

4th Grade Life Science: Animal Adaptations Unit



Developed for Chapel Hill Carrboro City Schools
Northside Elementary School Outdoor Wonder & Learning (OWL) Initiative

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4th Grade Animal Adaptations Table of Contents

Unit Overview.....	1
Go Outdoors! Tips and Tools.....	4
Arc 1: Animal Populations, Habitats, & Interactions.....	5
Engaging Activity: Journey Around the Schoolyard.....	7
Learning Activity 1: Oh Deer!.....	12
Learning Activity 2: How Many Bears Live in the Forest?.....	15
Learning Activity 3: Darwin & the Galapagos Islands.....	30
Learning Activity 4: Habitat Survey.....	35
Arc 2: Physical and Behavioral Adaptations.....	38
Learning Activity 5: Adaptation Relay.....	40
Learning Activity 6: Physical Adaptations: Camouflage & Mimicry.....	43
Learning Activity 7: How Do I Move?.....	46
Learning Activity 8: Behavioral Adaptations: Migration & Hibernation.....	53
Learning Activity 9: Why Do I Move?.....	54
Arc 3: Humans & Environment.....	58
Learning Activity 10: From the Rivers to the Sea: Stream Study Part 1.....	60
Learning Activity 11: Impacts of Pollution on a Habitat.....	62
Learning Activity 12: Humans & Changing Habitats.....	67
Learning Activity 13: From the Rivers to the Sea: Stream Study Part 2.....	69
References.....	72



Overarching Unit Question

How can animals meet their habitat needs to survive in changing environments?

Essential Questions

Arc 1: How do changes to an animal's habitat affect its ability to survive, and how do animal populations respond to these changes over time?

Arc 2: How can adaptations enable animals to survive in changing habitats?

Arc 3: What positive impacts can we have on our schoolyard and surrounding habitats to support the needs of a wide variety of animals?

Transfer Goals

- Use scientific thinking to understand the relationships and complexities of the world around them.
- Identify real-world dilemmas and opportunities and apply scientific thinking to develop solutions for them.

Enduring Understandings (Science)

- The world has many different environments, and distinct environments support the life of different types of organisms.
- Organisms within ecosystems are interdependent and can survive only in environments in which their needs can be met.
- All organisms cause changes in the environment where they live and they, in turn, are affected by changes in their environment.

Enduring Understandings (Social Studies)

- Physical changes in community, state, and region affect plants and animals.
- The discovery and use of resources hold benefits and problems.

Target Science Essential Standards

4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats.

4.L.1.1 Give examples of changes in an organism's environment that are beneficial to it and some that are harmful.

4.L.1.2 Explain how animals meet their needs by using behaviors in response to information received from the environment.

- 4.L.1.3** Explain how humans adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion).
- 4.L.1.4** Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats.

Secondary Target Standards (ELA, Math, Social Studies)

ELA

- RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- RI.4.2** Determine the main idea of a text and explain how it is supported by key details; summarize the text.
- RI.4.7** Interpret information presented visually, orally, or quantitatively and explain how the information contributes to an understanding of the text in which it appears.
- RI.4.9** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.
- W.4.2** Write informative /explanatory texts to examine a topic and convey ideas and information clearly.
- W.4.6** Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.
- SL.4.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.

Math

- 4.OA.3** Solve two-step word problems involving the four operations with whole numbers.
- 4.MD.4** Make a representation of data and interpret data in a frequency table, scaled bar graph, and/or line plot.

Social Studies

- 4.G.1** Understand how human, environmental, and technological factors affect the growth and development of North Carolina.

Unit Overview

This unit explores animal adaptations and how they are connected to an animal's survival in its habitat and environment. Students investigate their schoolyard and surrounding habitats, learning about how these habitats meet animals' needs and how animals are adapted to survive in them. Students interact with these habitats through observations, nature journaling activities, and hands-on explorations.

Arc 1 focuses on habitats and how an animal's habitat can affect its survival. After gaining some background knowledge, students investigate their schoolyard habitats through observations and nature journaling. Using two Project WILD activities, students delve further into how animals depend on their habitats for survival. Then students focus on bird adaptations and the specific example of Darwin's finches on the Galapagos Islands through activities and lessons. To wrap up Arc 1, students return to their schoolyard to more thoroughly assess their schoolyard habitat and then their home habitat to learn how each meets the needs of its inhabitants.

Physical and behavioral adaptations are studied in Arc 2. This arc looks at some specific adaptations including physical adaptations such as opposable thumbs, camouflage, and mimicry, and behavior adaptations such as hibernation and migration. Students experience how hard a simple task can be without the use of their thumbs. Camouflage and mimicry are explained through activities and books about butterflies and other animals that use these adaptations to survive. Students make connections between an animal's physical adaptations that help it move and the habitat in which it lives. Students learn about migration and hibernation through a presentation, books, and videos before focusing on two species that migrate. Students go outside to see if these migrating species are in their schoolyard.

Habitats and environments are constantly changing, with potential for positive or negative impacts on animals and animal populations. Arc 3 begins with students examining stream habitats near their schoolyard and connections with the larger watershed. Students then learn more about pollution and other potentially negative impacts that humans may have on habitats through books, pictures, and a nature journaling assignment. To wrap up this arc and unit, students go back outside to study a stream habitat and its occupants, illuminate positive and negative impacts that humans have made, and create (and hopefully conduct) a plan to reduce negative impacts.

Duration

22 days of 45 minute lessons

*Vocabulary**

Abiotic factors, biotic factors, environment, habitat, natural selection, organism, predator, prey, population, adaptation, behavioral adaptations, camouflage, hibernation, instinct, learned behavior, migration, mimicry, physical adaptations, pollution

**Definitions of vocabulary words can be found on the arc overview pages. Relevant vocabulary is listed on each learning activity page.*



Go Outdoors! Tips & Tools

Taking your class outside for science or any lessons can be rewarding and challenging. Along with behavior and materials management tips with each lesson, this section is intended to help you have the tools you need to successfully take your class outside.

Before You Go Outside

- Create **ground rules** with students for all outdoor lessons. Post the rules for students to be able to easily see.
- Ask for **parent volunteers**. Extra help can make an outdoor learning experience much more manageable.
- Teach students proper use, including safety, of the science tools they will be using.
- Set expectations before go. Give instructions both inside and repeat once outside.
- Have a clear **objective** for going outdoors. This will help focus students' attention.
- Be flexible. Structure lessons to take advantage of **opportunities and challenges**.
- Establish a meeting spot and emergency plan. Have a signal for emergency situations.
- Take students outside for short exercises to practice rules before longer outdoor lessons.
- Use **same door** to always go outside for learning. Emphasize this is different than going outside for recess.

While You Are Outside

- **Model** the activities and outdoor skills for students. Show them what you expect them to be doing.
- **Participate in the activity**. Get down on your students' level. Get your hands dirty.
- Model **respect for nature** with your students.
- The outdoors is full of **teachable moments**. Use "I wonder" statements to engage students in questioning the experience. Have students write down questions to be researched back in the classroom.
- Allow students to be **leaders** in the activity. Ask students to volunteer as teacher assistant or materials manager.
- Acknowledge that students want to explore and can do so once the assigned task is complete.

Safety First!

- Scout outdoor areas ahead of time if possible, to note **potential hazards** such as poison ivy.
- Students should **never be alone**. If a student needs to go back to the building, send 2 students.
- Take a **first aid kit and phone/walkie-talkie**. Consider bringing along staff trained in first aid/CPR.
- Let office staff know where you and your class are going if headed out on a walking field trip.
- **Stay on the trail/path**, unless otherwise directed. On the greenway, stay on the right side of path.
- **Do not eat wild plants**, unless harvesting in the garden with a teacher.
- Set **boundaries** for the students to stay within. You have to be able to see me and I have to be able to see you!

A Note on Nature Journaling

Nature journals that you use with your class should be small composition books or other blank books that students use to make outdoor observations, including writing, drawing, and painting. Students can use colored pencils, watercolor pencils, or other materials to remember details of plants, animals, and habitats they are investigating around the schoolyard. This is different from a science notebook. However, some teachers may choose to have students paste blank pages into their science notebook to use for nature journaling pages.

Essential Questions

How does an animal's habitat and its characteristics affect its ability to survive?

NC Science Essential Standards – Unpacked Content

4.L.1.1 Students know that for any particular environment, some kinds of plants and animals survive well, some survive less well and some do not survive at all. When the insect population grows in an area that is frequented by insect eating birds, this is advantageous for the birds. Conversely, if the insect populations are decreased by disease in a similar scenario, the population of birds would be stressed and likely, reduced.

4.L.1.4 Students know that there is variation among individuals of one kind within a population. Students know that sometimes this variation results in individuals having an advantage in surviving and reproducing. Survival advantage is not something that is acquired by an organism through choice; rather it is the result of characteristics that the organism already possesses.

Lessons in this Arc

- ✓ Engaging Activity: Journey Around the School
- ✓ Learning Activity 1: Oh Deer!
- ✓ Learning Activity 2: How Many Bears Live in This Forest?
- ✓ Learning Activity 3: Darwin & the Galapagos Islands
- ✓ Learning Activity 4: Habitat Survey

Go Outdoors!

- ✓ Engaging Activity: Journey Around the School
- ✓ Learning Activity 1: Oh Deer!
- ✓ Learning Activity 2: How Many Bears Live in This Forest?
- ✓ Learning Activity 4: Habitat Survey

Nature Journal Connection

- Engaging Activity: Journey Around the School
- Learning Activity 4: Habitat Survey

Duration:

- 7 days of 45 minute learning activities

Background Information

The **environment** that an animal lives in is everything living and non-living that surrounds and affects the animal. When the environment changes, it means that the animal is now exposed to a new set of conditions. Some kinds of plants and animals may survive this change but some may not. A **population** is a group of the same type of organism living in the same area. Population size can be affected by changes in the environment. For example, if a

predatory population increases, the species they prey on may decrease. A **predator** is an animal that eats another animal, while **prey** is the animal being eaten for food. A change in temperature may also cause animals to enter or leave the area. Increased pollution, destruction of habitat, and introduction of a new species are all changes to an environment that may affect the populations of animals living there.

A **habitat** is an environment that provides food, water, shelter, and space to meet the needs of an organism. A habitat contains both abiotic and biotic factors. **Abiotic** factors are non-living components of the environment that impact an organism. This could be sunlight, water, or oxygen for example. **Biotic** factors are all living components of a habitat or environment. All organisms are biotic factors. An **organism** is any life form, including animals, plants, fungi, and bacteria.

Animals that are more likely to survive in their environment will be more likely to be able to reproduce and pass down their traits. These traits that help them survive are a distinguishing quality or characteristic. This process of survival and passing down these beneficial traits is known as **natural selection**. In other words, natural selection is the survival of organisms most suited to their environment. Natural selection determines which organisms will be able to survive and reproduce. The theory of natural selection was first proposed by Charles Darwin and Alfred Russel Wallace. On his exploration of the Galapagos Islands, Darwin discovered that beak size and shape varied among multiple finch species. Upon further study, he theorized that the finches all evolved from one species of finch and led to the variation among the finches.

Vocabulary

- **Abiotic factors** are the non-living characteristics of an ecosystem (e.g. temperature, precipitation).
- **Biotic factors** are living things.
- An **environment** is everything non-living and living that surrounds and affects an animal.
- A **habitat** is an environment that meets the needs of an organism (food, water, shelter, and space).
- **Natural selection** is the process by which the characteristics best suited to an environment are passed on to offspring due to the survival and reproductive success of organisms best adapted to an environment.
- An **organism** is a living individual, such as a plant or an animal.
- A **predator** is an animal that obtains its food by killing and eating other animals.
- **Prey** is an animal that is eaten by another animal for food.
- A **population** is a group of the same type of organisms living in the same area.

Literature Connections

Books

- *Step Gently Out* by Helen Frost (811 FRO)*
- *One Beetle Too Many: The Extraordinary Adventures of Charles Darwin* by Kathryn Lasky (B DAR)*
- *What Darwin Saw: The Journey That Changed the World* by Rosalyn Schanzer

*currently available in Northside library

Lesson Prep

- ✓ **Note:** This lesson has students making observations about animals and habitats. By the end of the lesson, students should be beginning to make connections between animals and their habitats as a precursor to introducing the concept of animal adaptations.
- ✓ Preview the book *Step Gently Out* by Helen Frost.
- ✓ Make copies of the “*Step Gently Out* Nature Journaling Prompts”, 1 per student.
- ✓ Make Private Eyes accessible for Nature Journaling activity, 1 per student or per group.
- ✓ Identify areas in your schoolyard where students can make their observations.
- ✓ Be prepared to show the [video](#) about ecosystems to your class.
- ✓ Determine if you want to show students the video on [two-column notetaking](#) to use with the vocabulary words.

Vocabulary

Habitat, abiotic factors, biotic factors

Procedure Part 1

Mini-Lesson

- Review student’s pre-existing knowledge by asking:
 - What is a **habitat**?
 - What are **abiotic factors**? (non-living)
 - What are **biotic factors**? (living)
 - What is an **environment**?
 - What are **organisms**?
- Use [two-column notetaking](#) to chart their responses on the board. Have students add these **vocabulary words** to their notes once a good definition is agreed upon.
- **Read** the book *Step Gently Out* as a class **BEFORE** going outside. This will prompt students to look for insects as well as birds.
- Tell students they are going to be observing schoolyard habitats and the plants and animals that live there.
- Review rules and expectations for going outside and ask students to work with a partner or in small groups for the nature journal activity.
- Provide each student with a **Nature Journaling Prompt** sheet to glue into their notebook **BEFORE** going outside.
- Distribute Private Eyes, if using. Encourage students to use them to look for tiny things or to examine bigger things more closely.

Learning Objectives:

Observe animals that live in the schoolyard.

Nutshell/Skills:

Students can make observations about animals and their habitats.

Science Essential Standards:

4.L.1.1, 4.L.1.4

ELA Essential Standards:

RI.4.1, RI.4.9, W.4.6

Math Essential Standards:

NC.4.MD.4

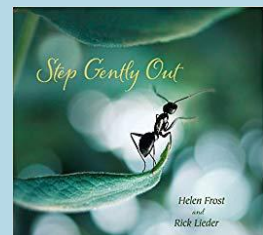
Time:

Part 1: 45 minutes

Part 2: 45 minutes

Teacher Materials:


- *Step Gently Out* by Helen Frost (811 FRO)
- Video on [How abiotic and biotic factors make an ecosystem](#) (5:30)



Student Materials:

- Nature Journals
- *Step Gently Out* Nature Journaling Prompts
- Pencils
- Drawing utensils (e.g., colored pencils)
- Private Eyes or hand lenses
- Notecards or scrap paper

Independent Work

- **Assign** each student a **section of the schoolyard** to make their observations. Spread students out as much as possible based on supervision available to allow for data collection of a larger area.
- **Instruct** students to quietly spend time observing the plants and animals that are found in their assigned section of the schoolyard. Students should **describe their observations** with words and drawings in their nature journal.
- **Nature Journal Prompts:** 
 - Draw a diagram of your assigned section. Make sure to label your diagram.
 - Describe the habitat in your section. Are there trees, grass, plants, rocks, water, etc.?
 - Do you see animals, or signs that animals have been there? Write the names of the animals that you see and add the animals to your diagram.
 - How many animals did you see? (If you see more than one bird or insect, count each one).

Assessment

- **Exit ticket:** Ask students to answer the following prompt on a notecard or scrap paper.
 - What is one thing you learned about your schoolyard habitat today?

Procedure Part 2

Mini-Lesson

- **Ask** students to name places where they have traveled or previously lived. Ask about the **habitat** in a few locations by using questions like:
 - What did the grass look like?
 - What did the trees look like?
 - What kinds of animals did you see?
 - What did the animals look like?
- **Ask** students:
 - Do you think we live in the same type of habitat?
 - What evidence can you use to explain how that habitat is different than ours?
 - How does it compare to the schoolyard habitat?

Guided Practice

- Inform the students that they are going to share how many animals they saw in their section, but first they need to decide how to **organize** the information into a **chart or table**.
- Have students record in their **Nature Journals** the number of animals observed in each section of the schoolyard using the preferred organizational method.
- Use the information to construct a **bar graph** as a class.
- Ask students to use the graph to determine which area of the schoolyard had the **greatest** number of animal sightings.
- Ask what **features** of that habitat might explain their observations.
- Inform students that you will be referring back to their diagrams and data later in this unit.

Independent Work

- Show the video [How abiotic and biotic factors make an ecosystem](#) (5:30).
- After watching the video, have students answer the following questions in their **Nature Journal** based on their assigned habitat:
 - What were the **abiotic factors** in your assigned section?
 - What were the **biotic factors** in your assigned section?

- What animals do you think are **predators**? How do you know?
- What animals do you think are **prey**? How do you know?
- The above questions are enlarged on a separate page to project for students.

Assessment

- **Exit ticket:** Ask students to answer the following prompt on a notecard or scrap paper:
 - Name a biotic and an abiotic factor you observed in your habitat.

Opportunities for Extended Learning

1. Each class can share their graphs and discuss any differences or similarities they might see. Classes could intentionally each look at the same section of the schoolyard on different days or different sections of the schoolyard for comparison.
2. Use a Venn diagram to compare and contrast another ecosystem and the schoolyard.
3. Watch the video "[Battle at Kruger](#)" as a whole class on **mute** as it includes inappropriate language.
 - Have students watch once without taking notes and then invite them to take notes in the second viewing. Have students share and add to their notes.
 - Have students work in pairs or small groups to define vocabulary words connected to the video: **environment, habitat, adaptation, beneficial, organisms, advantage, predator, prey, camouflage, population, instinctive behavior, learned behavior, physical adaptation.**
 - Students could use Discovery Tech Book dictionary to find definitions. Students could make a table connecting the vocabulary words to parts of the video. Students could make Frayer models of the vocabulary.

Behavior Management Tips

- ◆ Review expected behaviors for outdoor learning activities prior to going outside.

Step Gently Out Nature Journaling Prompts

- Write the **date** and **time** on your journal entry
- Draw a **diagram** of your section. **Label** your diagram.
- Can you see animals, or signs that animals have been there? Write the **names of the animals** that you see.
- **How many** animals did you see? (If you see more than one bird or insect, count each one of them.)
- **Add** the animals to your diagram.

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- **How many** animals did you see? (If you see more than one bird or insect, count each one of them.)
- **Add** the animals to your diagram.

After watching the video, answer the following questions in your **Nature Journal** based on your assigned habitat:

- What were the **abiotic factors** in your assigned section?
- What were the **biotic factors** in your assigned section?
- What animals do you think are **predators**? How do you know?
- What animals do you think are **prey**? How do you know?

Lesson Prep

- ✓ **Note:** *Oh Deer!* demonstrates connections between habitat and animal needs, carrying capacity, limiting factors, and the natural fluctuations in animal populations. This activity could be repeated with the variation of adding a limiting factor, such as a predator, at the end of the unit to reinforce these ideas as students better understand them.
- ✓ Review *Oh Deer!* activity in *Project WILD* (p.36-40). A copy of *Project WILD* is available in the Northside Elementary Media Center professional collection.
- ✓ Identify an area in your schoolyard where students can play *Project WILD's Oh Deer!*
- ✓ Create a data table on poster or chart paper for use during the game. Determine how you will write on it and display it to students outside during the game.
- ✓ Make copies of the *Oh Deer!* graphic organizer, one per student, if using. The graphic organizer could be completed on the following day to allow more time for the game.

Vocabulary

Habitat, population

Procedure

Mini-Lesson

- **Discuss** the features of a **habitat** that support animal life.
- If needed, refer students back to the engaging activity (Journey around the Schoolyard) to prompt their responses.

Guided Practice



- Tell students they are going to play a game called *Oh Deer!* In this game, each student will be assigned the role of either deer, food, water, or shelter.
- Take a big sheet of paper outside with the table below drawn on it. It needs to be big enough for students to be able to read after each round (year). You will record the number of deer at the beginning of the activity. Then fill in the number of deer at the end of each round (year).
- Conduct *Project WILD's Oh Deer!* according to the procedure provided in the activity description.
- **After** completing each round, ask the class:
 - What happened to the deer population?

Learning Objectives:

- Describe the needs of animals (food, water, shelter, space to raise young).
- Explain the role of habitats in aiding survival.

Nutshell/Skills:

Students can describe how a change in habitat affects an animal population.

Science Essential Standards:

4.L.1.1, 4.L.1.4

ELA Essential Standards:

RI.4.1, RI.4.9, W.4.6

Math Essential Standards:

NC.4.MD.4

Time:

45 minutes

Teacher Materials:

- *Oh Deer!* - *Project WILD* (p. 36-40)
- Poster or chart paper and marker for data table

Years	Deer
Beginning of activity	
End of year 1	
End of year 2	
End of year 3	
End of year 4	
End of year 5	
End of year 6	
End of year 7	
End of year 8	
End of year 9	
End of year 10	

Student Materials:

- *Oh Deer!* graphic organizer
- Pencil

- Why do you think the deer population changed?
- When the population increased, the habitat had plenty of ____?
- When the population decreased, the habitat had less _____?
- *Note: Asking these questions at the end of each round will help students make the connections faster.*
- When you return to the classroom, make a **line graph** using the data collected during the activity. Explain that a line graph is used to show change over time. The graph should reveal that the deer population changed over time. An example is shown on p. 38 of *Project WILD*.
- **Discuss** the graph and activity using the prompts suggested in the procedure in *Project WILD's Oh Deer!*

Independent Work

- After completing the outdoor game, ask students to answer the following questions which are also on a printable student page at the end of the lesson.
 - What is a population?
 - What does a habitat need to have in order to support a population?
 - Do you think deer could live in your schoolyard?
 - Do you think 10 deer could live in the schoolyard right now?
 - What do you think would happen if the deer population in the schoolyard doubled?

Assessment

- **Exit Ticket:** Ask students to answer one of the following questions on a notecard or scrap paper:
 - What did you “get” from today’s lesson?
 - What do you not understand about today’s lesson?
 - What else would you like to know?

Opportunities for Extended Learning

1. See *Project WILD's Oh Deer!* for variations and extensions. These would be best done later in the unit once the students have a better understanding of animal adaptations and habitats.

Behavior Management Tips

- ◆ Review expected behaviors for outdoor learning activities prior to going outside.

Name _____

Date _____



1. What is a population?

2. What does a habitat need to have in order to support a population?

3. Do you think deer could live in your schoolyard? Why?

4. Do you think 10 deer could live in the schoolyard right now? Why?

5. What do you think would happen if the deer population in the schoolyard doubled?



Lesson Prep

- ✓ Review *How Many Bears Can Live in This Forest* activity in *Project WILD* (p.23-27). A copy of *Project WILD* is available in the Northside Elementary Media Center professional collection.
- ✓ Make the appropriate number of food and water cards for your class. Refer to the chart on p. 24 of *Project WILD*. There is a template you can use at the end of the lesson for a class of 21-25 students.
- ✓ Make copies of the *How Many Bears Live in This Forest?* data table, one per student.
- ✓ Determine where you will do the activity. A large open area is best.

Vocabulary

Habitat, predator, prey

Procedure

Mini-Lesson

- **Ask** students to share what they know about **black bears**.
- Show students an [image](#) or [video](#) of black bears.
- Use the **background information** from *How Many Bears Can Live in This Forest* activity in *Project WILD* and North Carolina Wildlife Resource Commission's [black bear profile](#) to confirm accurate information about black bears.
- If it hasn't been brought up in the discussion, ask about what bears **eat**. Introduce the terms **predator** and **prey** in relation to what bears eat.

Guided Practice



- Follow the procedures for *Project WILD's How Many Bears Live in This Forest?*
- Students become "bears" to look for one or more components of habitat during this physically involved activity.
- Students can use *How Many Bears Live in This Forest?* data table to record their data and complete calculations.
- Rather than focus the end of the discussion on the term limiting factors, shift the focus slightly to discuss how changes to the forest habitat may affect the bears.
 - Ask for some examples of natural changes to this forest. How would they affect the bears' ability to survive? What might the bears do differently to survive in the changing habitat? For example, a wildfire may destroy some food sources, so the bears may expand their territory to find enough food.

Learning Objectives:

Apply the concepts of competition and limiting factors to observe how changes to a habitat may impact an animal's behavior and ability to survive.

Nutshell/Skills:

Students can demonstrate how changes to a habitat affect an animal's behavior and ability to survive.

Science Essential Standards:

4.L.1.1, 4.L.1.4

ELA Essential Standards:

RI.4.1, RI.4.9, W.4.6

Math Essential Standards:

NC.4.OA.3

Time:

45 minutes

Teacher Materials:

- *How Many Bears Live in This Forest - Project WILD* (p. 23-27)
- Red, yellow, green, blue, purple, and orange paper to make food and water cards
- Blindfold

Student Materials:

- Envelope or paper bag per student
- Data table
- Writing utensil

- Ask for possible man-made changes to this forest. How would they affect the bears' ability to survive? What might the bears do differently to survive in the changing habitat? For example, this forest may be logged for timber causing the bears to relocate or expand their territory to find enough food.

Independent Work

- Have students **write** a response to the following question:
 - A neighborhood is built in this forest. How could taking away some of the bears' habitat affect them?

Assessment

- Students' writing response could be used to assess their understanding.

Opportunities for Extended Learning

1. See *Project WILD's How Many Bears Live in This Forest?* extension option.
2. Additional rounds of *How Many Bears Live in This Forest?* could be played using students' suggestions for changes to the habitat.

Behavior Management Tips

- ◆ Review expected behaviors for outdoor learning activities prior to going outside.
- ◆ Have students stand in a circle while you are explaining the activity. While the students are writing their names on their envelopes and lining up, you can spread out the colored paper cards representing food and water.

How Many Bears Live in This Forest?

Food	Pounds	Percent
Total		100%
Did you get water?	Yes or No	

How Many Bears Live in This Forest?

Food	Pounds	Percent
Total		100%
Did you get water?	Yes or No	

Use the table below to print the cards with the correct colored paper. They have been labeled for you for a class of 21-25 students. If you have more or less students refer to the table on p. 24 of *Project WILD* to adjust the number of cards. You need one set per class.

Paper Color

Orange	Nuts	N
Purple	Berries	B
Yellow	Insects	I
Red	Meat	M
Green	Plants	P
Blue	Water	R OR L

N-20	N-20	N-20
N-10	N-10	N-10
N-10	N-10	N-10

N-10	N-10	N-10
N-10	N-10	N-10
N-10	N-10	N-10
N-10	N-10	

B-20	B-20	B-20
B-10	B-10	B-10
B-10	B-10	B-10
B-10	B-10	B-10
B-10	B-10	B-10

B-10	B-10	B-10
B-10	B-10	

I-12	I-12	I-12
I-6	I-6	I-6
I-6	I-6	I-6
I-6	I-6	I-6
I-6	I-6	I-6

1-6	1-6	1-6
1-6	1-6	

M-8	M-8	M-8
M-4	M-4	M-4
M-4	M-4	M-4
M-4	M-4	M-4
M-4	M-4	M-4
M-4	M-4	M-4

M-4	M-4	M-4
M-4	M-4	

P-20	P-20	P-20
P-10	P-10	P-10
P-10	P-10	P-10
P-10	P-10	P-10
P-10	P-10	P-10

P-10	P-10	P-10
P-10	P-10	

R	R	R
R	R	R
R	R	R
R	R	R
L	L	L

L	L	L
L	L	L
L	L	L
L	L	L
L	L	L

Lesson Prep

- ✓ Determine and preview which media options you want to use to provide background on Darwin and the Galapagos finches.
- ✓ Read more [background information](#) on natural selection and Darwin's finches if you find it useful.
- ✓ Make copies of the data sheet, one per student.
- ✓ Set up your bird beak stations:

- **Station #1** – Shallow pan, tub, or box lid with beans spread out to represent seeds. (pliers = cardinals and ground finches)
- **Station #2** - A log or board sprinkled with rice. Ideally, holes have been drilled into the log to better represent insects inside a tree. Place the log on a tray or newspaper to help contain the rice. (tweezers or forceps = woodpeckers and woodpecker finch)



- **Station #3** – Shallow pan or tub filled about halfway with water and a small, floating food, i.e. cut up straws, plastic beads, or puffed rice cereal, representing small plants and algae floating in a pond or lake. Place a towel or paper towels under the set up. (strainer = some ducks like mallards)
- **Station #4** – Shallow pan, tub, or box lid with dry oatmeal or sand and mini marshmallows, popcorn, or gummy worms to represent insects on the ground. (clothespin = robin)
- **Stations #5** – A jar, vase, or cup filled more than halfway with water to represent nectar in a flower. You can add a few drops of food coloring to the water if desired. (pipette or eye dropper = hummingbird and cactus finches)
- At each station, have 1 each of **5 different tools** (small strainer, clothespin, tweezers or forceps, pliers, pipette or eye dropper) and a **small empty container** for collected food. Have a **graduated cylinder or measuring cup** as the container to gather the food at **Station #5** to allow students to measure the amount of "nectar" collected.
- The correct tool is listed in parentheses along with bird examples for each of the above described stations.

Learning Objectives:

Summarize how the shape and size of a bird's beak helps it to survive in its habitat.

Nutshell/Skills:

Students can recognize connections between bird beaks, their food, and their habitat.

Science Essential Standards:

4.L.1.1, 4.L.1.4

ELA Essential Standards:

W.4.2

Time:

45 minutes

Teacher Materials:

- [Evolution by Natural Selection- Darwin's Finches](#) video (3:05)
- [Galapagos Finch Evolution](#) video (16:08)
- *One Beetle Too Many: The Extraordinary Adventures of Charles Darwin* by Kathryn Lasky
- *What Darwin Saw: The Journey That Changed the World* by Rosalyn Schanzer

Student Materials:

- Tweezers or forceps (5)
- Strainers (5)
- Pliers (5)
- Pipettes or eye droppers (5)
- Clothespin (5)
- Beans
- Rice
- Oatmeal or sand
- Marshmallows, popcorn, or gummy worms
- Plastic beads or other small items that float
- Log or board
- Pans, tubs, containers
- Jar
- Graduated cylinder or measuring cup
- Data sheets

Vocabulary

Habitat, natural selection, population

Procedure

Mini-Lesson

- Give **background** on **Darwin and the Galapagos finches**. Choose one or two media options to share:
 - **Video** - [Evolution by Natural Selection- Darwin's Finches](#) (3:05) Note: the finches in this animated video are brightly colored, but the real finches are all shades of brown, gray, and black.
 - **Video** - [Galapagos Finch Evolution](#) (16:08). This video shows actual footage of the Galapagos Islands, the finches, and Peter and Rosemary Grant. You can watch from 2:00 to 6:00 for just the portion about the different types of finches and their adaptations. From 6:00 on the video examines natural selection more in-depth using the Grants' study on the island.
 - **Book** – *One Beetle Too Many: The Extraordinary Adventures of Charles Darwin* by Kathryn Lasky (B DAR)
 - **Book** - *What Darwin Saw: The Journey That Changed the World* by Rosalyn Schanzer
- **Compare** the functions of **tools** to those of **bird beaks**.
 - Discuss how the right tool for the job makes the job possible and easier. Give an example such as trying to put a nail in a board with a screwdriver or a saw instead of a hammer.
 - Connect this to different shapes, structure, and sizes of bird beaks for eating different kinds of food. Prompt students with examples from Darwin's finches by asking questions about what the different finches eat and how their beaks are shaped.
 - Ask "How does a bird's beak connect to its habitat?"

Independent Group Work

- Students will use different tools to **identify** which tool or "beak" is best suited to gathering which type of food. They will test the same tools at each station with one type of food.
- Each station represents a **habitat** with a **food** source for birds with 5 different types of tools representing various **beak** types.
- Students will **rotate** between stations in groups. Students are not competing against each other but rather gathering data about types of beaks and birds.
- Each **station** should take about **5 minutes** total.
 - To keep students on track and for more accurate results, have students test **each tool** for **15 seconds**.
 - Be sure to give time between each tool for students to **record their results**, return collected food to the source, and switch tools.
 - Students will also need time to **answer questions** #1-3 before they start and #4-5 after they finish.
 - Some set ups allow for 2 students to be working at the same time. You may choose to increase your setups to increase the number of students that can safely and effectively be working at the same time.
- As students gather the different foods, they must **move** the food from the **source** to the **smaller container**. For the beans, they must crush the beans over the container as this represents opening a seed. For the "nectar", students will be measuring the amount rather than counting the number collected.
- Remind students that they are birds for this activity, so they can only use their beaks to gather and eat their food. Consider having students keep one hand behind their back to remind them to use their beaks only.
- Remind students no to eat the science lab!
- After students have completed all the stations, discuss each station. Ask students which tool worked best and why. Then talk about examples of birds that have this type of beak.
- Ask them again "How does a bird's beak connect to its habitat?" Then have them connect this to Darwin's finches and the Galapagos islands. Ask how the shape of a bird's beak helps it function, to help the bird survive.

Assessment

- **Exit ticket:** Use the Galapagos finches to explain what you think “natural selection” means.
- After collecting exit tickets, give students the definition of natural selection for their notes.

Opportunities for Extended Learning

1. [Mystery Science 5: Can selection happen without people?](#) In this Mystery, students will play a simulation based on a real-life experiment called “Lizard Island.” The simulation shows an example of how nature, not human beings, can slowly change the appearance of an animal using the process of selection.
2. [Galapagos Finches: Famous Beaks](#) is a chapter from *Virus and the Whale: Exploring Evolution in Creatures Small and Large* by Linda Allison and Sarah Disbrow which contains four connected activities about natural selection and beak adaptations in Darwin’s finches focusing on the research of Rosemary and Peter Grant. The video [Galapagos Finch Evolution](#) provides background information on the study. The first activity uses a compass and ruler to measure beaks. For the second activity, students build two size beaks to use in an investigation of which beak is best suited for which food. The third activity involves graphing and analyzing data collected by Rosemary and Peter Grant. The fourth activity is a writing assignment using all that students have learned from the previous activities.

Behavior Management Tips

- ◆ Demonstrate the proper way to use the various tools. In particular, model tool use at Station #3 where they are scooping floating food out of the water. Ask students what they notice about your tool use to prompt them to discuss tool use safety and proper use as well as keeping the water in the tub.
- ◆ Establish how the students will rotate between stations and what signal you will give when time to rotate.

Name: _____

Date _____

Darwin & the Galapagos Islands Data

If these tools are different kinds of bird beaks, which one is the best for gathering the food?

Directions:

At each station, answer the questions as you try the different bird beaks to gather the food into the container. Record the amount of food you can collect with each beak. Remember birds use their beaks, not hands, for collecting food.

Station #1

Tool (Beak) Tested	Amount Collected
pipette	
tweezers	
strainer	
pliers	
clothespin	

1. What is the food at this station? _____
2. What does it represent that birds actually eat? _____
3. Which "beak", or tool, do you predict will pick up the most food?

4. After testing each tool, which is the best "beak"? _____
5. Why did you choose that "beak"?

Station #2

Tool (Beak) Tested	Amount Collected
pipette	
tweezers	
strainer	
pliers	
clothespin	

1. What is the food at this station? _____
2. What does it represent that birds actually eat? _____
3. Which "beak", or tool, do you predict will pick up the most food?

4. After testing each tool, which is the best "beak"? _____
5. Why did you choose that "beak"?

Station #3

Tool (Beak) Tested	Amount Collected
pipette	
tweezers	
strainer	
pliers	
clothespin	

1. What is the food at this station? _____
2. What does it represent that birds actually eat? _____
3. Which "beak", or tool, do you predict will pick up the most food?

4. After testing each tool, which is the best "beak"? _____
5. Why did you choose that "beak"?

Station #4

Tool (Beak) Tested	Amount Collected
pipette	
tweezers	
strainer	
pliers	
clothespin	

1. What is the food at this station? _____
2. What does it represent that birds actually eat? _____
3. Which "beak", or tool, do you predict will pick up the most food?

4. After testing each tool, which is the best "beak"? _____
5. Why did you choose that "beak"?

Station #5

Tool (Beak) Tested	Amount Collected
pipette	
tweezers	
strainer	
pliers	
clothespin	

1. What is the food at this station? _____
2. What does it represent that birds actually eat? _____
3. Which "beak", or tool, do you predict will pick up the most food?

4. After testing each tool, which is the best "beak"? _____
5. Why did you choose that "beak"?

Lesson Prep

- ✓ Preview [The Needs of an Animal](#) video.
- ✓ Determine where you are taking your class to observe a habitat and the boundaries you will give students.
- ✓ Make copies of the “Habitat Survey Chart”, one per student.
- ✓ Gather blank paper and markers, crayons, or colored pencils for the “My Habitat” assignment.

Vocabulary

Habitat


Procedure Part I:

Mini-Lesson

- Show students [The Needs of an Animal](#) video (1:01) which is a song for children about the 4 things animals need to survive.
 - Note the song does say “air” instead of “space”. When discussing habitat needs, address the difference between animals needing air to breathe to live and needing a habitat that includes enough space for them to live, grow, and reproduce. A **habitat** needs **food, water, shelter, and space**.
 - You could play the video again having students sing along substituting space for air in the song.
- Tell students they are going outside to observe a particular habitat in their schoolyard.
- **This activity is intended to lead into the final learning activity in which they will do a creek study. To tie into the creek study, you may want to complete this activity near the creek.**

Independent Work



- Take your class outside to the predetermined area.
- Instruct students to silently observe the habitat around them from ground to sky for the next 1 minute. Tell them they are staying where they are and using their eyes only.
- Allow students to spread out within determined boundaries to work on the **Nature Journaling Prompt**: 
 - You have 10 minutes to observe and draw the habitat, label its features, and note any animals observed.

Guided Practice



- Pass out copies of the “Habitat Survey Chart”.

Learning Objectives:

- Observe a habitat in the schoolyard.
- Identify the four elements of a habitat that an animal needs in order to survive.

Nutshell/Skills:

Students can identify the elements of a habitat that an animal needs in order to survive.

Science Essential Standards:

4.L.1.1, 4.L.1.4

ELA Essential Standards:

RI.4.1, RI.4.9, W.4.6

Time:

Part 1: 45 minutes

Part 2: 45 minutes

Teacher Materials:

- [The Needs of an Animal](#) video (1:01)

Student Materials:

- Nature Journals
- “Habitat Survey Chart”
- Glue sticks
- Blank paper
- Markers, colored pencils, or crayons

- Instruct students to fill in the “Habitat Survey Chart” below as the class answers the questions.
- Ask the class the following questions about the habitat they observed:
 - What food sources did you notice?
 - Was there any water? Where was it?
 - Was there shelter? What kinds of things can provide shelter?
 - Was there enough space for any animals to move around? Prompt students to think about animals of different sizes such as a cricket, a cardinal, and a coyote.
- Have students glue their completed charts into their nature journals once back inside.

Procedure Part 2:

Independent Work

- Ask a student to pass out a blank sheet of paper to each student as well as markers, crayons, or colored pencils.
- As you are giving the verbal instructions below, **model** for students where to write and how to fold the paper.
- At the top of the paper (with it oriented in “landscape”) have students write “**My Habitat**”.
- Then have them **write** the definition of “habitat” on their paper:
 - A **habitat** is an area where people and/or animals live that provides food, water, shelter, and space.
- Ask them to fold it in half (“hamburger” fold) and reopen it. The fold is just to divide the paper in half.
- On the **left side** of the paper, tell students to draw a picture of the outside of their home.
- On the **right side** have them draw the inside of their home, labeling the kitchen, bathrooms, bedrooms, living room, etc.
- For each “habitat”, ask students to **label**: food sources, water sources, shelter, and space.

Assessment

- Collect students’ “My Habitat” drawings. Check that students identified food sources, water sources, shelter, and space in both their outdoor and indoor habitats.
- **Exit ticket:** Ask students to write down the 4 basic needs that a habitat must meet in order for animals to survive.

Opportunities for Extended Learning

1. Students could be introduced to a habitat that is in trouble as a result of air or water pollution, invasion by pests or an invasive species, overcrowding, deforestation, etc. and be prompted to consider which habitat feature is threatened. For example, run off from a new highway is polluting the river the highway crosses, which would impact the water available in that habitat to the animals living there.
2. Each student could pick one animal they observed and learn more about how it is adapted for a particular habitat. Students could draw/describe their animal and share their findings via a gallery walk.

Behavior Management Tips

- ◆ Before going outside, have students remind you of what the expectations are while learning outside.
- ◆ Be sure to give clear instructions on boundaries and appropriate noise level for their nature journaling activity.

Name _____

Date _____

Habitat Survey Chart

Basic Needs	Resources in Our School Yard

Name _____

Date _____

Habitat Survey Chart

Basic Needs	Resources in Our School Yard

Essential Questions

How can adaptations enable animals to survive in changing habitats?

NC Science Essential Standards – Unpacked Content

4.L.1.2 Students know that animals collect information about the environment using their senses. Animals also exhibit instinctive (inborn) behaviors that help them to survive. Students know that in animals, the brain processes information, and signals the performance of behaviors that help the organism survive.

Lessons in this Arc

- ❖ Learning Activity 5: Physical Adaptations of Humans
- ❖ Learning Activity 6: Camouflage & Mimicry
- ❖ Learning Activity 7: How Do I Move?
- ❖ Learning Activity 8: Migration & Hibernation
- ❖ Learning Activity 9: Why Do I Move?

Go Outdoors!

- ✓ Learning Activity 5: Physical Adaptations of Humans
- ✓ Learning Activity 9: Why Do I Move?

Nature Journal Connection

- Learning Activity 9: Why Do I Move?

Duration:

- 7 days of 45 minute learning activities

Background Information

Variation among individuals of a population is natural. Some variation can result in an individual being more fit for survival. An **adaptation** is a physical or behavioral variation that gives an animal an advantage to survive in its environment. Advantages create a better chance of survival. They are inherited and passed down through generations.

Physical adaptations are specialized body parts or physical attributes that help an organism survive. Examples include claws, fur, or a specific body pattern. **Camouflage** is a color or pattern that can help an animal blend in with its surroundings. This is similar to **mimicry** where an animal tries to look like something it is not. One form of mimicry is when an animal imitates the color pattern of a poisonous animal to lead a predator to believe it is also poisonous, such as the viceroy butterfly mimicking the colors of a monarch butterfly. These physical adaptations give an animal a better chance of survival. Camouflage and mimicry help protect animals from being eaten by predators. They can also help an animal catch its prey.

Behavioral adaptations are activities that an organism does to help it survive. Examples include hunting in packs, sleeping at night, hibernating, and migration. **Hibernation** is a state of inactivity, typically during the winter. Animals may **migrate** to another place during a seasonal change. Migrating animals are often in search of food, water, preferred weather, or desirable breeding habitat.

Animals use information from their surroundings as well as instincts in order to survive in their environment. **Instincts** are born behaviors, such as nest building and migrating. These are natural behaviors animals can do from birth that help them to survive in their environment. Some behaviors are **learned behaviors**, such as a bird's ability to fly and a person's ability to read. These are changes that an animal undergoes as a result of experience or behaviors that are taught to them. Learned behaviors are adaptive because they can change due to environmental changes.

Vocabulary

- An **adaptation** is a physical or behavior change that helps an animal survive in its environment.
- **Behavioral adaptations** are activities that an organism does to help it survive.
- **Camouflage** is an animal's color or pattern that helps it blend in with its surroundings.
- **Hibernation** is when an animal is inactive for a period of time, usually during winter.
- An **instinct** is a behavior with which an animal is born.
- **Learned behavior** is a change in behavior that occurs as a result of experience. Learned behaviors are adaptive because they can change if the environment changes.
- **Migration** is when animals move from one place to another during the seasons.
- **Mimicry** is when a living thing resembles another living thing or its environment.
- **Physical adaptations** are body parts or other physical characteristics that help a plant or animal survive in its environment.

Literature Connections

Books

- *What Do You Do With a Tail Like This?* by Steve Jenkins and Robin Page (591 JEN and eBook)*
- *A Butterfly is Patient* by Dianna Hutts Aston (595.78 AST)*
- *Living Color* by Steven Jenkins (591.47 JEN)*
- *Where in the Wild?: Camouflaged Creatures Concealed...and Revealed* by David M. Schwartz (590 SCH)*
- *A Journey Into Adaptation with Max Axiom, Super Scientist* by Agnieszka Biskup (ebook 578.4 BIS)*
- *Hide and Seek: Nature's Best Vanishing Acts* by A. Helman & G. Jecan

Book sets

- *Animal Migration* by Jeanie Mebane
- *Animal Hibernation* by Jeanie Mebane
- *Animals that Live in Groups* by Kelsi Turner Tjernagel

*currently available in Northside library

Lesson Prep

- ✓ Preview *What Do You Do With a Tail Like This?* by Steve Jenkins and Robin Page (591 JEN and eBook).
- ✓ Make copies of the *Physical and Behavioral Adaptations* graphic organizer, one per student.
- ✓ Prepare cloth gloves by taping thumbs down, at least one pair per team.
- ✓ Determine where you will do the relay. Ideally, the relay will go from a start line to about 50 feet away to a low, reachable object such as a bench, fence, or bike rack.
- ✓ Preview the Discovery Education materials.

Vocabulary

Adaptation, behavioral adaptation, physical adaptations

Procedure Part 1:

Mini-Lesson

- **Read** the book *What Do You Do With a Tail Like This?* by Steve Jenkins and Robin Page (591 JEN and eBook).
- Use examples from the book to **discuss physical** and **behavioral adaptations**. Students can complete the *Physical and Behavioral Adaptations* graphic organizer as you read and discuss the book.
- **Ask** students for **examples** of adaptations that **humans** have.
 - If needed, remind them that we have physical and behavioral adaptations that help us survive.
 - Examples include big brains, walking upright, bipedal (two-legged) motion, binocular vision (both eyes in front and working together), and opposable thumbs.
 - **List** the adaptations on the board.
 - Ask students to **turn and talk** to a partner about how their life would be different without these adaptations.

Guided Practice



- **Explain** to the class that they will be participating in the *No Thumbs! Adaptation Relay*. In this **relay**, each team will be tying and untying a piece of string to an object **WITHOUT** using their thumbs.
- The first team member will run up to the object, tie the piece of yarn to the object, and run back.
- The second team member will run up, untie the string, and bring it back to the third team member.

Learning Objectives:

- Describe why physical adaptations are important to humans.
- Discuss other human adaptations.

Nutshell/Skills:

Using a relay race activity, students will become familiar with the presence and importance of human adaptations such as opposable thumbs.

Science Essential Standards:

4.L.1, 4.L.1.2

ELA Essential Standards:

RI.4.1, RI.4.7, RI.4.9, W.4.6, SL.4.1

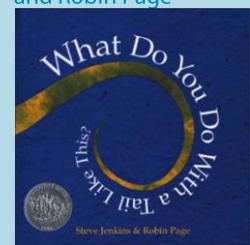
Time:

Part 1: 45 minutes

Part 2: 45 minutes

Teacher Materials:

- Discovery Education login
- *What Do You Do With a Tail Like This?* By Steve Jenkins and Robin Page



Student Materials:

- Graphic organizer
- Cloth gloves with thumbs taped down
- Masking tape
- Two or three 12-inch pieces of yarn
- Chromebooks

- One person ties and the next unties until everyone on the team has had a turn either tying or untying the string.
- When every member of a team has completed its turn, the relay is over and that team wins.
- **No thumbs can be used while tying the string.** Explain whether you will be giving them gloves or taping down their thumbs so that they can't use them during the relay.
- If you have not already done so, set up relay lines about 50 feet from any low, reachable object such as a bench, fence, or bike rack.
- Divide the class into two or three teams.
- Give each team a 12" piece of **yarn or string**.
- Provide each group with at least one pair of **gloves** with thumbs taped to the palm of the gloves. Encourage groups to work together to remove and put on gloves during the relay.
 - Alternatively, you could tape students' thumbs to their palms or alongside their hands. Wrap the tape around their hands a few times. **Be careful** not to cut off circulation.
- If time allows, **complete the relay a second time**, moving the person at the front of the line to the back, so that everyone has a chance to tie and untie the yarn without using their thumbs.
- **Debrief** by asking students the following questions:
 - What was it like to not have thumbs?
 - Was it easier to tie or untie the string? Why?
 - What would our life be like today if we never had thumbs?
 - Would humans have been able to develop things like written language, art, music, or technology?

Independent Work

- Have students write a response to:
 - What new adaptation would you give yourself? How will it help you survive? Draw yourself with your new adaptation.
- You may choose to limit the adaptations they may use, such as nothing that is considered a superpower or only physical adaptations.

Assessment

- **Exit ticket:** Why are adaptations important in humans?

Procedure Part 2

Mini-Lesson

- Use Discovery Education, Changes in Ecosystems, [Concept 4.1 Adaptations](#) to talk about adaptations.

Independent Work

- Students will explore the Discovery Education Board using differentiated boards (low, medium, high).
- Board Topics:
 - Daily writing from the Explain tab in Discovery Ed Techbook
 - Adaptations (low board, medium board, high board)
 - Short term changes in ecosystems (low board, medium board, high board)
 - Long term changes in ecosystems (low board, medium board, high board)
 - Population changes (low board, medium board, high board)

Behavior Management Tips

- ◆ Review expected behaviors for outdoor learning activities prior to going outside.

Can You Find Me? activity is adapted from the [Survivors Lesson Plan](#) by Melanie Potts, Breana Ranes, and Melanie Hay.

Lesson Prep

- ✓ [Read](#) or [watch](#) the instructions for the Butterfly Camouflage activity.
- ✓ Prepare 100 paper butterflies using an assortment of colored and wrapping paper.
- ✓ Tape the 100 butterflies around your room so that some are camouflaged while other are easy to spot.
- ✓ Preview "[Why are butterflies so colorful?](#)" from Mystery Doug (3:40).
- ✓ Familiarize yourself with *A Butterfly is Patient* by Dianna Hutts Aston.
- ✓ Copy the *Can You Find Me?* graphic organizer, one per student.
- ✓ Determine which book(s) you want to use for *Can You Find Me?*

Vocabulary

Camouflage, mimicry, physical adaptation, environment, natural selection, predator, prey

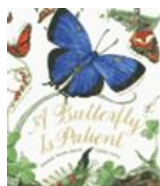
Procedure Part 1

Guided Practice

- ✓ Introduce the idea of camouflage and mimicry using Activity A from [Butterfly Camouflage](#) (video explanation of the activity) in which you place various paper butterflies around your classroom. Students then "hunt" for the butterflies.

Mini-Lesson

- ✓ Discuss the activity in the context of adaptations of butterflies and natural selection.
- ✓ Ask students:
 - Which butterflies were the easiest to find?
 - What do real butterflies and moths that you have seen look like?
 - How is their coloration helpful?
- ✓ Show "[Why are butterflies so colorful?](#)" from Mystery Doug (3:40).
 - The video talks about camouflage and mimicry but does not identify mimicry by name. Ask students if they know what it is called when an animal looks like another animal.
- ✓ Connect what they have learned back to the activity.
- ✓ If time allows, read *A Butterfly is Patient* by Dianna Hutts Aston for more information about butterflies and their adaptations.



Learning Objectives:

Compare and contrast how camouflage and mimicry help animals survive.

Nutshell/Skills:

Students examine what makes an animal seem hidden and give examples of animals that use these same kinds of adaptations.

Science Essential Standards:

4.L.1, 4.L.1.2

ELA Essential Standards:

RI.4.1, RI.4.9, W.4.6

Time:

Part 1: 45 minutes

Part 2: 45 minutes

Teacher Materials:

- "[Why are butterflies so colorful?](#)" video from Mystery Doug (3:40)
- [Butterfly Camouflage](#) activity instructions
- *A Butterfly is Patient* by Dianna Hutts Aston (595.78 AST)
- Colored & wrapping paper
- Butterfly template or die cut
- Scissors
- Tape
- Book(s) on camouflage (see suggestions in Part 2)

Student Materials

- *Can You Find Me?* graphic organizer
- Chromebooks

Procedure Part 2

Guided Practice

- The *Can You Find Me?* activity can be done together as a class or alternately as a station that students rotate through. For this activity, students will answer questions about camouflage using books with pictures of camouflaged animals.
- Pass out a copy of the *Can You Find Me?* graphic organizer to each student.
 - Explain that students will be looking for and then describing adaptations of camouflaged animals.
 - Have a student or students read aloud the questions on the graphic organizer.
- Ask students to remind you why animals need to be able to hide. Point out that camouflage is one of the adaptations animals use to hide.
- Read one or more books depicting camouflaged animals. Suggested titles:
 - *Living Color* by Steven Jenkins (591.47 JEN)
 - *Where in the Wild?: Camouflaged Creatures Concealed...and Revealed* by David M. Schwartz (590 SCH)
 - *A Journey Into Adaptation with Max Axiom, Super Scientist* by Agnieszka Biskup (ebook 578.4 BIS)
 - *Hide and Seek: Nature's Best Vanishing Acts* by A. Helman & G. Jecan
- Instruct students to find the animals hidden within the pictures as you are reading. If possible, project the pictures. Also, encourage students to begin filling out the graphic organizer as you read.
- After finishing the book, give students a couple of minutes to finish the graphic organizer.
- Discuss what they learned and list examples of physical adaptations animal use to hide themselves in their environment on the board.

Independent Work

- The [Peppered Moth Simulation](#) is an interactive simulation going in-depth into an example of camouflage and natural selection.
 - Students click through readings about peppered moths, the affects of pollution on them, and experiments of natural selection's role in the coloration of peppered moths.
 - Then students become birds trying to eat peppered moths. They can try looking for moths in a polluted, dark environment or a natural, lighter forest. The simulation shows how the color of the moth is affected by natural selection.
 - The simulation uses Adobe Flash Player, so it will not work on iPads.
- Students can complete [these data and analysis questions](#) for the [Peppered Moth Simulation](#).
- Note: the simulation defines lichen as fungi whereas lichen are actually a symbiotic relationship between fungi and algae.
- Discuss the [data and analysis questions](#), in particular the three final analysis questions.

Assessment

- **Exit ticket:** How is mimicry similar to camouflage? How is it different from camouflage?
- The *Can You Find Me?* graphic organizer can be used as an assessment.

Opportunities for Extended Learning

1. Additional videos about adaptations, camouflage, and mimicry:
 - Brainpop video "[Camouflage](#)" (2:32)
 - Discover Ed video "[Exploring the Diversity of Life: Not What They Seem](#)"
 - SciShow Kids video "[Animal Tricksters](#)" (3:43) about mimicry
 - Crash Course Kids video "[Living Things Change](#)" (4:36) about adaptations, camouflage, and natural selection. Uses the peppered moth as an example.
 - Note: The rate of speech can be adjusted in the settings of the videos.

Can you find me?

Are these adaptations an example of physical or behavioral adaptations?

What adaptations hid the animals the best?

In the forest?

In the grass?

In the artic (snow)?

In the desert?

What other animals can you think of that use their coloring or body structure to hide themselves? Select an animal and describe how it is adapted to hide in its environment.

Adapted from [Survivors Lesson Plan](#) by Melanie Potts, Breana Ranes, and Melanie Hay

Lesson Prep

- ✓ Prepare one set of cards for each pair of students for the matching activity. Print, cut, and laminate (optional) each of the pictures in the *How Do I Move?* table of pictures. If desired, label the back of each picture so students can look to see if they matched the cards correctly.
- ✓ Make copies of the *How Do I Move?* graphic organizer, one per student.
- ✓ Make copies of the *Create a Creature* student instructions, one per pair.

Vocabulary

Physical adaptation, habitat

Procedure

Independent Group Work

- Explain to students that they will be examining physical adaptations that enable animals to **move** through their habitat.
- Provide each pair of students with a shuffled set of cards and ask them to match structures with the appropriate habitat.
- Correct matches are:

Webbed Feet Picture (duck)	Pond Picture
Wing Picture (dragonfly)	Sky Picture
Hooves Picture (reindeer)	Mountain Picture
Claws Front & Back Picture (crow)	Tree Picture
Flat Tail Picture (dolphin)	Ocean Picture
Long Feet Picture (grasshopper)	Grassland Picture
Flippers Picture (seal)	Rocky Shore Picture
Padded Feet Picture (polar bear)	Arctic Picture
Long Nails on Claw Picture (mole)	Soil Picture

- Ask students to answer the questions on the *How Do I Move?* graphic organizer once they have matched the cards.
- Ask for student volunteers to share a correct match until all are reviewed.
- Use the questions on their graphic organizers to discuss what they learned about how animals move through their habitats.

Learning Objectives:

Distinguish and design animal structures adapted for the appropriate habitat.

Nutshell/Skills:

Students can identify the structural adaptations that enable animals to move through their habitat.

Science Essential Standards:

4.L.1, 4.L.1.2

ELA Essential Standards:

W.4.2, W.4.6

Time:

45 minutes

Student Materials:

- *How Do I Move?* pictures
- *How Do I Move?* graphic organizer
- *Create a Critter* student instructions
- Pencil
- Colored pencils
- White paper

Independent Work

- Students will “Create a Creature” with adaptations to fit a stream habitat. They will draw and describe their creature along with its habitat and adaptations.
- Their creature may be any animal that would be found in a stream, such as a fish, a salamander, frog, insect, or crayfish.
- Within a stream, students will need to decide where their animal lives:
 - Swimming in the water
 - In the leaf litter at the bottom
 - On rocks
 - In sand
- Included should be the creature’s diet and behaviors that help it survive.
- Describe the adaptations and how the creature lives in its habitat.
- Briefly talk about possible adaptations, such as camouflage.
- Emphasize that students should follow the directions in order on their instructions sheet, i.e. coloring should be done at the end if they have time.

Assessment

- The discussion of the *How Do I Move?* graphic organizer can be used as a formative assessment.
- The Create a Creature drawings and descriptions can be assessed.

Opportunities for Extended Learning

1. ***Mystery Science 4: What kinds of animals might there be in the future?*** In this Mystery, students learn how people create new breeds of animals by mating (selecting) individuals with desirable traits. To assess, have students write a response to: Why do puppies in a litter look different from one another?
2. Students could read the [Science A-Z Adaptations book](#) and take the corresponding quiz.



Photo Credit: [artistlike/CC from Pixabay](#)

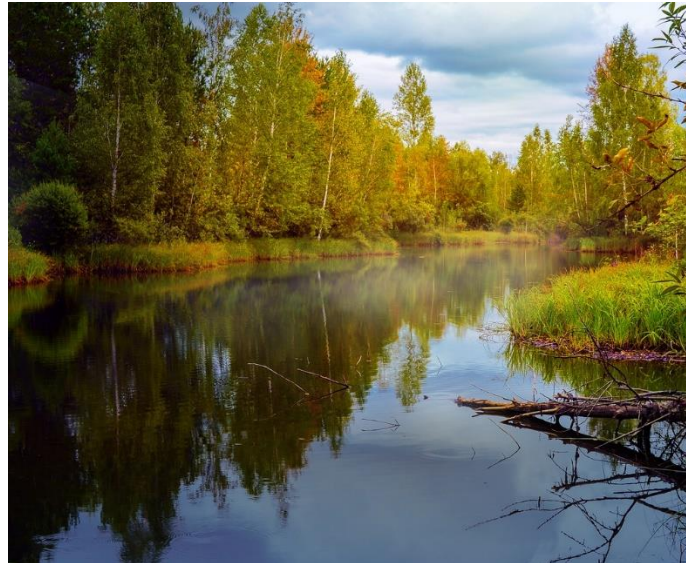


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Photo Credit: [Creative Commons](#)



Photo Credit: [National Park Service Digital Image Archives](#)



Photo Credit: MabelAmber from Pixabay



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Photo Credit: analogicus from Pixabay

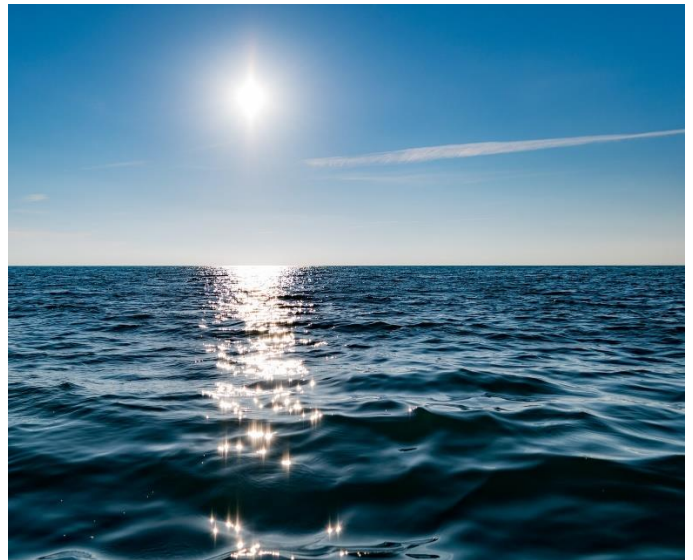


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Photo Credit: yanivmatza from Pixabay



Photo Credit: Free-Photos from Pixabay



Photo Credit: Alexas_Fotos from Pixabay



Photo Credit: MW from Pixabay



Photo Credit: Schlaup from Pixabay



Photo Credit: enriquelopezgarre from Pixabay



Photo Credit: Tabble from Pixabay



Photo Credit: HolgerK at English Wikipedia [Public domain]

How Do I Move?

Name: _____

Match each animal structure picture with the appropriate habitat. Use the pictures to answer these questions:

- a. Are these adaptations an example of physical or behavioral adaptations?

- b. What physical feature is helpful to have for an animal to move in the water? Why?

- c. What physical feature is helpful to have for an animal to move through the air? Why?

- d. What physical feature is helpful to have for an animal to move in the trees? Why?

- e. What physical feature is helpful to have for an animal to move in the mountains? Why?

- f. What physical feature allows humans to move in our environment?

How Do I Move?

Name: _____

Match each animal structure picture with the appropriate habitat. Use the pictures to answer these questions:

- a. Are these adaptations an example of physical or behavioral adaptations?

- b. What physical feature is helpful to have for an animal to move in the water? Why?

- c. What physical feature is helpful to have for an animal to move through the air? Why?

- d. What physical feature is helpful to have for an animal to move in the trees? Why?

- e. What physical feature is helpful to have for an animal to move in the mountains? Why?

- f. What physical feature allows humans to move in our environment?

Create a Creature

As an aquatic ecologist, you have discovered a new animal species. To be able to report your findings to the world, you need to:

1. Draw the critter you have discovered showing at least 2 adaptations.
2. Draw the aquatic habitat where you found the creature.
3. Describe the adaptations, whether they are physical or behavioral, and how they help the creature survive.
4. Color the creature and habitat.
5. Name the creature.

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4. Color the creature and habitat.
5. Name the creature.



Lesson Prep

- ✓ Preview the presentations and videos. Determine which ones to use.
- ✓ Make copies of the [Behavior Sort](#) graphic organizer, one per student.
- ✓ Gather books on migration and hibernation.

Vocabulary

Behavioral adaptation, hibernation, instinct, learned behavior, migration

Procedure

Mini-Lesson

- Ask “What is something that you learned how to do? What is something that you think you were born knowing how to do?”
- Use this slideshow: [Instinct and Learned Behavior](#) and/or this Prezi: [Instinct vs. Learned Behavior](#) to discuss instinct and learned behaviors.
- Watch the Brainpop video “[Behavior](#)” (3:04)
- Students can use this [Behavior Sort](#) graphic organizer to take notes and record examples of instincts and learned behaviors as they watch the Brainpop video and presentation.
- Ask students: What do you know about **migration**? Build on the ideas students share. Add vocabulary to chart. Repeat with the word **hibernation**.
- Watch the Discovery Ed video “[Migration and Hibernation](#)”.
- Show the National Geographic photo collection on [Great Migrations](#).

Independent Group Work

- Have students work in groups of three or four.
- Give each group a book on migration or hibernation. Suggested books are:
 - *Animal Migration* by Jeanie Mebane
 - *Animal Hibernation* by Jeanie Mebane
 - *Animals that Live in Groups* by Kelsi Turner Tjernagel
- Students in each group **read** their assigned book together and work together to identify three big important ideas from the book.
- Groups then **report** their findings to the class.
- **Challenge** each group to also share supporting details for one of their big ideas or have students ask questions.
- **Intervention:** Teacher can be at one of the stations to read with students, or the teacher rotate with a group.

Assessment

- 3-2-1: 3 key words, 2 new ideas, 1 thought about each topic.
- Write two instincts and two learned behaviors; share with a partner.

Learning Objectives:

Differentiate between instinct and learned behaviors.

Nutshell/Skills:

Students can explain migration and hibernation as behavioral adaptations.

Science Essential Standards:

4.L.1, 4.L.1.2

ELA Essential Standards:

RI.4.1, RI.4.2, RI.4.9, W.4.6, SL.4.1

Time:

45 minutes

Teacher Materials:

- [Instinct and Learned Behavior](#) slideshow
- [Instinct vs. Learned Behavior](#) Prezi
- Brainpop video “[Behavior](#)”
- Discovery Ed video “[Migration and Hibernation](#)”
- National Geographic photo collection on [Great Migrations](#)

Student Materials:

- [Behavior Sort](#) graphic organizer
- *Animal Migration* by Jeanie Mebane
- *Animal Hibernation* by Jeanie Mebane
- *Animals that Live in Groups* by Kelsi Turner Tjernagel



Adapted from [Survivors Lesson Plan](#) by Melanie Potts, Breana Ranes, and Melanie Hay

Lesson Prep

- ✓ Make copies of the *Why Do I Move?* graphic organizer, one per student.
- ✓ Be prepared to project map from [Journey North website](#).
- ✓ Preview the [slideshow](#) about migration and Journey North.
- ✓ Determine where you are taking the class outside.

Vocabulary

Migration, behavioral adaptation, instinct

Procedure


This activity uses data from an ongoing citizen science project called [Journey North](#).

Guided Practice

- Remind students that **behavioral** adaptations are **actions** animals take in order to survive in their environment. In this activity, they are going to explore one kind of behavioral adaptation, **migration**.
- Begin discussing the [slideshow](#).
- When you get to slide #4 about Journey North, pass out the *Why Do I Move?* graphic organizer and begin completing it together.
- Click on the Journey North logo to open the Monarch Peak Migration Map on their website. Make sure you are looking at this year's data.
- Follow the prompts on the worksheet and change the projected Journey North map accordingly.
- Once the graphic organizer is complete, move on with the rest of the slideshow.
- Make sure you explain to the students that they will be participating in Journey North and will need to be able to identify monarch butterflies and robins.

Independent Work



- Take the class outside to look for monarchs and robins.
- Take materials to record any data collected. If possible, take an iPad or other device to take a picture of any monarchs or robins spotted.
- **Nature Journaling Prompt** 
 - In which direction are monarchs and robins migrating this time of year? Why?
 - Do you see good habitat for robins or monarchs? Describe and draw what you see.

Learning Objectives:

- Analyze a map of the great Monarch butterfly migration.
- Explain why butterflies and other animals migrate.

Nutshell/Skills:

Students can summarize **migration** and learn why animals migrate.

Science Essential Standards:

4.L.1, 4.L.1.2

ELA Essential Standards:

RI.4.1, RI.4.9, W.4.6

Time:

45 minutes

Teacher Materials:

- Journey North [slideshow](#)
- [Monarch Butterfly Peak Migration Map](#)

Student Materials:

- Nature journal
- Pencil, colored pencils, or crayons
- *Why Do I Move?* graphic organizer

- At the conclusion of the activity, discuss what students have learned about migration and monarch migration in particular. Students should discover that monarch butterflies migrate south each fall to escape the cold weather in the northern part of North America.
- If any Monarch butterflies or robins are spotted, record the data on the [Journey North website](#).

Assessment

- **Exit ticket:** Describe 2 reasons why do animals migrate.

Opportunities for Extended Learning

1. Read a book about migration such as *Bird, Butterfly, Eel* by James Prosek (E Pro) or *Monarch Butterfly* by Gail Gibbons (ebook). Additional books about migration:
 - Carney, E. (2010). *Great migrations: whales, wildebeests, butterflies, elephants, and other amazing animals on the move*. Washington, D.C.: National Geographic.
 - Rylant, C., & Davis, L. (2006). *The journey: stories of migration*. New York: Blue Sky Press.
 - Sayre, A. P., & Berenzy, A. (1998). *Home at last: a song of migration*. New York: Holt.
2. Get students outside to report robin and monarch sightings at least once a month (in conjunction with outdoor activities on school grounds) in fall (and spring if desired).
3. Mystery Doug "[Why do animals come back after going warm places in winter](#)" video (5:25) about migration focusing on monarch butterflies.

Behavior Management Tips

- ◆ Review expected behaviors for outdoor learning activities prior to going outside.
- ◆ Discuss appropriate behavior for when wildlife, like Monarchs and robins, are spotted.

Name: _____

Date: _____

Why Do I Move?

1. Draw a **star** ★ near your town on the map below.
2. Go to <https://maps.journeynorth.org/>
3. Click on the box labeled **Monarch Peak Migration**
4. Observe the map and notice where migrating monarchs have been sighted this fall. Have any been sighted near you? _____
5. Using the legend provided on the right side of the screen, what color dot(s) represent(s) a sighting in August? _____ In October? _____ After November 21st? _____
6. In August of this year, where did most sightings take place? Use a colored pencil or crayon to indicate the location of sightings on the map below:



7. Next, select the previous year and click on “play” to view the animation for the fall of that year. **What do you notice?**

8. **Predict** what you would expect your map to look like at the end of the current year. Use the map and colored pencils or crayons to draw your predictions.

Migration Nature Journaling Prompt

- ◆ In which direction are monarchs and robins migrating this time of year?
Why?
- ◆ Do you see good habitat for robins or monarchs? Describe and draw what you see.

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Essential Questions

What positive impacts can we have on our schoolyard and surrounding habitats to support the needs of a wide variety of animals?

NC Science Essential Standards – Unpacked Content

4.L.1.3 Students know that humans can adapt their behavior in order to conserve the materials and preserve the ecological systems that they depend on for survival.

Lessons in this Arc

- ❖ Learning Activity 10: From the Rivers to the Sea: Stream Study Part 1
- ❖ Learning Activity 11: Impacts of Pollution on a Habitat
- ❖ Learning Activity 12: Humans & Changing Habitats
- ❖ Learning Activity 13: From the Rivers to the Sea: Stream Study Part 2

Go Outdoors!



- ✓ Learning Activity 10: From the Rivers to the Sea: Stream Study Part 1
- ✓ Learning Activity 11: Impacts of Pollution on a Habitat
- ✓ Learning Activity 13: From the Rivers to the Sea: Stream Study Part 2

Nature Journal Connection



- Learning Activity 10: From the Rivers to the Sea: Stream Study Part 1
- Learning Activity 11: Impacts of Pollution on a Habitat

Duration:

- 8 days of 45 minute learning activities

Background Information

Humans rely on the natural world to provide resources for survival. Humans can use learned behaviors to conserve materials and protect ecological systems, thereby, having a positive impact on an environment. Recycling, participating in litter clean-ups, reducing consumption of resources, and conserving energy are some ways humans can take responsibility. Pollution, on the other hand, negatively impacts an environment. **Pollution** is any substance that enters the environment and has a harmful effect. Pollution can affect any part of an environment – land, water, or air. The negative impacts on the abiotic factors in a habitat may then have a negative impact on the biotic factors. Over consumption, invasive species, deforestation, and climate change can cause changes to habitats that may have negative impacts on biodiversity.

Vocabulary

- Pollution

Literature Connections

Books

The Lorax by Dr. Seuss (E Seu)*

*currently available in Northside library

Adapted from [Exploring Your Watershed](#) by Jenna Hartley, part of the US EPA's EnviroAtlas Educational Modules.

Lesson Prep

- ✓ If desired, watch an [overview](#) of these lessons.
- ✓ Preview the "[What is a Watershed](#)" video (1:15).
- ✓ Make copies of the *Wax Paper Watersheds* handout, one per student. Choose whether you are using the student-led or teacher-led version.
- ✓ Make copies of the *EnviroAtlas* handout, one per student or one per group. Choose whether you are using the student-led or teacher-led version. If computers are unavailable, use the paper map version.
- ✓ Follow the instructions for the *EnviroAtlas* lesson to be sure you can easily assist students as needed.
- ✓ Walk the path of a raindrop as created in *EnviroAtlas* to identify where it goes and to mitigate any safety hazards.
- ✓ Print paper maps of the school from the [EnviroAtlas Interactive Map](#) online, if using.
- ✓ Note: all materials are available in Spanish.

Vocabulary

Pollution


Procedure

Students will complete the US EPA's EnviroAtlas Curriculum [Exploring Your Watershed](#). Note: these lessons were written by Jenna Hartley who provided onsite professional development during the summer of 2018 at Northside Elementary School.

Mini-Lesson

- Introduce what a watershed is using the "Engage, Option 1: Video".

Guided Practice/ Independent Group Work

- Complete the *Wax Paper Watersheds* Lesson.
 - Have students work in small groups.
 - Decide if you want to complete the activity as a guided practice using the teacher-led handout or as independent group work using the student-led handout.
- Have students work in pairs or small groups to complete the *EnviroAtlas* Lesson.
- Take students outside to complete the "Elaborate: *EnviroAtlas* Lesson – Follow Your Raindrop!" portion of the curriculum. 

Learning Objectives:

Describe a watershed and how humans can impact their watershed.

Nutshell/Skills:

Students can define and explain the concept of a watershed.

Science Essential Standards:

4.L.1.1, 4.L.1.3

ELA Essential Standards:

W.4.2, W.4.6, SL.4.1

Social Studies Essential Standards:

4.G.1

Time:

2 sessions of 45 minutes each

Teacher Materials:

- [Exploring Your Watershed](#) curriculum from US EPA
- "[What is a Watershed](#)" video

Student Materials:

- Spray bottle with water, 1 per group
- Wax paper
- Washable markers
- Baking pan or other container for wax paper watershed
- *Wax Paper Watersheds* handout
- Chromebooks
- *EnviroAtlas* handouts

- Before returning inside, have students respond to the **Nature Journaling** prompt:
 - How can you have a positive impact on your watershed?



Assessment

- Handouts from the *Wax Paper Watersheds* and *EnviroAtlas* activities can be used as assessments.

Opportunities for Extended Learning

- Complete the *Exploring Your Watershed by Getting Outdoors* activity using the [teacher handout](#) on p. 19-21 of the *Exploring Your Watershed* curriculum.
- Explore the extension options at the end of the procedure's description on p. 9 and at the end of the description for *Exploring Your Watershed by Getting Outdoors* on p. 21 of the *Exploring Your Watershed* curriculum. Note: students will be going outside in Stream Study Part 2 to observe macroinvertebrates and other aspects of a local stream.
- Watch and discuss the Mystery Doug video "[Why can't fish breathe on land?](#)" (4:55).

Behavior Management Tips

- ◆ Review expected behaviors for outdoor learning activities prior to going outside.
- ◆ Remind students of boundaries and expectations during Nature Journaling.

Lesson Prep

- ✓ Preview *The Lorax* by Dr. Seuss.
- ✓ Make copies of the *Before & After T-Chart* and the *Positive & Negative Impacts T-Chart*, one per student. They can be copied front and back on the same paper.
- ✓ Make copies of *The Lorax Nature Journaling Prompt*, one per student.
- ✓ Determine where you are going to go outside to look for pollution and respond to the nature journaling prompt.

Vocabulary

Pollution, abiotic factors, biotic factors, environment, habitat, population, adaptation

Procedure



Mini-Lesson

- Ask students: What is **pollution**? Name some types of pollution.
- Then read *The Lorax* by Dr. Seuss

Guided Practice

- Ask students:
 - Give **examples** of **pollution** from *The Lorax*.
 - How did the Once-ler's factory **affect** the food supply for any animals?
 - What did the Brown Bar-ba-loots eat?
 - The Humming-Fish couldn't live in their pond anymore because the water was dirty. Do you think they could find food to eat in the dirty water?
- Have students **complete** the *Before & After T-Chart* as a class.

Independent Work

- Have students **complete** the *Positive & Negative Impacts T-Chart* to show how the factory changed the environment.
- Go **outside** to look for **evidence** of **pollution** in the schoolyard or a nearby habitat. 
- **Nature Journaling prompt:** 
 - Thinking about what the Lorax did, what could you do to "speak for the trees"? What can you do to have a positive impact on your habitat?
- Take bags outside for students to pick up trash.

Learning Objectives:

Classify changes to a habitat as positive or negative impacts.

Nutshell/Skills:

Students can describe examples of pollution.

Science Essential Standards:

4.L.1.1, 4.L.1.2, 4.L.1.3

ELA Essential Standards:

RI.4.1, RI.4.2, RI.4.7, W.4.2, SL.4.1

Social Studies Essential Standards:

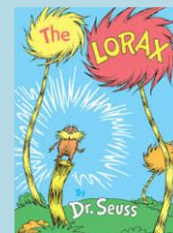
4.G.1

Time:

45 minutes

Teacher Materials:

- *The Lorax* by Dr. Seuss (E Seu)



Student Materials:

- *Before and After T-Chart*
- *Positive & Negative Impacts T-Chart*
- Nature Journals
- *The Lorax Nature Journaling Prompt*
- Glue sticks
- Pencils

Assessment

- Exit ticket: What are 2 ways in which pollution can negatively impact a habitat?

Opportunities for Extended Learning

1. Use the [Fly Away Home](#) activity to further discuss how habitat loss can affect animal populations.
2. Have students respond to one of these writing prompts:
 - Could the Lorax had done something differently to save the Truffla Trees and animals?
 - Describe a real-life example of how man-made pollution affected a real ecosystem.

Behavior Management Tips

- ◆ Review expected behaviors for outdoor learning activities prior to going outside.
- ◆ Remind students of boundaries and expectations during Nature Journaling.

Name _____

Date _____

Before & After T-Chart

Before the Once-ler
opened the factory

After the Once-ler
opened the factory

Name _____

Date _____

Positive & Negative Impacts T-Chart

Positive Impacts
of Manufacturing Thneeds
(Who benefitted from this?)

Negative Impacts
of Manufacturing Thneeds
(Who did not benefit from this?)

The Lorax Nature Journaling Prompt:

- Thinking about what the Lorax did, what could you do to “speak for the trees”? What can you do to have a positive impact on your habitat?

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The Lorax Nature Journaling Prompt:

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Lesson Prep

- ✓ Preview the [Changing the Faces of the Earth: Before and After Images](#) slideshow.
- ✓ Preview the [Humans & the Environment](#) BrainPop video (4:36).
- ✓ Make copies of the [Human Impact on the Environment](#) graphic organizer, one per student.

Vocabulary

Pollution

Procedure

Mini-Lesson

- **Show** [Changing the Faces of the Earth: Before and After Images](#) slideshow.
- The slideshow contains discussion **questions** about **changes** to the ecosystem including **impacts** to wildlife and **impacts** caused by humans.
- **Watch** the [Humans & the Environment](#) BrainPop video (4:36).
- **Ask** students "What can we do to reduce pollution and help the environment?"

Independent Work

- Students will use the [Human Impact on the Environment Interactive](#) website to answer the questions on the [Human Impact on the Environment](#) graphic organizer.
- Show students the website and where to click on "Launch Interactive". Briefly **demonstrate** how the interactive works and how to check the boxes under impacts per their instructions.

Assessment

- **Exit Ticket:** 3 things I learned, 2 things I want to know more about, 1 thing that surprised me

Opportunities for Extended Learning

- Watch the BrainPop videos on [Air Pollution](#) (3:31) and [Water Pollution](#) (3:15).
- Watch the BrainPop Jr. [Reduce, Reuse, Recycle](#) video (4:48).
- [NASA's Earth Observatory](#) website has images showing natural and man-made impacts to our world.
- Show students pictures of pollution. Ask the following question for each one:
 - What type of pollution do these pictures show?
 - How does it affect people? Animals? Plants?
 - What can we do to reduce pollution and help the environment?

Learning Objectives:

Describe human impacts on the habitats and the animals living there.

Nutshell/Skills:

Students can interpret how changes to a habitat can impact that habitat and its inhabitants.

Science Essential Standards:

4.L.1.1, 4.L.1.3

ELA Essential Standards:

W.4.6, SL.4.1

Social Studies Essential Standards:

4.G.1

Time:

45 minutes

Teacher Materials:

- [Changing the Faces of the Earth: Before and After Images](#) slideshow
- [Humans & the Environment](#) BrainPop video

Student Materials:

- [Human Impact on the Environment](#) graphic organizer

Name: _____

Date: _____

Human Impact on the Environment

Directions: Go to <https://www.biointeractive.org/classroom-resources/anthropocene-human-impact-environment> Click "Launch Interactive" above the mountain picture. Follow the directions below and answer each question.

1. Read the Introduction.
2. Describe the picture. _____

3. Next to the word **atmosphere** click on the box, making a check appear. What happens to the picture?

4. Next to the word **biodiversity** click on the box, making a check appear. What happens to the deer?

5. Next to the word **cities** click on the box, making a check appear. What happens to the trees and little house?

6. Next to the word **coastal habitats** click on the box, making a check appear. What happens to the coastal habitat? _____
7. Next to the word **farms** click on the box, making a check appear. What happens along the river?

8. Next to the word **forests** click on the box, making a check appear. What happens to the forest?

9. Next to the word **invasive species** click on the box, making a check appear. What happens along the coast?

10. Next to the word **mining** click on the box, making a check appear. What happens to the mountain?

11. Next to the word **ocean** click on the box, making a check appear. What happens to the ocean?

12. Next to the word **water use** click on the box, making a check appear. What happens to the area between the mountains? _____
13. With all the boxes checked, what does the picture look like now? _____

14. How have people changed this environment? _____

15. How do you think this affects the animals? _____

Adapted from *Are You Me?* in [Project WILD Aquatic](#) (©2010) and [Baby Animals: A Science Lesson](#) by Christy Peterson

Lesson Prep

- ✓ Prepare cards of pictures of animals with a picture of that animal as an adult and as a young animal, one card per student. For animals, with multiple stages in their life cycle choose the adult stage and one other stage. Focus on aquatic animals, specifically on ones they may see in a stream. The *Project WILD Aquatic* activity “Are You Me?” (p. 2-7) has pictures that you could use.
- ✓ Gather or print and laminate [Key to Macroinvertebrate Life in the River](#) and the [Biotic Index](#), one per group.
- ✓ Gather stream study materials including nets and containers. Note: nets may include D-nets, kick nets, and aquarium nets.

Vocabulary

Habitat, adaptation

Procedure Part 1

Guided Practice

- **Before** going to the stream, explore with students what they may find and how to safely look for aquatic animals.
- Refer to *Are You Me?* from [Project WILD Aquatic](#) and [Baby Animals: A Science Lesson](#) by Christy Peterson for additional procedures and resources.
- **Ask** students if they have always looked the way they do today.
- Use students’ answers to **discuss** how as humans and other animals grow their appearance and adaptations change.
- **Explain** that students are going to be matching pictures of animals at two different points in their life. Each student will receive a card with a picture of an animal on it. Each card handed out has a matching card of the same animal at a different stage in its lifecycle.
- Students should **move** safely around the room in **search** of the person with the card of the **same animal at a different life stage**.
- Direct students to either move to a specific location in the classroom or to sit down once they have found their match.
- Set a timer for 2 minutes for students to find their match.
- Once time is up, have students hold up their matches. Address the fact that some matches were more challenging than others as the different stages look very different from each other.
- Collect all the matches. Show the students the correct matches for each of the animals.
- Choose a few matches to more deeply explore that animal’s adaptations.

Learning Objectives:

Evaluate a stream habitat and the adaptations of its inhabitants.

Nutshell/Skills:

Observe and classify animals that live in a stream.

Science Essential Standards:

4.L.1.1, 4.L.1.2, 4.L.1.3

ELA Essential Standards:

SL.4.1

Social Studies Essential Standards:

4.G.1

Time:

Part 1: 2 sessions of 45 minutes each
Part 2: 2 sessions of 45 minutes each

Teacher Materials:

- Project WILD Aquatic

Student Materials:

- Cards with pictures of matching adult and baby animals
- [Key to Macroinvertebrate Life in the River](#)
- [Biotic Index](#)
- Aquatic field guides
- Nets
- Private Eyes
- Tubs for water
- Smaller containers such as bug jars, ice cube trays, and petri dishes
- Boots
- iPads (optional)

Mini-Lesson

- Pass out copies of the key to **macroinvertebrates**, **biotic index**, and **field guides** that you will be using at the stream.
- If available, download [Aqua Bugs App](#) to a few iPads as an additional way to identify macroinvertebrates.
- Have students **practice** using the materials for **identification** by calling out a few animals, such as mayfly, snail, and dragonfly, for students to find in these resources. Ask if the pictures of the animals are when they are young or as adults.
- **Explain** that some animals are **adapted** to live in more **polluted** water than others. Ask how they can use these resources to learn about these animals and how polluted the stream near school is.
- **Describe** to the class how they will **collect data** and make **observations** of a nearby stream. Briefly go over the procedures for their time at the stream to help prepare them and to maximize the amount of time you are outside.
- **Model** how to use any **equipment** students will be using and give specific guidelines for proper use. For example, demonstrate how a net can be used to investigate the biotic factors in the creek and explain that putting rocks in the nets will break the nets.
- Give students **instructions** for how to **dress** the following day for the stream study. Recommend to students to bring an extra set of clothes, especially socks, in case they get wet. Suggest to students to bring rain boots or other shoes that can get wet along with a second pair of shoes to change into afterward. Provide extra boots and extra socks, if possible.

Guided Practice



- Take your class to the **stream**. Have students look for **macroinvertebrates** and **human impacts** to the habitat.
- **Before** breaking up into groups, discuss with students the importance of respecting nature, both biotic and abiotic factors.
- Ask a **student** to **model** how to use the **nets** and what to do when they catch an animal based on what you showed them the previous day.
- **Remind** students if an animal is taken out of the water it needs to immediately be placed into a container of water to keep it alive.
- **Divide** the class into groups.
 - Give each group a [Key to Macroinvertebrate Life in the River](#) and a [Biotic Index](#) as well as any field guides.
 - Each group also needs a net and a small container in which to put captured critters.
 - Have a few larger containers with water available in which to collect animals.
- After about 10 to 15 minutes of exploration is up, gather class to **observe** the various **macroinvertebrates** and other critters that have been caught. Have students tell you about some of their **adaptations**.
- Discuss the biotic index and the health of their stream
 - Ask students for examples of negative and positive human impacts to the stream.
- Return all organisms back to the stream and gather all materials.

Procedure Part 2

Mini-Lesson

- Discuss how the stream is a part of their watershed, connecting to the larger creeks and rivers until it reaches the ocean.
- Refer back to *From the Rivers to the Sea: Stream Study Part 1* to prompt students to make these connections.
- Use a map such as the [EnviroAtlas Interactive Map](#) used in *From the Rivers to the Sea: Stream Study Part 1* or [Discover Your Ecological Address](#) ArcGIS map to show students the flow of water to the ocean.

Independent Group Work

- Have students work in the same groups as they did in the stream to make a plan to improve the stream habitat, such as a litter clean up between the school and the stream.

- Ask students to repeat the impacts that were discussed the previous day.
- Emphasize to the students that they will be doing these improvements the next day.
- If needed, prompt students to think about pollution to the stream and to the surrounding watershed. Ask them how they could improve the habitat.
- Have each group briefly share their idea with the class.
- Determine if it is feasible for each group to implement their plan or if preferred choose one plan for the whole class to implement. You could have the class vote on the plans to determine which one to implement.

Guided Practice

- Take students outside to implement their plans to improve the stream habitat.

Opportunities for Extended Learning

- Watch "[A Fresh Future: Crash Course Kids #33.2](#)" about positive and negative impacts to freshwater systems.

Behavior Management Tips

- ◆ Make sure you give students clear boundaries where they can go but allow room for groups to explore and be somewhat separated from each other.
- ◆ If student behavior is not meeting expectations, have students debrief through a +/Δ conversation, discussing what is going well in their investigation and what they should change.
- ◆ Set a timer for a little less than how long you want to spend studying the stream. This allows you to give students a warning that time is almost up and time to clean up materials.
- ◆ Have students check the area for any forgotten materials.
- ◆ Remind students that they must wear shoes for their safety as there may be broken glass on the ground.
- ◆ Ask students to remind you of the learning goal.



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Engaging Activity: Journey Around the Schoolyard

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Learning Activity 2: How Many Bears Live in This Forest?

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Learning Activity 8: Migration & Hibernation

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Learning Activity 9: Why Do I Move?

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