



## **“Science Takes Wing” Northern Arizona Edition**

## SCIENCE TAKES WING

### Curriculum Outline

<b>Lesson:</b>	<b>Focus Question:</b>	<b>Activity:</b>
Intro to Birds	Why is bird study important?	2 worksheets and writing assignment
Intro to Binoculars	How do we identify birds?	Binocular Worksheet & Bino Blitz game
Bird Sounds	Can we identify birds by sound?	PowerPoint show and quiz
Be a Biologist' Bird Survey	Where are the birds?	Outdoor bird walk. Online data entry into eBird.

<b>AZ Science Standards</b> Grade 6, 7, 8 (all = black)	Intro to Birds	Intro to Binos	Bird Sounds	Bird Survey & eBird
<b>Strand 1: Inquiry Process</b>				
C1: Observations, Questions & Hypotheses			X X	X
C2: Scientific Testing	X	X	X	X
C3: Analysis & Conclusions			X	X
C4: Communication			X X	
<b>Strand 2: History &amp; Nature of Science</b>				
C1: History of Science as a Human Endeavor	X	X	X X	X
C2: Nature of Scientific Knowledge	X	X	X	X
<b>Strand 3: Science in Personal &amp; Social Perspectives</b>				
C1: Environmental Changes				
C2: Science & Technology in Society	X X			X
<b>Strand 4: Life Science</b>				
C1: Structure & Function in Living Systems				
C2: Reproduction & Heredity				
C3: Populations in an Ecosystem				
C4: Diversity, Adaptation & Behavior	X			X

# Science Takes Wing



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## **TEACHER RESOURCE: INTRODUCTION to BIRDS**

### **Overview**

Students will learn basic bird biology and complete two worksheets.

### **Science Standards Alignment**

Strand 1, C 1

Strand 2, C 1 & 2

### **Materials**

“What is a Bird” and “Why Study Birds” worksheets

Bird Cinquain Instructions

Bino Blitz Bird Cards (or photographs of local birds)

**Time:** 30 minutes for lecture, worksheet and cinquain assignment

### **Directions:**

**Read** the below **background information titled “What is a Bird”** and facilitate a **classroom discussion about birds.**

**Pass out handouts and have students complete.** Discuss answers.

**Break up into groups and give each group a bird card or photograph and a copy of the Bird Cinquain Directions.** Direct each group to create a cinquain (a five-lined poem) about their bird and let each group present their poems.

## **TEACHER RESOURCE: WHAT IS A BIRD?**

### Background Information

Birds differ from other animals in several important ways.

#### **Birds:**

- Are warm blooded
- Lay eggs
- Have feathers
- Often build nests
- Usually fly

**1. Initiate a discussion with your students to establish the above list.**

**2. Have students complete the “What is a Bird” worksheet. Discuss your answers as a group. Helpful information includes:**

Bats are mammals, not birds. Bats have fur and they have no feathers. In addition, bats bear live young (no eggs). Bats are active at night and birds usually are active during the day (but there are some exceptions such as owls). Bats and birds both have wings and they both fly.

**3. Have Students complete the “Why Study Birds” worksheet. Expand upon the “Why is it important to study birds?” question with a class discussion.**

Birds' beaks and feet shapes give good indications to what the animal eats and where it lives (i.e. water birds tend to have long legs & beaks). Hummingbirds eat primarily nectar from flowers and they use their beaks like long straws. Hawks eat meat and use their beaks to tear prey into bite sized pieces. Birds are an important piece in the ecological puzzle. If birds disappeared, people would suffer tremendously as birds pollinate our groups and eat pests such as rodents and insects.

Remind the students to pay attention to beak and foot shape as they learn to recognize different bird species. Beaks and feet provide clues as to what a given bird eats.

Lead the group to conclude that bird diversity, density and health indicates environmental health. By noting changes in any of the three variables listed above, we can determine that the birds' habitat is changing. How? Why?

Name: \_\_\_\_\_

**What Is a Bird?**

**Compare and contrast these 2 animals:**



List one thing that is similar:

\_\_\_\_\_

List one thing that is different:

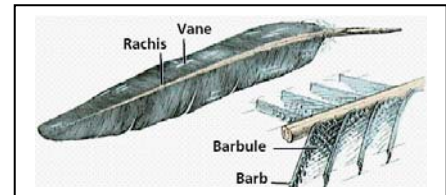
\_\_\_\_\_

**Have you ever found a feather? Where?** \_\_\_\_\_

- Birds are the only animal that has feathers.
- Feathers have several functions, including flight.

Can you name another feather function?

\_\_\_\_\_



**Have you ever found a nest?** \_\_\_\_\_

Most birds build nests to hold their eggs. All birds lay eggs. Bird nests and eggs vary greatly depending on the size of the bird and where the bird lives.



**Why is it important to study birds?**

Name: \_\_\_\_\_

Bird-watching is the second most popular hobby in the United States, (gardening is the most popular). Why do you think people like to watch birds?

\_\_\_\_\_

Birds are VERY DIVERSE. There are over 300 different birds in Arizona. By observing birds' beaks and feet we can tell what they eat. What do the below birds eat? Make a choice for each and explain your answer.



**Circle the correct answer for each bird**

1. **Hummingbird:**            seeds            vegetables            nectar            meat

2. **Hawk:**            seeds            vegetables            nectar            meat

How did you know the answers?

\_\_\_\_\_

Hummingbirds are important pollinators. Would people be affected if hummingbirds disappeared? Why or why not?

\_\_\_\_\_

Hawks eat pests such as rats and mice. Would people be affected if hawks disappeared? Why or why not?

\_\_\_\_\_

## Cinquain Directions

The cinquain, also known as a quintain or quintet, is a poem or stanza composed of five lines.

Examples of cinquains can be found in many European languages, and the origin of the form dates back to medieval French poetry.

Simple cinquains have the following format:

Line 1: a person, place, or thing (noun)

Line 2: two words that tell about the noun

Line 3: three verbs ending in “*ing*” showing action about Line 1

Line 4: one four-word phrase or sentence about the noun

Line 5: the noun from line 1 again, or a synonym (or close)

Choose a bird card or bird photograph and write a cinquain about your bird. Work alone or in groups. Below is an example:

Heron  
Long, thin  
flying, fishing, sneaking  
One with the river  
Wader

## **TEACHER RESOURCE: INTRODUCTION to BINOCULARS**

### **Overview**

Students will how binoculars work, parts of the binocular and proper care of this important bird-watching tool. Students will practice using binoculars and will simultaneously learn 10 common Arizona birds by playing the Bino Blitz Game and completing the “Mystery Bird Worksheet”.

### **Science Standards Alignment**

Strand 1, C 1-4

Strand 2, C 1 & 2

### **Materials**

Bino Box Resource Truck, furnished by Audubon AZ and AZ Bird Conservation Initiative (ABCI)  
Binocular Parts Worksheet  
Bino Blitz Answer Sheets  
Bino Blitz Bird Cards  
Mystery Bird Worksheets

**Time:** 30 minutes for lecture, worksheet completion, Bino Blitz game and Mystery Bird Activity.

### **Directions:**

**Lecture briefly about binoculars**, using the material in the Teacher Resource sheet.

**Show the class a pair of binoculars** and point out the various parts and functions

**Pass out the the binocular worksheet and have students complete.** Discuss answers as a group.

**Pass out binoculars** to each student (or divide students into teams as necessary)

Direct the students in the proper technique to **focus binoculars** and then let them practice.

**Pass out the Bino Blitz answer sheets and play the game.** If possible, provide a small gift for the winning student/team.

**Divide into 2 person teams and give each team a bird card and Mystery Bird worksheet.**  
Discuss answers.

## **TEACHER RESOURCE: What are binoculars & how are they used?**

**Birds are very easy to observe. By studying birds we can ensure that our environment is healthy. Biologists use binoculars to watch birds from a distance to keep from disturbing them.**

**Binoculars are precise instruments and must be treated with care.**

**Share the following information with your students:**

### **What are Binoculars?**

#### **Structure**

Binoculars are essentially two identical telescopes mounted side by side and aligned to point in the same direction. At the front of each telescope is an objective lens where light enters, is magnified, and formed into a visual image. The image produced is upside down and backwards. With the help of prisms (blocks of glass functioning as mirrors without reflecting back), the visual images are turned right side up and viewed properly left to right.

#### **Magnification**

Binoculars are described by a pair of numbers such as 7x35 or 8x40. The first number represents the magnification, or “power,” of the binoculars. This means the 7 in a pair of 7x35 binoculars makes an object appear seven times closer than when viewed by the naked eye. The second number represents the aperture, or the diameter of each objective lens. Aperture is especially important because it determines the amount of light entering the binoculars. The larger aperture, the brighter the image.

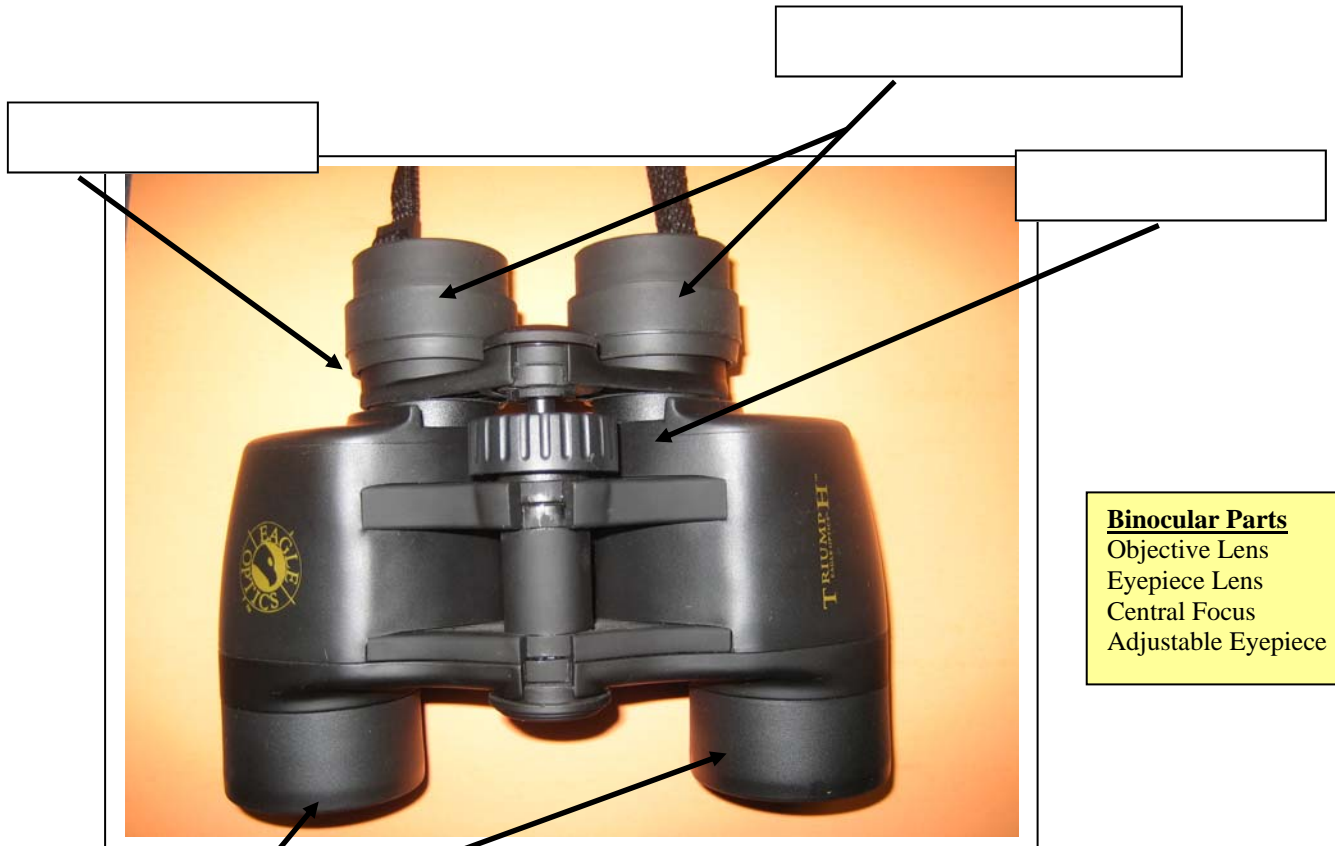
### **Essential Bino Care**

- Always wear neck strap
- Never drop, rattle, or swing binoculars.
- Avoid looking directly at the sun
- Don't touch lens with dirty cloth or fingers
- Never try to open binoculars to see inside
- Always stand still when using binoculars

Name: \_\_\_\_\_

**Binocular Worksheet**

1. Label the diagram with the appropriate binocular parts listed below.
2. Using your knowledge of binoculars, answer the questions below.



1. There are numbers on your binoculars: 7x35. By how many times do your binoculars magnify the image you see? \_\_\_\_\_

2. What does the second number mean?

\_\_\_\_\_

3. Other than bird watching, what are some reasons you might use binoculars?

\_\_\_\_\_

### How to Focus Binoculars

1. Place the **strap around your neck**
2. Close your left eye and look only through your right. **Turn the right eyepiece until you can see clearly through the right eye.**
3. **Open both eyes and adjust the binoculars** (lifting them up or crunching them down) so that they fit your face and you can see through both eyepieces.
4. **Use the center wheel focus** to sharpen your view.

### Play the Bino Blitz Game

Be the first student to use your binoculars to read the bird names from the bird pictures placed around the room. These are all common birds in your area. Yell "Blitz" when done.

#	Bird Name
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

**TEACHER RESOURCE: “Bino Blitz” Instructors’ Sheet**

**Directions:**

Before class, cut out the 10 bird pictures below and either paste them on a poster board or hang them around the room.





Pass out binoculars and Bino Blitz answer sheets and remind students how to focus binoculars. Make sure that everyone can see clearly through their binoculars, and assist as necessary. Have students use their binoculars to view the bird pictures/names and to write the correct bird name on the “Bino Blitz” answer sheet. This is a race--you may wish to reward the winner with a small prize.

**Field Marks**

Following the “Bino Blitz” activity, lead a discussion about “Field Marks”.

Field marks are characteristics such as size, color, beak and tail shape and special markings on birds such as eyebrows or spots that enable people to identify them.

Have students select one of the 10 pictured birds and describe it in terms of the birds’ field marks on the “Mystery Bird” Worksheet. Next have students partner up and trade papers. Partners must guess which bird is being described. Do this activity multiple times if time allows. Then have students pick one bird to research in a field guide or other resource.

<p><b>1</b></p>  <p><b>Hairy Woodpecker</b></p>	<p><b>2</b></p>  <p><b>Pygmy Nuthatch</b></p>
<p><b>3</b></p>  <p><b>Steller's Jay</b></p>	<p><b>4</b></p>  <p><b>Mourning Dove</b></p>

5



Dark-eyed Junco

6



House Finch

7



Western Bluebird

8



Mountain Chickadee

9



American Robin

10



Broad-tailed Hummingbird

\* Be certain to emphasize that the birds pictured here are all very common to our area. Ask the students if any of these species are familiar to them.

Mystery Bird Worksheet

Select one of these birds to describe on your worksheet



American Robin



Mourning Dove



Broad-tailed Hummingbird



Mountain Chickadee



Western Bluebird



Dark-eyed Junco



Steller's Jay



Hairy Woodpecker



House Finch



Pygmy Nuthatch

Great-tailed Grackle

Curve-billed Thrasher

Name: \_\_\_\_\_



## **Mystery Bird Worksheet**

**Directions:** Pick one of the birds pictured here and describe it to your partner without using the bird's name. Make your partner guess! Use the clues below. Trade papers with a partner and see if you can guess each others' birds. If you have time, repeat the activity with another partner.

My mystery birds is mostly: \_\_\_\_\_

My bird's beak is: \_\_\_\_\_

My bird's tail is: \_\_\_\_\_

My bird's eyes are: \_\_\_\_\_

My bird probably eats: \_\_\_\_\_

My bird probably lives (where?) \_\_\_\_\_

### **After the Mystery Bird Activity, do some research!**

Use a bird book called a "field guide" to answer the following questions:

My mystery bird was: \_\_\_\_\_

Scientific Name: \_\_\_\_\_

Size: \_\_\_\_\_

Habitat: \_\_\_\_\_

Other Comments: \_\_\_\_\_

## **TEACHER RESOURCE: Bird Sounds Lesson Instructions**

### **Overview**

Students will learn to identify 10 common Arizona birds by sound by watching a PowerPoint show and answering questions as prompted.

### **Science Standards Alignment**

Strand 1, C 1-4

Strand 2, C 1 & 2

### **Materials**

Bird Song Answer Sheets

STW Bird Sounds PowerPoint presentation

Computer/projector with speakers

**Time:** 45 minutes for show and discussion

**Background:** Birds can be identified by the sounds they make. Birds make several different sounds. They **sing** to attract mates and **call** to alert other birds to danger or to food. Listening to bird sounds is an important skill to develop if you wish to be a skilled bird observer.

### **Directions:**

Watch the **Science Takes Wing Bird Sounds PowerPoint Show** and use the **Bird Sounds** answer sheet to record your answers.









To learn more Arizona bird sounds, visit “The Virtual Aviary” created by the Arizona State University’s “Ask a Biologist” program <http://askbiologist.asu.edu/>



**After completing the PowerPoint show, have students go outside and listen for birds for as long as possible.** What did the group hear? What would be the best time to listen for birds? (Morning) Where would be the best place? (Quiet area with cover). Did the group hear other sounds? If so, what did you hear?

Name: \_\_\_\_\_

**“Bird Sounds” Answer Sheet**

Picture	Bird Name	Song Description (Some helpful words: chirping, cooing, whistling)	Quiz Answers (print the correct letter for each question below)
	American Robin		1.
	Mourning Dove		2.
	Broad-tailed Hummingbird		3.
	Dark-eyed Junco		4.
	Hairy Woodpecker		5.
	House Finch		6.
	Mountain Chickadee		7.
	Pygmy Nuthatch		8.
	Steller's Jay		9.
	Western Bluebird		10.

## **TEACHER RESOURCE: Bird Survey and eBird Data Entry**

### **Overview**

Students will use binoculars to find and identify common birds in the schoolyard. They then enter data online at the Cornell Lab of Ornithology's eBird website. Students may formulate questions and use eBird data to answer these. \*Note: It is advisable that prior to the lesson, the instructor becomes familiar with the eBird resource and sets up an online profile.

### **Science Standards Alignment**

Strand 1, C 1-4

Strand 2, C 1 & 2

### **Materials**

Binoculars

Bird Survey Data sheet and "Can You Find These Birds" handout  
(Double-side copy these and provide one for each student)

Computer (with internet access)

**Time:** 45 minutes for survey and data entry

### **Directions:**

Procedure:

1. Tell the students that we will be going outside to look for birds. They will all become what we call birders. Birders have a few important guidelines that must be followed in order to look for birds. The basic guidelines for a bird walk are as followed 1) stay with your group, 2)whisper and use indoor voices, 3) tip toe vs. run, and 4) respect each other's space (i.e. hand's to yourselves)
2. Pass out the binoculars and break up into small groups (3-4 students) if possible. Assign each group a different section of the school yard or park to survey. Make sure that each group has at least one survey data sheet with common bird photos. The groups should work together and fill out ONE form.
3. Take students outside and direct them to find and record all the birds in their area (10-20 minutes is usually plenty of time).
4. Return to classroom and build a class bird list by having each group share their findings and record the total of each species detected on the blackboard. Which group found the most birds? Why?
5. Log on to the eBird website at <http://www.eBird.com>. If possible, project the screen view so that the class can observe the website and watch as data is entered. Have students take turns entering data into this free, online database. Make sure that you are not double counting birds (i.e. two or more students are entering the same bird). To prevent this, you may want to assign each student a single species (i.e. John enters the Mourning Doves, Mary enters the House Finches). Have students not entering date fill out the Bird Survey Worksheet.
6. Play with eBird data by inviting the class to choose a species they observed and look at that birds' range map. Look at other eBird features (such as frequency graphs) depending upon students' interest and available time.

**Bird Survey Data Form**

Name: \_\_\_\_\_

Bird Picture	Bird Name	Count (Use hatch marks)	Other birds (Describe)	Count (Use hatch marks)
	American Robin			
	Dark-eyed Junco			
	Hairy Woodpecker			
	House Finch			
	Mountain Chickadee			
	Pygmy Nuthatch			
	Broad-tailed Hummingbird			
	Steller's Jay			
	Western Bluebird			
	Mourning Dove			



**Bird Survey Worksheet**

Date: \_\_\_\_\_ Survey time: \_\_\_\_\_

Survey Location: \_\_\_\_\_

Sky (Circle one): clear      30% clouds      60% clouds      100% clouds

How windy was it? (Circle one): calm      slight wind      windy enough for a kite      blustery

Do you think that weather conditions influence how many birds observers can detect? If so, how?

\_\_\_\_\_

# of birds seen: \_\_\_\_\_ # of bird species seen \_\_\_\_\_

Which bird was your favorite? Why?

\_\_\_\_\_

How could you attract more birds to your school yard?

\_\_\_\_\_

What can you do to help birds?

\_\_\_\_\_