birds don't need to do anything for us to be valuable. Birds are a beautiful and fascinating part of this world and perhaps that's enough of a reason for us to take care of them. But considering how connected we are to birds, it's very important that we think about the future of birds and what role we each should play in that future. This unit discusses some ideas behind *conservation* – the way we think about, use, and protect the natural world, including birds.

How do we balance human needs with those of birds and other wildlife? This is a complex and very personal question! But it's also among the most important questions that humans need to ask themselves. Some people say that wildlife must come first, while other people think that humans must. As we go through life, we'll all have to think about how birds, other wildlife, and the natural world in general fit into our idea of the future. We have to do this because we need to think about how we want to leave the world for generations to come. If we don't think about it now, by the time we do, it may be too late! The threats facing birds and other wildlife are happening now and will only get worse, so the sooner we plan for our collective future, the better!

Here are a few things to consider. First of all, we have to appreciate that the world is not just ours. We humans *share* this planet with birds and many other organisms. When you step outside you can see it: life is everywhere and we humans are only a part of the bigger picture of the natural world. The natural world gives us food to eat, clean air and water, and other resources to improve our lives. Think about the natural world, what it means to you, and how you and other humans affect it. Learn more about the environment and how ecosystems work. Educating yourself and others about the natural world, and how humans fit into it, is the key to helping preserve earth for future generations.

Second, your choices are an essential part of the picture. Whether or not you know it, the decisions you make influence the world and its future – even now. So,

how you value the natural world, and how your choices affect it, matters a great deal! It's your world and your future, so you need to take some responsibility for it. The leaders you elect, the work you decide to do, and even the products you buy all influence our collective future. Choose wisely.

Third, if we decide to not act to help protect other species, eventually we will have to pay a cost for our lack of action. Many species will become endangered, some will go extinct, but eventually habitat loss and other issues we just discussed will touch almost all species – including ourselves. Remember, we're all connected, and plants, animals, and all forms of life play a vital role in keeping our planet (and therefore us) healthy. As more and more parts of earth's ecosystems are affected, the future will become uncertain, but one thing is for sure: it will be difficult (and perhaps impossible) to reverse the damage. As the saying goes, "extinction is forever".

Finally, be positive and proactive. The problems are big, but there is definitely hope! You have access to so much information and unprecedented connections to people all around the world today because of the Internet. This is an amazingly powerful tool, so use it. Recognize that you have the power to change the world, but you have to start with yourself and your community. The famous expression "think globally, act locally" sums it up. Talk to your friends, family, and neighbours. You can also talk to your local government representatives – after all, it's their job to listen to your concerns and do something about it! Start a local club at your school. Do something and get involved! If you don't do it, then who will?

GLOSSARY

Adaptation – special traits or skills, that can be structural, physiological, or behavioural, that help animals thrive in a particular environment

Annual cycle – a pattern of events related to survival and reproduction that takes place over roughly one year and repeats from year-to-year

Behaviour – broadly, anything an animal does that can be observed

Binoculars – a tool consisting of two telescopes mounted side-by-side that allows the viewer to see enlarged images of objects

Bird – technically, a member of class *Aves*; a warm-blooded, two-legged animal, with wings and feathers, that lays eggs

Birders – people who watch birds recreationally; a shortened name for "birdwatchers"

Breeding ground – the geographic area where birds eventually settle down to mate, lay and incubate eggs, and raise young

Breeding period – the time during which birds mate, lay and incubate eggs, and raise young

Carrion – the flesh of a dead animal; typically eaten by scavengers such as vultures

Cavity – an enclosed space used for nesting, such as a hollowed out tree trunk or riverbank, or a crevice in a building

Chick – a baby bird that has hatched from its egg

Collision – the contact of a bird with an object; usually used to refer to cases where a bird flies into an object, or where an object crashes into a bird, often causing harm or death to the bird

Condition – the general state of a bird including its health and nutrition

Conservation – the way we think about, use, and protect the natural world

Courtship – the period when birds find and attract a mate, often involving singing and displays

Cover – vegetation in which birds can find shelter and protection from predators

Displays – combinations of vocalizations, showing off of ornaments, and other behaviours used during courtship (and sometimes also as a warning); can be very elaborate in some bird species

Ecosystem – an environment made up of living (plants, animals, and other organisms) and non-living (rocks and minerals, water, air, sunlight) components

Ecosystem service – a benefit to humans provided by some part or process of an ecosystem

Endangered – populations or species that have so few individuals left that they are in danger of becoming extinct

Extinct – species that no longer have any living representatives left on earth

Feral – a domesticated animal that was born and is living in the wild; different from "stray" which is a domesticated animal that has run away and is living in the wild

Fledging – the process (or time period) when young birds leave the nest; for species that fly, this involves the bird's first flight

Flock – a group of birds; can be all the same species, or two or more different species (called a "mixed flock"); the act of forming and maintaining a flock is called "flocking"

Game birds – birds that are legally allowed to be hunted; populations of game bird species are managed by humans to ensure there are enough to hunt each year

Habitat – a term that describes an environment used by wildlife; includes all natural features such as plants, animals, and non-living components (such as water and rocks); examples include: wetland, alpine, grassland, forest, shoreline, desert

Habitat degradation – the change of a habitat for the worse and typically away from its natural state; over time can add up to habitat destruction

Habitat destruction – the process of destroying natural habitat; typically involves removal of vegetation and loss of many (if not all) of the naturally-occurring wildlife species

Identify – to properly classify (name) an individual or type of bird

Incubate – keeping eggs at the temperature appropriate for development; the act of doing this and the period during which this occurs is called "incubation"

Mate – a bird's partner during breeding; also the act of breeding

Migration – the period when birds that are "migratory" fly from their breeding grounds to their wintering grounds; in Canada, birds fly south during fall and fly north during spring

Moulting – the period(s) when birds naturally replace their feathers

Native plants – plant species that are naturally-occurring in a particular area; these plants are often well-adapted to the local environment

Nest – a structure that will hold a bird's eggs and eventually the growing young (called "nestlings")

Nesting site – the general area where a bird will lay and incubate eggs then care for its growing young; contains the nest

Nestling – a baby bird that has hatched from its egg; similar to "chick" but typically used for species that develop in a nest

Nocturnal – active mostly at night

Ornament – specialized plumage or other structure (such as a rooster's comb) that is used to attract attention, often during courtship

Ornithology – the scientific study of birds

Pesticides – poisonous chemicals that humans use to kill pest animals like insects and rodents

Population decline – a situation where fewer and fewer individuals in a population

successfully survive or reproduce over time, resulting in a shrinking number of individuals

Preserve – protected areas that are deliberately left alone as refuges for wildlife; typically established by communities or governments by legal means

Raptors – flesh-eating birds (also called "birds of prey"); typically have a hooked bill for tearing flesh and strong grasping feet with sharp talons for holding prey; includes hawks, eagles, falcons, owls, vultures, and others

Resources – anything that can be used by a species for its benefit; for birds, this includes things like food, vegetation for cover and nesting areas, materials to construct a nest, water, and even mates.

Scrape – name for the "nest" used by shorebirds and some falcons; typically just a shallow depression that has been cleared of debris, rather than a built nest

Sea ducks – a group of waterfowl species that spend the majority of their non-breeding period at sea

Seed dispersal – the transportation of seeds by gravity, wind, or other means (including animals such as birds)

Songbirds – a diverse and numerous group of bird species that typically have well-developed songs; includes birds like warblers, finches, thrushes, sparrows, magpies, and crows

Territory – an area claimed by an individual and defended against others; often includes important resources

Vocalizations – the sounds that birds produce using their lungs and vocal apparatus (similar to our voice box) to communicate; can be simple calls or more elaborate (and musical) songs

Waterbirds – a group of bird species that live on or close to water

Waterfowl – a specific group of waterbirds that includes ducks, geese, and swans

Wintering grounds – the area used by a species during the non-breeding period; for migratory species, this is a geographically separate area from the breeding grounds

Resources

National Audubon Society: www.audubon.org

American Bird Conservancy: www.abcbird.org

Society of Canadian Ornithologists: www.sco-soc.ca

Nature Canada: www.naturecanada.ca

Bird Studies Canada: www.bsc-eoc.org

Environment Canada: www.ec.gc.ca

BirdLife International: www.birdlife.org

Conservation International: www.conservation.org

A list of websites for regional North American bird organizations:

www.nmnh.si.edu/BIRDNET/ornith/state.html

www.birdingonthe.net

www.bcnature.ca

www.naturealberta.ca

www.naturesask.ca

www.naturemanitoba.ca

www.ontarionature.org

www.naturequebec.org

www.pqspb.org

www.naturepei.ca

www.nsnt.ca