

THE WHYNAUTS:

Amazing Adaptations

EDUCATOR GUIDE SUGGESTED GRADE LEVELS 3RD-5TH



Per[]t
Museum of Nature and Science

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INTRODUCTION

HOW TO USE THIS GUIDE

The Whynuat **“Amazing Adaptations”** video explores how structural and behavioral adaptations help plants and animals survive in three ecoregions of Texas. This guide is designed to help you incorporate the video into a complete learning experience for your students. It is composed of three main sections:

The **Viewing Strategies and Tools** section includes suggestions for engaging students with the video, a student viewing journal to encourage active participation, and a pre- and post-assessment to track student learning. These materials can be printed out or completed digitally.

The **Supplemental Activities** section includes options for both hands-on and virtual learning. The pre-video activities are recommended to help students engage with and explore the content, while the post-video activities are recommended to extend and evaluate learning. You can choose to use the activities in any order or combination that works best for you.

The **Additional Resources** section includes a glossary, reading list, and links to continue learning.



LEARNING OBJECTIVES

Students will be able to:

- Explain how adaptations help a plant or animal survive in its environment.
- Compare structural and behavioral adaptations of different plants and animals.
- Understand that humans and other animals impact their environments.

TEKS ALIGNMENT

SCIENCE CONCEPTS

3.10A Explore how structures and functions of plants and animals allow them to survive in a particular environment

4.10A Explore how structures and functions enable organisms to survive in their environment

5.9A Observe the way organisms live and survive in their ecosystem by interacting with the living and nonliving components

5.10A Compare the structures and functions of different species that help them live and survive in a specific environment such as hooves on prairie animals or webbed feet in aquatic animals

SCIENTIFIC INVESTIGATION AND REASONING

3-5.3C Connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists

SOCIAL STUDIES

4.8A Describe ways people have adapted to and modified their environment in Texas, past and present, such as timber clearing, agricultural production, wetlands drainage, energy production, and construction of dams

BACKGROUND INFORMATION

ORGANISMS AND ENVIRONMENTS

An **organism** is an individual living thing, such as a plant or an animal. You are an organism too! An organism's **habitat** is a lot like your own home. It contains everything the organism needs to survive - including food, water, shelter, and space. An **ecosystem** is like your neighborhood, and is composed of many different habitats.

The organisms that live in an ecosystem often interact with each other. One example is when animals are looking for food. **Herbivores** mainly eat plants, **carnivores** mainly eat other animals, and **omnivores** eat both plants and other animals. We call an animal that eats another animal a **predator**, and we call the animal that gets eaten **prey**.

Organisms also interact with their surroundings. These surroundings, such as temperature or pollution, are referred to as the environment. Humans and other animals impact their environments. For example, beavers build dams, which helps establish and maintain wetlands. Humans clear land for agriculture, buildings, homes, and roads. Human activity also causes pollution of the air, land, and sea.

ADAPTATIONS

Plants and animals (and other organisms), have a variety of **adaptations** that help them survive within their environments. These adaptations may help the organism protect itself, locate food, or communicate. There are two kinds of adaptations - structural and behavioral. A **structural adaptation** is a physical feature that helps an organism survive. The way a **structure** is shaped allows it to complete a particular **function** or role. A **behavioral adaptation** is an action an animal does that helps it survive.

The wide, flat tail of a beaver is a great example of both types of adaptations. When a beaver is swimming, its tail helps to steer and is a powerful paddle for extra speed. This physical feature is a structural adaptation. When a beaver feels threatened, it will slap its tail on the surface of the water to alert other beavers of the nearby threat. This action is a behavioral adaptation.

Many careers relate to adaptations and ecosystems. Students who enjoy learning about these topics may be interested in becoming a veterinarian, wildlife biologist, environmental engineer, park ranger, or other STEM professional.

NORTH AMERICAN BEAVER



TEXAS ECOREGIONS

Texas is divided into **ecoregions** – areas where ecosystems are generally similar. The video explores three of these ecoregions: Trans-Pecos, Blackland Prairie, and Pineywoods.

Trans-Pecos

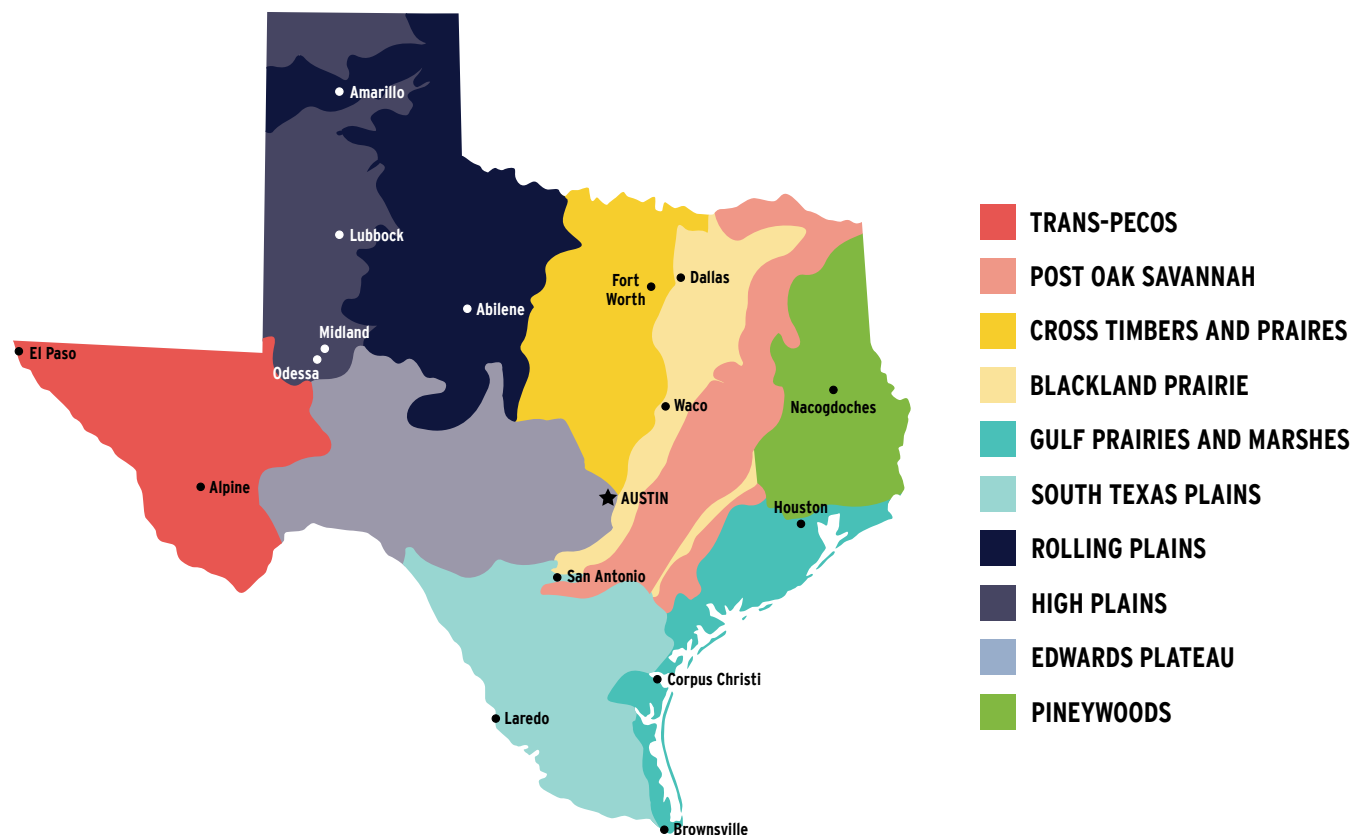
The Trans-Pecos includes many diverse habitats and vegetation, including desert valleys and plateaus, and wooded mountain slopes. The average rainfall is less than 12 inches per year, but fluctuates greatly throughout the region depending on elevation. The Chihuahuan Desert is within this ecoregion and is one of the most biologically rich and diverse desert ecoregions in the world! Some plants and animals that call the Chihuahuan Desert home are: creosote bush, prickly pear cactus, black-tailed prairie dog, collared peccary, Harris's hawk, burrowing owl, horned lizard, and Trans-Pecos rat snake.

Blackland Prairie

The Blackland Prairie is named for the deep, rich, black soils that characterize this region of Texas. The average rainfall is 28-40 inches per year. The landscape is described as gently rolling to nearly flat, and features tallgrass prairies with species such as: little bluestem, Indiangrass, switchgrass, purple coneflower and Texas bluebonnet. Large areas of the prairie have been developed and less than 1% remains today, making it the most endangered large ecosystem in North America. This region is home to animals such as: coyote, plains harvest mouse, red-tailed hawk, ornate box turtle, and copperhead snake.

Pineywoods

The Pineywoods region of Texas is just a small portion of a pine-hardwood forest that extends into the surrounding states of Louisiana, Arkansas, and Oklahoma. It contains many hills covered with pines and oaks and low-lying areas with tall hardwood trees. Swamps are common in southern portions. The average rainfall is 36-50 inches per year, with high temperatures and humidity. It is home to a variety of animals including: white-tailed deer, nine-banded armadillo, Virginia opossum, blue jay, red-cockaded woodpecker, Texas ratsnake, and southern leopard frog.



VIEWING STRATEGIES AND TOOLS

SUGGESTED DISCUSSION QUESTIONS

You can choose to have students watch the Whynauts “Amazing Adaptations” video in one sitting, or break it up into sections. We recommend pausing the video between ecoregions to check for understanding, using the suggested discussion questions. Example answers are also included.

■ INTRODUCTION AND TRANS-PECOS REGION

- **Describe one adaptation of the cactus. How does it help the cactus survive in its environment?**
 - Thick, waxy skin to prevent water loss
 - Shallow roots to gather water quickly
- **Discuss the adaptations of the western diamondback rattlesnake. Which adaptations are structural and which are behavioral?**
 - Structural- long tubular fangs, venom, bones of jaw are loosely joined together
 - Behavioral- shaking their rattle to warn larger animals

■ BLACKLAND PRAIRIE REGION

- **What impact have humans had on the Blackland Prairie?**
 - Humans have developed the prairie for agriculture and to build homes and other buildings. This has caused a lack of space for wildlife and therefore a lack of diversity within the prairie.
- **Describe the relationship between the coyote and cottontail rabbit.**
 - Predator/Prey Relationship. Coyotes are the predators; rabbits are the prey.

■ PINEYWOODS REGION

- **How does the beaver impact its environment?**
 - Beavers act as “ecosystem engineers” by cutting down trees and building lodges and dams. Stopping or slowing the flow of water provides habitats for many plants and animals.
- **If you could choose one adaptation from the video, which would you choose and why?**

STUDENT VIEWING JOURNAL

This tool helps students actively participate before, during, and after watching the video. For younger students, you may want to go through the Know, Wonder, Learned (KWL) chart and reflection sentence stems together as a group.

PRE- AND POST-VIDEO ASSESSMENT

The assessment contains both multiple choice and short answer questions. You can assess prior knowledge and track learning by having students complete the assessment both before and after watching the video.

Student Viewing Journal

BEFORE YOU WATCH THE VIDEO:

Use the KWL chart to record what you **know** and what you **wonder** about how plants and animals survive in their environment.



KWL Chart

WHAT I KNOW	WHAT I WONDER	WHAT I LEARNED

AFTER YOU WATCH THE VIDEO:

Record what you **learned** in the KWL chart.

COMPLETE THESE SENTENCES:

This reminds me of

I was surprised by

The most interesting thing I learned was

Pre- and Post-Video Assessment

1. If you could choose to have one adaptation from any plant or animal in the world, what would you choose and why?

2. Some animals, like the cottontail rabbit, have chisel-shaped front teeth and relatively flat molars. Others, like the coyote, have sharp, pointed canines and molars with sharp edges.



RABBIT SKULL



COYOTE SKULL

The difference in the shape of teeth is most likely related to:

- A. The noises the animal makes
- B. What the animal eats
- C. The habitat the animal lives in
- D. It isn't related to anything

3. What do you think would happen in the Blackland Prairie if all of the coyotes disappeared? Explain your reasoning.

PRE- AND POST-VIDEO ASSESSMENT

1. If you could choose to have one adaptation from any plant or animal in the world, what would you choose and why?

Answers will vary.

2. Some animals, like the cottontail rabbit, have chisel-shaped front teeth and relatively flat molars. Others, like the coyote, have sharp, pointed canines and molars with sharp edges.



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The difference in the shape of teeth is most likely related to:

- A. The noises the animal makes
 - B. What the animal eats**
 - C. The habitat the animal lives in
 - D. It isn't related to anything
3. What do you think would happen in the Blackland Prairie if all of the coyotes disappeared? Explain your reasoning.

Answers will vary. Example - The coyotes are predators that may eat small mammals within the prairie.

If the coyotes disappeared, the population of these small mammals would increase. Many of the small

mammals are herbivores or omnivores, so if there is a larger population feeding on the plants, the plants

would soon disappear - disrupting the entire ecosystem.



PRE-VIDEO ACTIVITIES

Birds in my Backyard
Opposable Thumb Challenge

PRE-VIEWING ACTIVITY #1

Birds in my Backyard

Adapted from The Cornell Lab *On Meadowview Street* Lesson

OBJECTIVE

- Students observe their local habitat, looking for sources of food, water, shelter and space. Then they will observe and compare the adaptations of some of the birds that live in the habitat.

MATERIALS

- Computer with internet access
- Habitat Exploration Field Notes - printed or digital (pg 16)

ACTIVITY

PART 1: HABITAT EXPLORATION

1. Begin with a class discussion about habitats:

- a. What is a habitat? What does it contain?
 - A **habitat** is the place where an animal lives. It contains everything an animal needs to survive.
- b. What does an animal need to survive? You may ask students to name examples, or why each factor is important for a plant or animal.
 - **Food** - plants, insects, other animals
 - **Water** - streams, ponds, lakes, puddles
 - **Shelter** - nests, burrows, lodges; offers protection from weather or predators
 - **Space** - this will vary by species, but an animal will be able to find the food, water and shelter needed to survive within the space it travels.
 - You may get other answers (such as air, a way to protect themselves) - try to work them in too!

2. Have students imagine they are a bird. Tell them you will ask some questions, and that they should think about their habitat and visualize their answers rather than responding verbally.

- a. What do you see? Where do you live?
- b. Think about what you eat. How do you find your food? How do you eat it?
- c. Where can you find water?
- d. Where is your shelter? What does it look like? Does it offer protection from predators? From weather?
- e. Where do you lay your eggs? Are they protected? How?
- f. How much space do you need to survive? Is there enough?

3. Separate students into small groups to discuss their answers to the questions above. Then discuss as a class. You may wish to use a graphic organizer to record and display answers by category - food, water, shelter, space.

4. Birds (and other animals) rely on their habitat to provide everything they need to survive. Let's take a look at the habitat here! Have students go outside - the schoolyard, backyard, or park - to observe the habitat. Ask them to record their observations using the Habitat Exploration Field Notes.

5. Back in the classroom, discuss what students observed. You may want to update or redo the graphic organizer with information from the local habitat. Keep in mind students may observe different items. This is important, as many different birds will call the schoolyard or park home - even some not seen today!

PART 2: BIRD ADAPTATIONS

- 1. Animals, including birds, have adaptations that help them to survive in their habitats. Structural adaptations** are physical features that help an organism survive. The way a **structure** is shaped allows it to complete a particular **function** or role. **Behavioral adaptations** are actions an animal does that help it survive.
- 2. Now that we have explored some local habitats**, let's look more closely at 3 birds found in North Texas and how they are adapted to survive in this region. If you live somewhere else, you can use these birds or research species local to your area.
- 3. The videos and images linked below illustrate several adaptations these birds use to survive.** Ask students what they observe while viewing and to compare and contrast the adaptations they see.
 - a. Bird Behaviors:**
 - Red-Tailed Hawk - Watch how it soars through the air, and listen to its call.
 - Northern Mockingbird - Listen to the calls, or watch how it interacts with other mockingbirds.
 - Mallard - Watch how it eats, or how it moves through the water.
 - b. Structure and Function:**
 - *Feet* - Look at the pictures of feet. What do you notice? How might that be beneficial for the bird? Think about how they are getting food, water, shelter, and space.
 - *Beak* - Look at the pictures of beaks. What do you notice? Look at the shapes. What do you think these birds are eating?
 - *Wings* - Birds are the only living animals with feathers. Feathers may help the bird stay warm, fly, or even **camouflage**. Birds maintain their feathers by preening, or using their beak to clean and straighten their feathers. The wing shape is adapted for the bird's habitat. Compare the pictures of wings. Are they all the same? How are they different?
- 4. All of these birds are local to North Texas.** However, they have slightly different adaptations for their individual habitats. Some of these habitats may even overlap, meaning that the birds will not only interact with their surroundings, but with each other too!

EXTENSIONS

- **Visit the Cornell Lab of Ornithology Live Bird Cams**, or their [YouTube](#) page. Have students compare and contrast the adaptations of birds local to North Texas (or your area) and birds which live in other places.
- **Citizen Science:** Citizen Science is a collaboration between scientists and the general public. Participants can collect data by taking photos or videos or documenting changes using the protocols designed by the scientists. Scientists will then use this data to draw conclusions about what they are studying. [SciStarter](#) is a great resource for a variety of citizen science projects for your class.
 - Seek by iNaturalist - This app is appropriate for students under 13, and does not require an account. Students point the camera at a living thing, and the app uses data from iNaturalist to identify what is in the photo. Your students can earn badges and participate in monthly challenges.
 - Celebrate Urban Birds - This project is focused on the importance of green spaces in urban locations for birds. Learn to identify local birds of interest, pick an observation spot, observe for 10 minutes a day for 3 days (during a one-month period) and record your data.

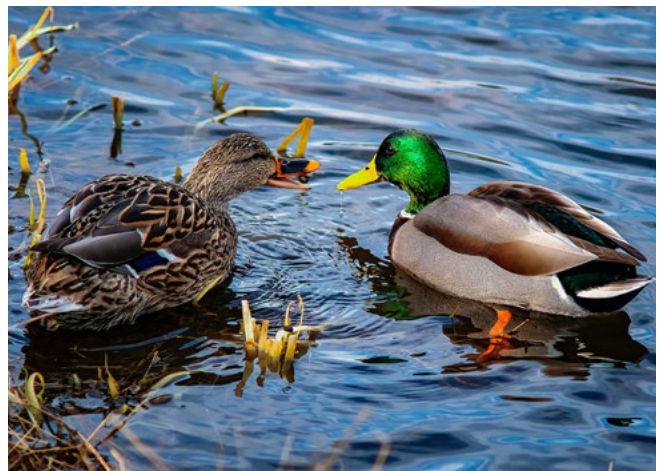
RED-TAILED HAWK



NORTHERN MOCKINGBIRD



MALLARD

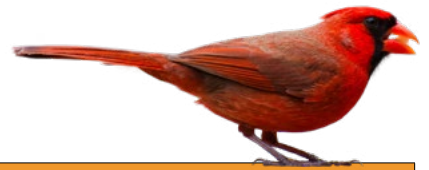


SAMPLE OBSERVATIONS

		RED-TAILED HAWK	NORTHERN MOCKINGBIRD	MALLARD
FEET	Structure	3 Toes that point forward, 1 that points back, sharp talons or claws	3 Toes that point forward, 1 that points back	Webbed feet
	Function	Use talons or claws to capture and kill prey.	Wraps toes around branches or shrubs while perching.	Beneficial for swimming, acts as a paddle to push bird through the water.
BEAK	Structure	Large, hook-shaped beak Diet: carnivore- small mammals, small birds, and reptiles	Long, thin bill with a slight downward curve Diet: omnivore- insects and fruit, diet changes seasonally	Broad, flat, yellow beak Diet: omnivore- eats many different things, such as aquatic invertebrates, seeds, and vegetation
	Function	Hooked shape helps to tear food apart.	Good for a variety of food sources.	Edge of the bill acts like a sieve to filter seeds and insects from the water. Mallards dabble - dip their heads below the water and stir up the mud, moving their heads back and forth to scoop up anything they find.
WING	Structure	Passive soaring wings, broad and rounded shape	Elliptical wings, short, rounded, and broad	High speed wings, long and thin; Preening is especially important to distribute oil that makes the feathers waterproof.
	Function	Soars in circles over open fields.	Great for short bursts of speed with quick takeoffs and turns. These short, rounded wings also help them get into compact spaces, such as thick bushes, to find food or avoid predators.	Allows bird to maintain fast speed.

Birds in My Backyard

Habitat Exploration Field Notes



FOOD	WATER
What kind of food is available for birds to eat?	Where can birds find water?
SHELTER	SPACE
How can birds protect themselves from weather or predators?	Is there enough space for birds to live? Is the space covered in plants, or in pavement or buildings?

NOTES:

PRE-VIEWING ACTIVITY #2

Opposable Thumbs Challenge

OBJECTIVE

- Students consider the adaptations that help humans survive. They explore the significance of having opposable thumbs by completing challenges both with and without the use of their thumbs.

MATERIALS

- Stopwatch or timer - physical or digital
- Student worksheet - printed or digital (pg 20-21)
- Challenge materials, such as:
 - Paper
 - Pen, pencil, or marker
 - Scissors
 - Shoe with shoelaces
 - Shirt with buttons
 - Jacket with a zipper
 - Screw-top jar or water bottle
 - Paper or plastic cups
 - Coin
 - Paper clip

ACTIVITY

1. Begin with a class discussion about human adaptations:

- a. Like all living things, humans have **adaptations** that help us survive. What do you think some of these adaptations might be? Remember to think about both **structural** and **behavioral** adaptations!
 - One example is that humans and other primates have opposable thumbs. This means that each thumb is able to turn back and touch the four other fingers on the same hand.
- b. How do you think having opposable thumbs helps humans and other primates?
 - Our opposable thumbs allow us to grasp and manipulate objects, and have helped the human species develop more accurate fine motor skills.

2. Ask students to imagine life without thumbs:

- a. What do you think life would be like if you didn't have thumbs?
- b. What actions or activities would be harder for you to do?
- c. Are there any actions or activities that would be easier for you to do?

3. Students will work in pairs to complete four challenges, first using their thumbs, and then without using their thumbs. You may select the challenges, ask students to choose from a list, or allow them to come up with challenges on their own. Some examples are:

- Write your name
- Tie your shoe
- Button a shirt or coat
- Zip up a jacket
- Unscrew a bottle cap or lid
- Stack six cups into a pyramid
- Pick up a coin off a flat surface

4. After completing the challenges, ask students to answer the reflection questions and discuss with their partner.

5. Discuss as a class:

- a. How do you think opposable thumbs help other primates survive in their environments?
 - Watch this [video of great apes](#) using their opposable thumbs to move, eat, groom, and more.
 - Some primates have even learned to use tools. For example, some monkeys pick up rocks to use as hammer stones, and some chimpanzees grasp twigs to slip into termite mounds to find termites to eat.
- b. What other adaptations might an animal have for gripping objects?
 - Watch this [video of spider monkeys](#) using their prehensile tails to grasp tree branches.

EXTENSIONS

■ **Math Connection: Data Analysis**

- Have students make a double bar graph of their results. Use one color for the times using your thumbs, and a second color for the times without using your thumbs.

■ **Career Connection: Archaeology**

- **Archaeology** is the scientific excavation and study of ancient human material remains. Archaeologists use hand fossils to help them understand if a specimen swung from tree branches or if they could use hand-held tools.
- Take a 360 Virtual Tour of the Perot Museum's "[Origins: Fossils from the Cradle of Humankind](#)" exhibit to learn more about the adaptations of humans and their ancestors and what it is like to be an archaeologist. [Educational Resources](#) include a video series, VR experience, and lesson plans.

SPIDER MONKEY



CHIMPANZEE



APE AND HUMAN HAND



Opposable Thumbs Challenge

DIRECTIONS:

1. Complete each challenge while your partner times you. Record how many seconds it takes for you to complete each challenge.
2. Switch! Time your partner while they complete the 4 challenges.
3. Now, carefully tape your thumbs to your index fingers, or wrap tape all the way across your hands. You should not be able to bend or move your thumbs, but be sure not to make the tape too tight. If you have trouble, you may want to ask someone for help, or just try your best to not use your thumbs during the challenges.
4. Complete each challenge again while your partner times you. Record how many seconds it takes for you to complete each challenge.
5. Switch! Time your partner while they complete the 4 challenges.

Data Table

CHALLENGE	TIME (SECONDS) WITH THUMBS		TIME (SECONDS) WITHOUT THUMBS	
	PARTNER 1	PARTNER 2	PARTNER 1	PARTNER 2
1.				
2.				
3.				
4.				

QUESTIONS:

What do you notice from your results?

Were there any differences between your results and your partners results?
If so, why do you think they were different?

What was the hardest challenge to complete without thumbs? What was the easiest?

What did you learn about how opposable thumbs help humans?



POST-VIDEO ACTIVITIES

Nature's Engineers: Build Like a Beaver
Create a Critter

POST-VIEWING ACTIVITY #1

Nature's Engineers: Build Like a Beaver

OBJECTIVE

- Students learn about the importance of beaver dams for wetland ecosystems and use the Engineering Design Process to build and test a model dam.

MATERIALS

- Leaves, grass
- Sticks, twigs, craft sticks
- Clay, playdoh, mud, etc.
- Paint tray, plate, or baking sheet to run water on
- Pitcher and water to create stream
- Engineering Design Process worksheet - printed or digital (pg 26-28)

ACTIVITY

- 1. After watching the Whynauts "Amazing Adaptations" video,** review the **adaptations** of the beaver. Remember to think about **structural** and **behavioral** adaptations.
- 2. Explain to students that beavers alter their environment** by using large trees, twigs, sticks, grass, rocks and mud to build dams. A **dam** is built to stop or slow the movement of water, creating a pond behind the dam. Ask students questions to help them connect the beaver's adaptations to their impact on the environment.
 - a. Why does a beaver build a dam?**
 - Beavers alter their environment to meet their needs to survive. By building a dam and stopping or slowing the flow of water, they create the environment for which they are best suited. The water provides protection from predators, and since they are excellent swimmers, a better way to travel than walking on land (webbed feet).
 - Beavers do not live in the dam. They will build a lodge or burrow within the created pond. This will have an underwater entrance and provide the beaver with shelter - a place to hide from predators, sleep, and even raise babies. In North Texas, water levels fluctuate more drastically, making burrows along the banks more common. Lodges can be found where the water is still and slow, or more uniformly level.
 - b. What adaptations help the beaver build its dam?**
 - Large constantly growing chisel-like front teeth not only help the beaver eat, but also provide them with the materials necessary for building a dam (sticks and twigs).
 - Front hands with 5 fingers - they do not have thumbs, but the 5 fingers do help them to pick up and grip objects easily.
 - c. Are beavers the only ones that benefit from the dam construction? Why or Why not?**
 - Beavers are not the only animals that benefit from a dam. The pond created is an important **habitat** for aquatic plants and other animals, such as birds, fish, and amphibians. This habitat is also beneficial for trees that grow well near water, which beavers love to eat!
- 3. Tell students their challenge today is to build a dam, just like a beaver.** The goal is to stop, or slow, the water from flowing under/through the structure. Have students go through the engineering design process and record their observations. Supplies may be provided in class, or you can ask students to gather materials from around their homes.

- 4. Have a class discussion about the challenge.** Ask students what they observed about their model dam, and how they think a real beaver dam would affect the environment.
- What did you discover while building the model dam? Beavers use a variety of materials when building their dams. Why do you think beavers use a variety of materials?
 - Trees and larger branches create a base. Smaller branches, plant material, rocks, and anything else the beaver can find fill in the larger gaps, while mud and clay fill in any smaller gaps to prevent leaking.
 - How does the dam affect the surrounding environment?
 - By creating a pond, the dam helps establish and maintain **wetlands**. This provides a habitat for many plant and animal species.
 - The water that flows through the dam is filtered by the structure, so the water quality downstream improves.
 - Sometimes dams can affect humans too. Dams can store water in times of drought. Since they slow the flow of water, they also help to control floods, but after unusually heavy rain it is possible to have flooding behind the dam.
 - Do you think humans alter the environment in any way? How?
 - Dams - humans build dams to store water in man-made lakes.
 - Clearing land for agriculture, buildings, homes, and roads.
 - Human activity causes pollution of the air, land, and sea.
 - Highways can cut through environments too. But bridges and tunnels designed for animals can help reduce the environmental impact. Look at the animals that used Utah's Parleys Canyon Wildlife Overpass in 2020!
 - Conservation - maintaining and restoring habitats, protecting endangered species

EXTENSIONS

■ Social Studies Connection: Geography

- Explore other ways animals impact their environments. For example, the reintroduction of wolves to Yellowstone changed the ecosystem and the physical geography of the National Park. Watch a clip [here](#).
- Discuss the positive and negative consequences of human modification of the environment.

■ Career Connection: **Engineering**

- Visit [Dams 101 for Kids](#) from the Association of State Dam Safety Officials to learn about man-made dams and the engineers who design them.
- Read about MIT engineers that are designing [beaver-inspired wetsuits](#). Then, explore The Biomimicry Institute's AskNature Resource Library to discover other examples of how humans use strategies from nature to inspire design. Ask students to design an invention inspired by a plant or animal adaptation that they have learned about.

■ Community Connection: Clean Water

- Read an [article about Bois d'Arc Lake](#), a man-made reservoir being built in Fannin County, Texas. This project will provide clean water for communities in North Texas for many years, and includes the construction of a 2-mile-long and 90-foot-tall dam. Learn more about the reservoir and its significance to the community at the [Bois d'Arc Lake website](#).
- Don't live in North Texas? Research new or existing dams and reservoirs in your area. How do they affect your community?

BEAVER DAM



BEAVER USING ITS FRONT TEETH



BEAVER SWIMMING



Engineering Design Process



Ask: What is the goal or problem you are trying to solve? Are there any obstacles or constraints?

Imagine: Think about possible solutions – be creative! This may involve some research on beaver dams.

Plan: Make a sketch of your solution. What supplies will you use? Make a list or label supplies on your sketch.

Create: Build your solution!

Test: Test your solution. Does it stop or slow the flow of water? Record your observations.

Improve: Modify your solution to better stop or slow the flow of water. This may involve a few rounds of testing, improving, and testing again. Describe or sketch the changes you make.

Share: What did you learn from this process? Share your solution and conclusions with others.

POST-VIEWING ACTIVITY #2

Create a Critter

OBJECTIVE

- Students research a Texas ecoregion and imagine a critter that could live there. Students present information for a museum “exhibit” about their critter, including how its structural and behavioral adaptations help it survive in its habitat.

MATERIALS

- Computer with internet access, or printed information about Texas ecoregions
- Critter Report – printed or digital (pg 30-31)

ACTIVITY

1. **Have students visit Texas Parks and Wildlife Kids to research a Texas **ecoregion**.** You may assign regions to students or allow them to choose on their own. Alternatively, you can provide printed information about the ecoregions, or research them together as a class.
2. **Tell students that they have each discovered a brand-new animal species living in their region!** Now they must fill out a “Critter Report” to provide the local museum with information about the critter for a new exhibit about its discovery.
3. **Hold an in-person or virtual “Exhibit Grand Opening” for students** to share their critters with the class.

EXTENSIONS

■ Art Connection:

- Have students create a 3-D model of their critter in its habitat to display as their exhibit.

■ Writing Connection:

- Write a newspaper article about the discovery of your critter or the “Exhibit Grand Opening.”
- Write an acrostic poem about your critter, with each letter of its name beginning a description of one of its adaptations.
- Write a story about how your critter interacts with its ecosystem.

Critter Report

Critter Name: _____

Texas Ecoregion: _____

What is your critter's habitat like? What are the challenges of living in its ecoregion?

What does your critter look like? Describe or sketch your critter living in its habitat:

Describe at least **three (3) structural adaptations** and **two (2) behavioral adaptations** that your critter has and explain how they help it survive in its habitat. Think about:

- **Food:** What does your critter eat? Is it a carnivore, herbivore, or omnivore? How does it catch and eat its food?
- **Water:** How does it get water?
- **Shelter:** How does it protect itself from predators? How does it find cover from the weather?
- **Space:** Where does it sleep? Where does it raise its young?

STRUCTURAL ADAPTATIONS	BEHAVIORAL ADAPTATIONS

RESOURCES

GLOSSARY

Adaptation - a structure or behavior that helps an organism survive in its environment

Animals - a group of organisms that are typically made of multiple cells, consume food (plants or other animals) for energy, and are capable of moving around and responding to their environment

Archaeology - the scientific excavation and study of ancient human material remains

Behavioral Adaptation - a behavior or action of an organism that helps it survive in its environment

Camouflage - An adaptation that allows an animal to disguise its appearance, usually to blend in with its surroundings.

Carnivore - an animal that eats primarily meat

Dam - a barrier constructed to stop or slow the flow of water, creating a lake, pond, or reservoir

Ecoregion - a region containing ecosystems that are generally similar

Ecosystem - includes all of the living organisms (plants, animals, fungi, and single-celled microorganisms) in a given area, interacting with each other and with their non-living components (weather, rocks, sun, soil, climate, atmosphere)

Engineering - the application of math and science to solve problems. Engineers design and create solutions such as buildings, dams, space craft, computers, and chemical compounds.

Environment - the conditions around a living thing, such as temperature, precipitation, and pollution

Food - substance that an organism consumes (usually a plant or animal) that provides energy and nutrients to maintain life

Function - the purpose or role of a structure. For example, the function of a bird's wing is to help it fly.

Habitat - place where an organism lives and all the conditions it needs to survive are met

Herbivore - an animal that eats primarily plants

Living thing - anything that is now or has ever been alive. Some examples include: sunflower, dinosaurs, birds, or logs. All living things are made of one or

more cells, use energy, grow, reproduce, and respond to their environments.

Nonliving thing - anything that is not alive now, nor ever been alive. Some examples include: rocks, computers, glasses, or a volcano

Omnivore - an animal that eats both plants and meat

Organism - an individual life form, such as a plant or animal. You are also an organism!

Plant - living thing that uses photosynthesis to make its own food

Predator - an animal that preys on, or hunts, other animals for food

Prey - an animal that is hunted and eaten by another animal

Shelter - structures that offer protection from weather or predators, such as nests, burrows, or lodges

Space - the amount of habitat a plant or animal will need to survive. This will vary by species, but an animal will be able to find the food, water and shelter necessary for survival within the space it travels.

Species - a group of organisms that share common features and are able to reproduce

Structural Adaptation - a physical feature of an organism that helps it to survive in its environment, such as an internal or external body part

Structure - Something made of many parts. The way a structure is put together or shaped allows it to complete a particular function or role. For example, a bird's wing is a structure that helps it fly.

Survive - to remain alive; in order to survive, organisms require food, water, shelter, and space

Water - a substance that is essential for life and can be found in all ecosystems. Examples of water sources include streams, ponds, lakes, puddles, and rivers.

Wetlands - an area where water covers the surface of the soil. They can be found along the margins of ponds or lakes, along floodplains of rivers, and along the coast.

READING LIST

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ONLINE RESOURCES

PEROT MUSEUM EDUCATIONAL RESOURCES

- [Amaze Your Brain at Home](#) - Videos and activities to try at home. Be sure to check out...
 - Space: Out of this World
 - Sports Science: Amazing Dogs
 - Earth Science & Sustainability: The Sky is a Highway, Fantastic Frogs, Denizens of the (not so) Deep
 - Weather & Nature: Backyard Bug Exploration, Scat Chat, Butterfly Hide and Seek, Biomimicry
- [Origins: Fossils from the Cradle of Humankind](#) - 360 Virtual Tour and Educational Resources

NATURE AND WILDLIFE

- [Texas Parks and Wildlife: Texas Ecoregions](#)
- [Texas Parks and Wildlife Kids: Learn About Texas Regions](#)
- [Texas Parks and Wildlife: Texas Birds](#)
- [National Park Service Multimedia Search](#) - photos, videos, and audio files
- [Cornell Lab of Ornithology](#) - bird identification and information, educational resources, citizen science projects
- [Live Bird Cams](#)
- [The Biomimicry Institute](#)

CITIZEN SCIENCE

- [SciStarter](#)
- [Seek by iNaturalist](#)
- [Celebrate Urban Birds](#)

STEM CAREERS

- [IF/THEN Collection](#) - digital asset library of women STEM innovators
- [Skype a Scientist](#) - connects scientists with classrooms across the globe

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