The Cornell Lab of Ornithology

BirdSleuth K–12

Bird Communication

Exploring bird sounds and the meanings behind them.

Welcome to BirdSleuth!

BirdSleuth is a growing series of STEM resources and training opportunities for K-12 educators and students developed at the Cornell Lab of Ornithology. Our kits and free resources focus on participating in the Lab's citizen-science projects, getting outdoors, and doing real science investigations. Please visit www.birdsleuth.org discover the many resources and opportunities we have for you.

Bird Communication **is part of BirdSleuth K-12 suite of educational resources from the Cornell Lab of Ornithology.**

Project Manager: Jennifer Fee
Curriculum Writers: Jennifer Fee, Ileana Betancourt, Anne James-Rosenberg, Barbara Jacobs-Smith

Cover image: USFWS; Joel Trick

If you have questions about the BirdSleuth K-12 curriculum, please contact us.
Email: birdsleuth@cornell.edu ~ Phone: (607) 254-2489 ~ Website: **www.birdsleuth.org**

For additional background information, useful resources, and direct links to the videos described within this unit, please visit: **www.birdsleuth.org/communication.**

The Cornell Lab of Ornithology is a nonprofit membership institution whose mission is to interpret and conserve the earth's biological diversity through research, education, and citizen science focused on birds.

The Cornell Lab of Ornithology

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Introduction to *Bird Communication*

What's in a sound? Why do birds sing? In these activities we will ask you to close your eyes and open your ears – and those of your students – to the world of birds.

Known for their glorious songs and early dawn choruses, birds rely heavily on sound. Whether singing, chirping, squawking, or knocking on wood, sound is a prominent component of bird communication. In these lessons, you will encourage your students to listen to the world around them and begin to make sense of the different sounds they hear. You and your students will discover the meaning and purpose of various bird vocalizations.

Big Idea: Listening carefully outdoors can provide information about what is occurring in nature. It is possible to investigate those sounds to learn more about animal and, specifically, bird communication.

Learning objectives:

Students will be able to

- list at least three functions of bird calls and songs;
- use evidence to evaluate hypotheses about why birds communicate.

Time Needed:

- Activity 1: 15 minutes outside, 15 minutes inside;
- Activity 2: 90 minutes inside

Materials:

- Black-capped Chickadee vocalizations (Song, Foraging Call, Mobbing Call, Territorial Call)
- *BirdTalk* Reports, one per group or student
- Student Journal, copied one per student
- Pencils
- Clipboards

Visit the BirdSleuth website at www.birdsleuth.org/communication to find the Black-capped Chickadee vocalizations needed for Activity 2 and other useful resources.

Background Information

Vocal Communication in Birds: Bird Calls and Songs

Many people enjoy learning the songs of birds in their backyard. Expert birders go even farther, collecting a mental library of bird songs and using them to identify birds. (Legendary birder Ted Parker could identify more than 4,000 species by ear!) Researchers study sounds in detail, trying to understand how – and why – birds developed their effusive communication skills. Many birds communicate vocally, but passerines (a bird of the order Passeriformes, also known as perching birds or songbirds) are the order of birds in which singing is most highly developed. Passerines include about half of all bird species on the planet, with over 5,000 species.

Why do birds sing? And why do they call?

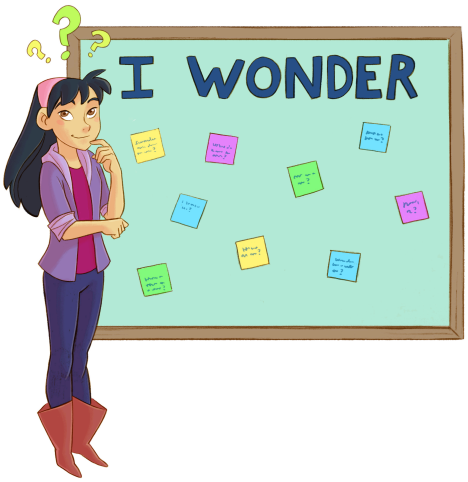
Birds communicate for many reasons, and most songbirds draw on a repertoire, or variety of sounds to convey meaning. We can often differentiate birds' calls and songs by the way they sound. Typical bird communications fall into two main groups and serve different purposes

- **Songs:** are relatively long and elaborate, **are** used to impress and attract a mate, or declare territorial boundaries.
- **Calls are** typically briefer than songs, used to identify family members, announce the presence of a predator, or convey information about food.

The relationship between vocalizations and behavior is fluid. A song or call may relate to more than one behavior, and specific behaviors may be connected to more than one kind of vocalization.

How does a bird learn to communicate?

How does a duckling know how to quack like a duck, or which duck to quack like? Different species learn in surprisingly different ways: some know their songs at birth, some require tutoring; others learn their songs and then improvise to build their repertoires. Others, like the mockingbird, copy nearly anything they hear with hundreds or thousands of variations.

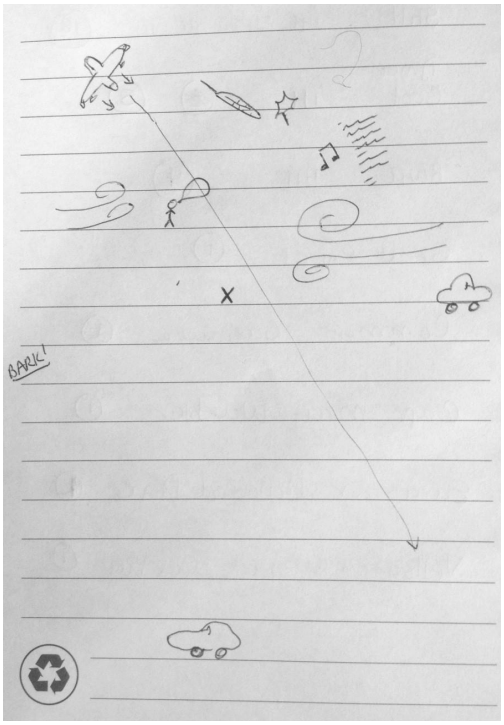


The "I Wonder Board"

We encourage you to keep track of student questions during these activities. Consider creating an "I Wonder Board" in your classroom where students can put questions that arise. Students can also jot their questions in the Student Journal page 6 to later place on the board. At the end of this unit, turn to the "I Wonder Board" to help your class jump into scientific inquiry projects.

For more information about the "I Wonder Board" and support for guiding students through the inquiry process, download BirdSleuth's *Investigating Evidence* curriculum.

Activity 1: Make a Sound map!



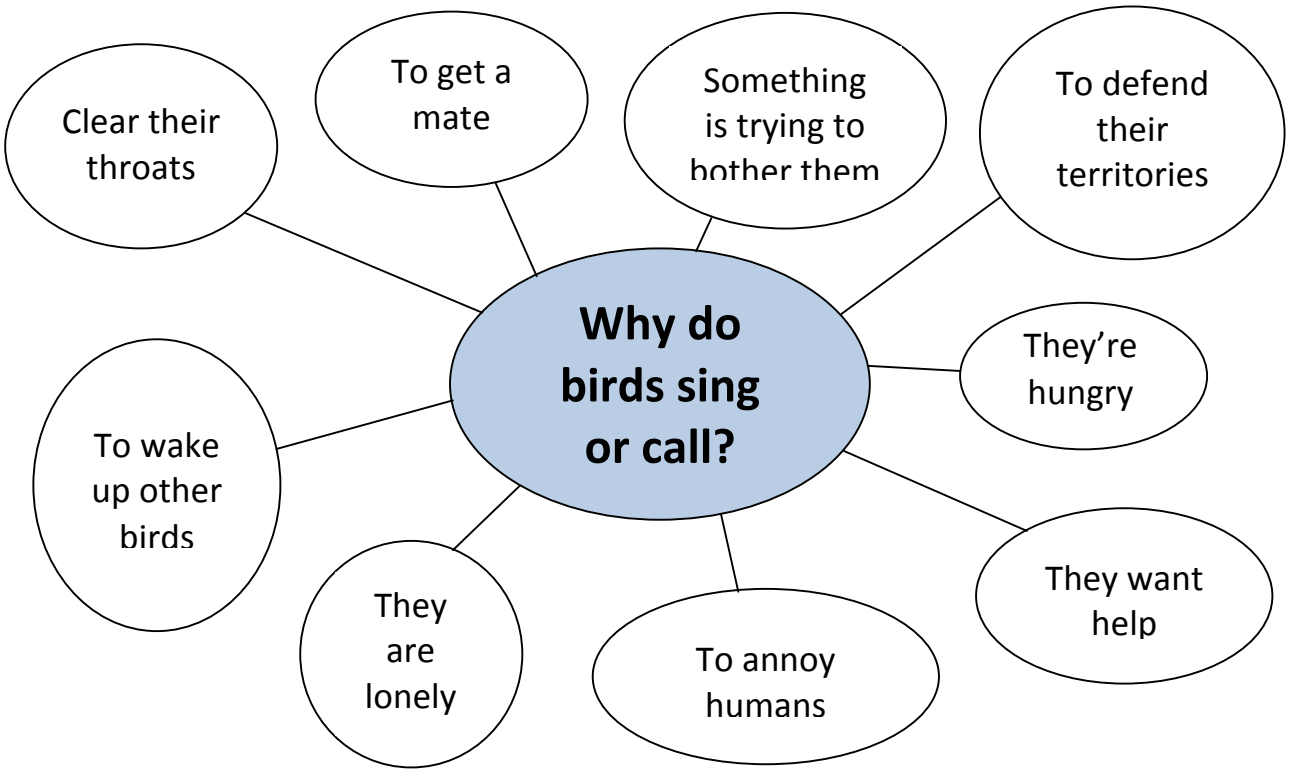
- **Explain** that on Journal page 2 students are going to create a "sound map" of everything they hear. They can make up any symbols they want to illustrate the different sounds they notice: thin curly lines for the "wind," a messy scribble for the loud rumbling of a truck, short lines to represent the sounds of a cricket, a stick figure dog for barking, whatever makes sense to them. Invite students to record the symbols and their meanings in the Map Key area below the map. They are also to indicate the direction and distance of the sounds from their "X" location, if possible.
- **Guide** students outside and have them spread out, at least an arm's distance apart. If conditions allow, have students sit. If not, this can be done standing. Have students turn to the Sound Map page in their Student Journal. The "X" in the middle of their paper indicates their location. They should orient their paper so the top of the page is the direction they are facing.
- **Direct** students to close their eyes and remain as quiet as possible, listening to all the sounds they can hear for about 30 seconds. Now, have them open their eyes, but continue to listen carefully. Every time they hear a sound, they are to draw a symbol or picture on their paper to represent the sound.
- **Gather** the students together after about 5 minutes of listening and drawing to show and discuss their individual sound maps. You can now move indoors, if desired.
- **Discuss** what your sound map can tell you about, 1.) what is around you and, 2.) how well you listened? Ask students: Which noises stood out to you the most? Could you tell the distance of the sounds? How? Were any sounds inviting? Alarming? Surprising? How do the sound maps differ based on your different locations? Did you hear a sound that others couldn't? Were there any unknown sounds? Were there sounds heard from every direction? Why or why not? How many of you heard a bird? If you heard a bird, could you identify it?

Activity 2: Why sing and call?

Now that students are more aware of sounds, explore why birds make sound and what those sounds might mean.

1. **Bird Brainstorm.** Ask students why they think birds might sing or call. Record all answers in a list or graphic organizer on the board under the title, "Why do Birds Sing or Call?" Accept all answers for now.

   One 4th grade class suggested the following reasons:



2. **Explore a Species' Sounds.** Tell students that different bird species make different sounds, and the same species of bird can make many different sounds. Some bird watchers can tell what a bird is doing by the type of sound it makes. Tell your students that you are going to test their ability to identify what a Black-capped Chickadee might be saying just by listening to them.
   - **Play** the four chickadee vocalizations, one at a time, repeating as needed.
   - **Ask** students to guess what the intended message might be.
   - **Discuss:** Why would a species need so many different calls?
3. ***BirdTalk Reports.*** Explain to students that they will read some *BirdTalk Reports* to help them understand the different reasons birds communicate.

- **Read** aloud *BirdTalk* Report #1. Model for the group answering the questions on the *BirdTalk* Report Discussion Sheet starting on Student Journal page 3.
- **Divide** the class into five groups and give each group a copy of one of the remaining five *BirdTalk* Reports.
- **Direct** each group to discuss the function of the bird communication they read about and fill out the corresponding portion of their Discussion Sheet on pages 3 or 4 of their Journal.
- **Gather** together as a class and have each group designate a "reporter" to share their findings, having students fill in the missing information within their journals.

4. **Revisiting the Chickadee.** Students will have the opportunity to re-evaluate the meaning of the Black-capped Chickadee's vocalizations.
   - **Review** with students the different sounds birds can make and their purposes from the BirdTalk Reports information (*to attract a mate, to establish and protect territory, to keep in contact, announce danger, to identify family members, to convey information about food*) and the difference between a call and a song. (see Background Information)
   - **Play** the Chickadee vocalizations, one at a time, repeating as needed. Have students write on page 5 of their Journal, what they now think the message might be.
   - **Discuss** as a group, asking: Why do you think the Chickadees are singing or calling? Based on what you now know from the *BirdTalk* Reports, how would you classify the chickadee calls? Why? What about the vocalization made you feel that way? What did the Black-capped Chickadee sounds make you think about?
   - **Share** the meaning of each vocalization.
     1. *The first sound was a chickadee **singing to a potential mate**.*
     2. *The second sound was a **contact call**, the simple chipping of a chickadee foraging in the forest with other birds.*
     3. *The third sound was the chickadee's **danger or alarm call** when a predator is nearby.*
     4. *The final sound was the territorial "chick-a-dee-dee-dee" sound that the bird calls **to mark and defend its territory**.* Teacher Note: As mentioned in the background information, the meaning of many calls changes depending on the context and behavior of the bird. The "chick-a-dee-dee-dee" call is particularly dynamic and, while often territorial, can also be an alarm or contact call. Depending on your students it may be useful to simplify this call as territorial or to discuss what situations might change the meaning of the call.

5. **Pulling it Together.** Revisit and re-evaluate the "Why do Birds Sing and Call?" list that students generated earlier, adding any additional ideas to the list and removing any that no longer seem valid or accurate based on what has been learned.

   Teacher Tip: Re-evaluating the "Why do Birds Sing and Call?" List
   The *BirdTalk* Reports do not describe every reason for or nuance of bird communication, but some of the ideas your students came up with just may be wrong. When the fourth

grade class mentioned previously re-evaluated the list they made, they decided that birds do not call to "annoy humans" or to "clear their throats."

It also may be that some re-phrasing or re-defining of students' initial ideas will help to fit what they first thought with what students now understand. The fourth graders above further refined their ideas and decided that the "lonely" bird might be calling for a mate, and that the calls "for help" or "being bothered" might be better classified as alarm calls.

6. "**Think on Your Own**" Ask students to think about how the life of a deaf bird would be different from that of a bird that can hear. What would be the hardest part? Would it be possible for a deaf bird to survive?

   (*Songbirds depend on hearing to learn their mating songs—males that sing poorly don't attract mates, so hearing a song, learning it, and singing correctly are all critical for songbird survival. A deaf bird would be at a great disadvantage in nature and, even if it survived to become mature for breeding, it is doubtful if successful nesting could be accomplished. A male could not sing a developed territorial song and a deaf female could not respond to a male's song invitation for mating.*)

Inquiry Alert!
Students are often fascinated by questions such as whether a deaf bird could survive and how humans can help injured birds. Invariably, they will ask questions about these topics after completing the "Think on Your Own" activity. Remember to record any bird-related questions that have been asked or written at the back of the Student Journals are placed on the "I Wonder Board!"

Visit the BirdSleuth website at www.birdsleuth.org/communication to find ideas for going further.

BirdTalk: Report 1

Love is in the Air

One very important function of bird song is to attract a mate. Usually, it is the male bird that sings, starting in the spring, and he will repeat his song until he pairs with a female. Even after they pair up, the male may continue to sing throughout the summer as a way of maintaining the bond with his mate.

Many males showcase their vocal talents by singing their longest and most complex songs in the early morning. In spring, the early morning hours around sunrise are filled with a "dawn chorus" of songs made by many different bird species, such as the Song Sparrow.

Singing is an important clue to a female bird looking for a potential mate. If a male bird has enough energy to sing a long, loud, complicated song after a night without food, he must be strong and healthy, and live in a good territory. This is what the female birds are looking for in a mate. They may listen to many songs and visit several territories before choosing a mate.

This Song Sparrow sings loudly on his perch to attract a mate.

Photo by Felicity Dawn

BirdTalk: Report 2

Keep Off My Turf!

During the breeding season, most birds need a home base, or "territory." This is where they will find food, and a place to nest and raise their young. In order to protect their nests and food resources from other birds of the same species, males use song to set up and keep their territory. Birds like this Northern Mockingbird sing from an open perch as a way of saying "Keep Out!" to other birds of the same species.

Some birds, such as woodpeckers, use non-vocal sounds to defend their territory. In the forest, woodpeckers drum on dead trees and hollow logs to announce themselves to other birds. In towns, they will sometimes choose metal road signs, rain gutters, and even trashcans to loudly project their message!

Northern Mockingbird at his perch.

Photo by Mike Baird

BirdTalk: Report 3

Listen Up!

Many birds make sounds during flight. These "flight calls" are thought to help birds keep in contact with each other. They may also be a kind of "air-traffic control" so the birds don't crash into each other.

A good time to hear a lot of flight calls is at night when birds are migrating. Twice a year, millions of birds migrate between their winter and summer homes. People on the ground can hear these calls—*phew, wheeer, pink, zeep*—if they go to a quiet place and listen carefully. But keep in mind that many of these night-migrating birds sound like insects, frogs, or even cats!

Next time you are out on a quiet fall or spring night, listen up! You may hear the voices of many birds letting each other know where they are in the night sky.

The Swainson's Thrush is one of many bird species that make flight calls during night migration.

Photo by David Mitchell

BirdTalk: Report 4

Watch Out!

Some birds, like the Spotted Redshank, are known as 'sentinel' species. Sentinel means "one that watches or guards."

The Spotted Redshank is found in wetlands and coastal marshes, and it is often the first species to spot danger and sound an alarm call. This call is shrill and loud, and is part of the birds' strategy for avoiding predators. Birds of other species know that the alarm call means "danger!" and they soon follow with a loud chorus of concern. In the confusion, a predator might be distracted and have trouble hunting for its meal.

Some common bird species that you might hear acting as sentinels are American Crows, Blue Jays, and Steller's Jays. Listen for their alarm calls the next time you are out in your schoolyard or neighborhood!

This Spotted Redshank will make a loud call when it sees a predator, warning other birds of the danger.

Photo by Ian A. Kirk

BirdTalk: Report 5

I’m here! Where are you?

In winter, some birds like Downy Woodpeckers travel and forage (look for food) together in flocks with other bird species, such as chickadees and titmice. These mixed-species flocks can often be seen in schoolyards and neighborhood parks, as well as around feeders.

The birds moving in these flocks make short, high-pitched "chips," or call notes, which might sound like a single cricket chirp. Call notes probably communicate a number of things. We can imagine birds using them to say to each other: “Where are you?” “Here I am,” and “Got anything good?” “Yeah, a whole bunch of juicy caterpillars on this tree!”

A Downy Woodpecker perched on the tree.

Photo by Peter de Wit

BirdTalk: Report 6

Where's my lunch?

Getting food is important. For baby birds, which get their food from their parents, being seen and heard is the key. So the young birds "beg" loudly to be heard—and fed! Even after they leave the nest, some young birds (fledglings) continue to be fed by their parents. You might see the fledglings following their parents around, flapping their wings, and begging for food.

In some cases, it might be important for parents to be able to tell their young from those of their neighbors. For example, Bank Swallows live in large groups (colonies) with many other Bank Swallows. Once their young leave the nest, they mix with other young Bank Swallows from their colony. How can the parents recognize their 'children' in such a large group? Parents use the unique voices of their begging young to identify them in the crowd!

A Bank Swallow preparing to feed her chicks.

Photo by Stephen J Stephen

ANSWER KEYBirdTalk Reports Discussion Sheet

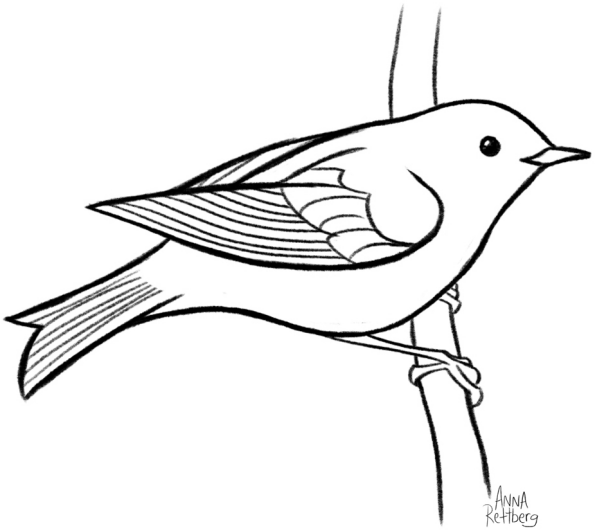
BirdTalk Report #	**1**	**2**	**3**
What is the purpose? (What does the bird want?)	To attract a mate/female; to keep a bond, Clue for a perspective mate (female) of a strong male	To establish (set up) their territory and then protect their nests and food resources from other birds of the same species	To help birds keep in contact with each other when they are flying; Air traffic control so they don't crash into each other
What is one species that communicates in this way?	**Song Sparrow** in this *BirdTalk* Report	**Northern Mockingbird, woodpeckers** in this *BirdTalk* Report	Most migratory birds, **Swainson's Thrush** in this report.
Who makes the sound? (Male, Female, Young)	Male	Male	Birds that are flying and migratory
When? (Season, time of day)	Starting in the Spring Some species, early morning, some, all day long	During Breeding season	During migration, At night
Other interesting details:	This song is an important clue for a female bird looking for a possible mate. If a male bird has enough energy to sing a long, loud, difficult song after a night without food, he must be strong, healthy, and live in a good territory.	Some birds, such as woodpeckers, use non-vocal sounds to defend their territory. Woodpeckers will drum on dead trees and hollow logs. They will sometimes choose metal road signs, rain gutters, and even trashcans.	Can sound like insects, frogs, or even cats.

This is a general overview of answers found in *BirdTalk* Reports.
Individual answers will vary. Accept all reasonable responses.

BirdTalk Report #	4	5	6
What is the purpose? (What does the bird want?)	Alert others to danger, Avoid or deter predators	To stay in contact Give information about food	For young birds to get parents' attention For parents to be able to tell their young from those of their neighbors
What is one species that communicate in this way?	Sentinel species, for example: Killdeer, American Crows, Blue Jays, and Steller's Jays	All species	All Species
Who makes the sound? (Male, Female, Young)	Male or female	Anyone	Baby and juvenile birds
When? (Season, time of day)	Any time, When in a group of mixed species	Anytime birds want contact with others When in a group of mixed species	When they young birds want to be fed When parents want to identify their offspring
Other interesting details:	Some birds are known as 'sentinel' species. Sentinel means "one that watches or guards." This bird is watchful, alert, and quick to sound an alarm.	The birds moving in flocks can make short, high-pitched "chips," or call notes, which might sound like a single cricket chirp.	Even after they leave the nest, some young birds (fledglings) continue to be fed by their parents. Birds need help identifying their own offspring

Bird Communication

Student Journal



Name:_____

Date:_____

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My Sound Map

X

My Map Key

Time:

Location:

BirdTalk Reports Discussion Sheet

BirdTalk Report #	**1**	**2**	**3**
What is the purpose? (What does the bird want?)			
What is one species that communicates in this way?			
Who makes the sound? (Male, Female, Young)			
When? (Season, time of day)			
Other interesting details:			

BirdTalk Report #	**4**	**5**	**6**
What is the purpose? (What does the bird want?)			
What is one species that communicate in this way?			
Who makes the sound? (Male, Female, Young)			
When? (Season, time of day)			
Other interesting details:			

What's That Chickadee?

Listen to four Black-capped Chickadee vocalizations. Predict what the Black-capped Chickadee might be trying to say. Later, you'll find out the real reasons for the sounds!

1. Predicted Message: _____

   Actual Reason: _____

2. Predicted Message: _____

   Actual Reason: _____

3. Predicted Message: _____

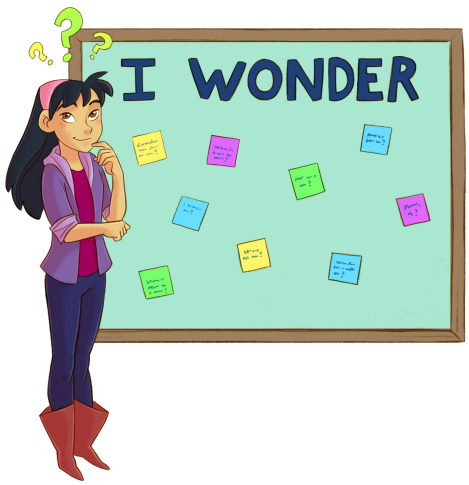
   Actual Reason: _____

4. Predicted Message: _____

   Actual Reason: _____

Think on your Own

How do you think that the life of a deaf bird would be different from that of a bird that can hear? Do you think it would it be possible for a deaf bird to survive? Why or why not?



Use this page to write your questions and discoveries.