

# TEACHER GUIDE: ANIMAL BEHAVIOR AND COMMUNICATION

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Dear Teachers,

In this guide we hope to offer you ways to incorporate *Greentimes* into your classroom. Your input directly affects our decisions of what to include in future guides, so please feel free to send feedback and suggestions to [freemahe@bc.edu](mailto:freemahe@bc.edu). Also, you can visit [www.greenscreen.org](http://www.greenscreen.org) for more information.

Happy Learning,  
Heather Freeman  
Greentimes Program Director

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### **Background Information**

#### Senses:

- Every animal has adapted to, and senses, their environment in different ways. Humans use sight and sound as their primary means of communication and survival but ants see polarized light, bats use echolocation, honey bees can detect magnetic fields, and dogs hear sounds at frequencies that are silent to humans. Visit <http://faculty.washington.edu/chudler/amaze.html> to learn more about how other animals sense their environment.

*Curriculum concepts: Life Science concept 6. "Recognize that people and other animals interact with the environment through their senses of sight, hearing, touch, smell and taste."*

#### Migration:

- Many forces cause animals to migrate. A large portion migrate seasonally to take advantage of abundant resources in other locations or to avoid the lack of resources in their own. Others are forced to make a permanent migration because of changes in their habitat. Sometimes, only a percentage of a species will migrate and the rest will remain. To learn more about the various whys and hows of migration visit <http://www.nps.gov/akso/ParkWise/Students/ReferenceLibrary/general/MigrationBasics.htm>.

*Curriculum concepts: Life Science (Biology 3-5) concept 7. "Give examples of how changes in the environment (drought, cold) have caused some plants and animals to die or move to new locations."*

#### Biodiversity:

- Biodiversity is important to human life for many reasons. Some animals, such as insects, are loathed by humans but important to the well being of ecosystems. For example, insects pollinate flowers and provide food for predators. Other plants and animals hold the key to cures for diseases that plague modern society. Biodiversity is important for many economic, social and medical reasons. For more information on the importance of biodiversity visit <http://isis.csuhayward.edu/alss/geography/mlee/envt2000/biodivf99.htm>.

#### Animal Classification:

- Students are aware that animals are categorized by their features but you can clarify the basic breakdown. First, there are two kingdoms of living organisms, one for plants and one for animals. The animal kingdom is broken down into three subkingdoms called Protozoa, Parazoa & Metazoa. Each subkingdom is broken down into phyla which is further divided into subphyla, where each layer is more specific, with less animals. For more information where mammals, amphibians, and others are placed visit <http://falcon.jmu.edu/~ramseyil/vertebrates.htm>.

## **Quick, Hands-On Science**

### ***A dark and stormy experiment:***

Here's an activity for a rainy day- or you can tell your students about this experiment so they can do it at home. Since light travels faster than sound it is possible to calculate how far away a storm is. Tell students to count the number of seconds between the moment they see a lightening flash and the moment that they hear the thunder clap. Dividing this number by 5 will tell you how many miles away the storm is. If students do this at home and bring in their calculations, you can make a chart of the results. A way to demonstrate this without a real thunderstorm is to split students into 2 groups, turn the lights off and have a competition to see which group can calculate the most demonstrations accurately. To demonstrate, flash the lights, then create a 'thunder' noise at specific intervals.

### ***Slinkies and sound:***

Show students a visual representation of sound with a slinky. **How are a slinky and sound connected?** Pull the slinky so that it is stretched out horizontally (recruit a student to help) and pulse one end of the slinky. As the disturbance (your hand) hits one end of the slinky the energy is transferred from each adjacent ring to the next. The slinky, in this case the medium, moves in the direction that the energy is moving in. This is also how sound travels, where molecules transfer energy to bordering molecules until the sound hits your ear and is registered by your brain.

## **Spotlight**

### ***Diversity of the Galapagos Islands:***

Students read about Charles Darwin and his discovery of the Galapagos Islands. Locate the Galapagos on a map, off the shore of Ecuador. The Galapagos have a particularly large number of plant and animal species for their size. Can students surmise why there is so much biodiversity in this location? What conclusions can they make about other isolated tropical places and their abundance of biodiversity? Other relevant facts about the Galapagos are:

- They are a province of Ecuador. Show students where Ecuador is. What ocean borders Ecuador and surrounds the Galapagos?
- The Galapagos Islands are comprised of many small islands but only a few of them are large enough for tourism. Most visitors go there specifically to observe and enjoy (or study for research) the biodiversity.
- The islands were created by volcanoes. Can students name any other islands they know that are the products of volcanoes (e.g. the Hawaiian Islands).

### ***Monarchs and Migration:***

Monarch butterflies sometimes migrate an incredible 2,000 miles or more from locations in the northern United States and southern Canada to warmer environments, such as southern California and Mexico. Show the gravity of this accomplishment by providing a visual representation of their flight. Emphasize to students that humans travel by plane to reach far away locations but the tiny Monarch butterfly is able to fly the whole way itself. This is also a good time to point out:

- Monarch butterflies do not live in northern Canada because of its Arctic climate. In fact, few people even live there. As a result, although Canada is large in land mass, it is inhabited by only the same amount of people that live in California.
- In contrast, Mexico's population is only second to Brazil in size in Latin America. The capital of Canada is Ottawa and the capital of Mexico is Mexico City.
- What do these facts tell the students about climate and human habitats?



## Writing & Reading Comprehension

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### *Calling all senses:*

Students learned how different animals communicate in the article, “All Eyes and Noses— Up Here Please.” Ask students to write a few paragraphs about how humans use their five senses. For example, when we smell cookies baking we know that there will be a treat for dinner. When we see someone walking towards us we know to move to the side. And when we touch a hot stove we know to pull our hand away.

Have students read Helen Keller: Courage in the Dark (Step Into Reading: A Step 3 Book), by Johanna Hurwitz. Can students hypothesize how life would be different without one of their senses? How do they think blind and deaf people compensate for their lost sense?

### *There’s no place like home:*

“Animals in Your House” explains why animals inhabit our homes. But, what makes a house a home to a human? Ask students to write a piece about what their home means to them. What makes their home special? Is it the people inside? The objects they have? What do students need from their home? Shelter? Food? A controlled climate?

## Reading Suggestions

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How Animals Communicate, by Betty Tatham. A book about animal communication through sight, sound and other signals. Includes a section on miscommunication.

Peterson First Guide to Urban Wildlife, by Sarah B. Landry, Roger Tory Peterson (ed.). Condensed version of the traditional Peterson guide, it focuses on more visible wildlife. Good for kids.

Wild Minds: What Animals Really Think, by Mark Hauser. Insight into why animals do what they do in the context of their social and physical environment.

## Art Activities

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### *Diagrams and Visual Representations*

Students can practice making diagrams by showing the migration path of a specific bird. For example, a student could research the time of year and locations a Whooping Crane migrates to and from. They can include in their diagram things that may interrupt the bird along its path and what challenges it faces (i.e. not enough food, hunters, weather, etc.).

Students learned in *Greentimes* that animals use tools for various reasons. Ask students to look up, or take from *Greentimes*, a simple tool from the outdoors near their home. They should know how a specific animal uses the tool and be able to show the class. For example, a student could bring in a twig and explain how monkeys “fish” for termites with it. Or, they could use a rock to demonstrate how a monkey crushes the shell of nuts.

Show students how important our sense of hearing and sight is. First, blindfold students or ask them to close their eyes. Put an object into their hand and have them guess what the object is. Next, put students into small groups. Create a small deck of cards with an object or message on it. Taking turns, each student should try to convey the message on the card without speaking.



## Worksheet Instructions, Framework Connections and Answer Key

### Worksheet 1:

This worksheet encourages students to think about how various forms of animal communication compare to human communication. We have more in common with other animals than we may think. Humans use a variety of sounds and signals to communicate with each other depending on the situation and the message we wish to get across.

*Instructions:* Have students fill in each question in complete sentences, giving two examples of each type of communication and when it might be appropriate. Encourage students to share what they wrote, especially about non-vocal and silent communication. Which form of communication do we use most often? Why is that?

#### Examples:

##### 1. Vocal communication:

- Answering questions in class
- Talking with friends or family over the phone
- Singing

##### 2. Communication through non-vocal noise:

- Clapping after a performance
- Snapping fingers to keep a beat
- Judge pounding a gavel

##### 3. Silent communication:

- Waving your arms to get a friend's attention
- Pointing to indicate directions
- Mouthing a sentence to someone in a quiet space

### Worksheet 2:

This worksheet challenges students to think about what birds must go through to prepare for migration by translating the amount a bird must eat into the number of hamburgers a human must eat to gain the same amount of body mass. One goal is for them to see just how much food birds have to eat before their journey.

*Instructions:* Have the students read the article "Cold Weather? Billy and friends say, 'No thanks!'" from this issue of *Greentimes*. Then have them use their own weight (or an approximation) to calculate the number of hamburgers they would have to eat to gain 5% of their body weight in 1 day. Could they realistically eat this many burgers for 1 day? How about for a week straight?

This activity is an excerpt from 'Bird Olympics,' courtesy of *Flying Wild: An Educator's Guide to Celebrating Birds*, Council for Environmental Education, 2006, pg 193.

#### Answers:

If you weigh:

60lbs  
100lbs  
150lbs

To gain 5% in one day  
you would have to eat:

42 burgers  
70 burgers  
105 burgers



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

Date: \_\_\_\_\_

## ***GREENTIMES: ANIMAL COMMUNICATION*** **Worksheet 1**

You already learned that animals communicate using both **vocal** and **non-vocal noises**. Voice produces sound for communication, but animals often use other body parts to create audible noises and send signals. Some animals, such as bees, also communicate silently through signals. Humans use both vocal and non-vocal noises, and sometimes use silent signals to communicate.

***Directions:*** Use complete sentences to give two examples of situations where you communicate through vocal noise, non-vocal noise and silent signals. Keep in mind what you learned about how and when animals use these different methods of communication.

When do you communicate with vocal noise? Give two examples:

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Are there times when you communicate through non-vocal noise? Give two examples:

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When would you communicate silently? How would you do it? Give two examples:

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

Date: \_\_\_\_\_

## **GREENTIMES: ANIMAL BEHAVIOR**

### **Worksheet 2**

In this issue of *Greentimes*, you learned what **migration** is and read about animals who migrate, including Billy the bird and Mary the monarch. Many other animals migrate, including the Canada goose, who you may see flying in a V-shaped formation. Just like we prepare for a trip by packing, animals must prepare to migrate. Birds prepare for migration by storing extra fat— energy for their journey. Some birds gain up to 50% of their body weight in fat before migrating!

#### **EATING LIKE A BIRD**

To gain 50% of their body weight before migrating, some birds increase their body weight by 5% in a single day. Use the formula below to calculate how many hamburgers you would have to eat to gain 5% of your body weight in one day. To perform these calculations, it is necessary to make a few assumptions.

#### **Assumptions:**

1. Each hamburger contains 250 calories
2. Every 3,500 calories consumed results in a 1 lb. weight gain
3. This simplistic calculation does not take into account the calories burned through digestion and other activities. It also does not take into account different metabolic rates between individuals. Therefore, it serves only to give an idea of the caloric intake required.

#### **Formula:**

Step 1— To calculate the weight you need to gain, multiply your current weight, in pounds, by the percent increase you wish to gain. For example, if I want to increase my weight by 5%, I multiply my current weight (60 lbs.) by 5%. The result is 3 lbs.

So the formula is:

$$\text{Desired weight gain} = (\text{your weight} \times \text{desired percent increase})$$

$$\text{ex — } 60\text{lbs} \times 5\% = 3\text{lbs}$$

Step 2— Use the number from step 1 to figure out how many hamburgers you would need to eat to make the weight increase happen. To do this, multiply the answer from step 1 by 3,500 (the number of calories needed to gain 1 lb.), then divide that number by 250 (the number of calories in 1 hamburger). For example, I figured out in step 1 that I need to gain 3 lbs. to gain 5% of my body weight. Therefore, I multiply 3 by 3,500 to figure out the number of total calories needed, then divide that number by 250 to figure out how many hamburgers that would be. The result is 42 hamburgers.

The formula here is:

$$\frac{(\text{Desired weight gain} \times 3,500 \text{ calories})}{250 \text{ calories}} = \# \text{ of hamburgers required}$$

$$\text{ex — } (3\text{lbs} \times 3,500 \text{ calories}) / 250 \text{ calories} = 10,500 / 250 \text{ calories} = 42 \text{ hamburgers}$$

#### **Directions:**

Use steps 1 and 2 above to calculate how many hamburgers it would take for you to gain 5% of your body weight. What if you wanted to gain 50% and therefore had to eat that many hamburgers each day for 10 days?