



Name: _____

Everglades Adaptations

Lesson Summary:

This lesson focuses on structural and behavioral adaptations in Everglades bird species. Students will compare and contrast adaptations of the Anhinga, Wood Stork, and Osprey. Students will answer questions that draw from the reading passages to examine the topics and convey ideas and information clearly.

Lexile Level:

The Adaptations reading passage is 1210-1400L with 477 words.

The Wood Stork and Its Adaptations reading passage is 1010-1200L with 874 words.

The Osprey and Its Adaptations reading passage is 810-1000 and 687 words.

Standards:

- **SC.5.L.17.1:** Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycle variations, animal behaviors, and physical characteristics
- **LAFS.5.W.3.9:** Draw evidence from literary or informational texts to support analysis, reflection, and research
- **LAFS.5.RI.3.9:** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

Procedures

1. Ask your students if they know what an **adaptation** is. You might want to put their responses on the board.
2. Before learning about Everglades animal **adaptations**, have your students participate in an [activity \(click here\)](#) that will teach them about one of the most important **adaptations** humans have: **opposable thumbs**. Have your students experiment completing activities with and without using their thumbs. Examples of activities include: write your name with a pencil, tie a shoelace, open a door using a knob, brush or comb your hair, and more. After the experiment, ask students the following questions and write their responses on the board: Which activities on the list required lots of use of the thumb? Which took longer without being able to use your thumb?
3. Discuss as a class their ideas and experiences from the activity. Create a class discussion summary on the board. The term "**fully opposable thumbs**" should be introduced if it hasn't already.
4. Once you have reviewed opposable thumbs as an **adaptation**, assess prior knowledge of the Everglades by asking students what they know about the animals that live there and what **adaptations** they might have. You might want to put their responses on the board as a word web.
5. Use the ***Adaptations reading passage*** to review the concepts of **structural** and **behavioral adaptations**. Have students record main ideas from this reading passage on the board or in their notebooks. Tell students they are going to be learning about different bird species in the Everglades and their **adaptations**: the Anhinga, Wood Stork, and Osprey.

Procedures Continued

6. Distribute the **Adaptations Compare and Contrast Chart** to students and explain that they will be recording information about the adaptations they learn about for each bird species. Use complete sentences when filling out the chart.

7. Have your students watch the **Anhinga: Designed for Survival video by Odyssey Earth**. Have students complete the Anhinga column in the **Adaptations Compare and Contrast Chart**.

8. Then, have your students read The Wood Stork and Its Adaptations reading passage. Have students complete the Wood Stork column in the Adaptations Compare and Contrast Chart.

9. After, have your students read ***The Osprey and Its Adaptations reading passage***. Have students complete the Osprey column in the **Adaptations Compare and Contrast Chart**.

10. Have your students complete the **Structural and Behavior Chart**, and use the 2 charts to answer the **Short Response Questions**.

11. After students have completed the **Adaptations Compare and Contrast Chart**, the **Structural and Behavioral Chart**, and **Short Response Questions**, discuss with students the different structural and behavioral adaptations they learned about.

11. Use the Answer Key to review student responses.



Name: _____

Wood Stork Vocabulary

- **Adaptation-** Any characteristic that helps a plant or animal survive in its environment.
- **Behavioral Adaptation-** Action an organism takes to survive and reproduce successfully in its environment.
- **Dry Season-** In southern Florida, December-April, the rains diminish and surface water levels drop.
- **Fluctuations-** The seasonal rising and falling of water levels.
- **Structural Adaptation-** Physical feature of the organism's body that helps it survive and reproduce successfully in its environment.
- **Tactolocation-** Locating food by touch rather than sight.
- **Vertebrae-** Animals with a backbone.

Osprey Vocabulary

- **Behavioral Adaptation-** Action an organism takes to survive and reproduce successfully in its environment..
- **Brooding-** To sit upon the eggs for the temperature regulation necessary for safe, successful hatching.
- **Camouflage-** A type of coloration or pattern that helps an animal blend in with its surrounding.
- **Pesticide-** A substance used for destroying insects or other organisms harmful to cultivated plants or to animals.
- **Raptor-** A bird of prey that feeds on live, captured prey using its strong grasping feet and hooked beak.
- **Structural Adaptation-** Physical feature of the organism's body that helps it survive and reproduce successfully in its environment.

Anhinga Vocabulary

- **Adaptation-** Any characteristic that helps a plant or animal survive in its environment.
- **Incubate-** To sit upon (eggs) or maintain temperature which promotes development.
- **Preen-** To trim or arrange feathers or fur with beak or tongue.
- **Regurgitate -**To bring back up undigested food.
- **Rookery -** Breeding place or colony where birds congregate.

Adaptations Vocabulary

- **Adaptation-**Any characteristic that helps a plant or animal survive in its environment.
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Adaptations Reading Passage

In order to survive, every plant and animal has certain features that help it live and thrive in the conditions of the specific habitats where they live. These features are called adaptive traits, or what we simply call **adaptations**. It is important to understand that no organism can simply choose to adapt. Biologists define **adaptation** as a natural process by which organisms become better able to live in their environments; a process that occurs over many generations (and in many cases hundreds or thousands of years) of a population of organisms.

There are two major categories of adaptations: **structural adaptations** and **behavioral adaptations**. **Structural adaptations** are physical features of the organism's body that help it survive and reproduce successfully in its habitat. **Structural adaptations** involve a genetic change that requires a long period of time, usually several generations, in order for the adaptation to assist with the survival of the entire population. For example, in the Everglades, the American alligator has many **structural adaptations** to live in freshwater wetlands. Its powerful tail is a structural adaptation that helps it move through its watery habitats.



The American alligator uses its strong tail and legs to live in freshwater wetlands. (Nicholas G, Reptile-wiki)

Adaptations Reading Passage Continued

To survive during the **dry season** in the Everglades, it uses its tail as well as its claws to dig alligator holes that fill up with water. They do this to create a 'pool' of water that serves as an oasis for themselves as well as other Everglades wildlife. Its tail can also be used as a weapon of defense when an alligator feels threatened.

Behavioral adaptations are composed of inherited behaviors and/or the ability to learn. These behaviors may be inherited through basic instinct, or a tendency for learning may be inherited. For example, the female American alligator protects her hatchlings. Baby alligators congregate in pods that may include hatchlings from other nests and remain close to the mother typically as long as one year, but sometimes for two or even three years. This social system is a **behavioral adaptation** that affords protection to the young alligators during their most vulnerable life stage from predators such as raccoons, large fish, birds, and even other alligators – mostly large, dominant males.

All Everglades plants and animals have fascinating **adaptations**, both **structural** and **behavioral**. These **adaptations** are the keys to their success in surviving in the diverse habitats of the Everglades. **Adaptations** help Everglades predators hunt or Everglades prey hide or escape, they help animals move through their habitats, and they help them reproduce and raise their young – just to name a few examples of the important roles that **adaptations** play in life in the Everglades.

The Wood Stork and Its Adaptations

Meet the Wood Stork, a resident of the Everglades. With its bald head and unfeathered neck, some would argue it has a face only its mother could love! Although it may not be the most beautiful of the birds that call the Everglades home, it is beautifully adapted to the Everglades wetland habitats where it lives. It can be found in the freshwater cypress swamps and sawgrass marshes as well as the brackish water of the mangrove swamps.

Structurally, the Wood Stork is not a swimmer as some wetland birds are. It is a large long-legged wading bird, standing more than 3 feet tall. Its long legs help it move through watery habitats as it forages for food.



*Notice the Wood Stork's long legs and long stout bill.
(Wikipedia commons)*

Its long, hefty bill is another **structural adaptation**, and it is very special indeed. The Wood Stork does not use its eyes to hunt for prey, like so many other wading birds. Instead it finds its food - mostly small freshwater fish - by its sense of touch. This hunting method is called **tactolocation**.

The Wood Stork and Its Adaptations Continued

Feeding in shallow water, the Wood Stork stirs the water with its feet and sweeps its submerged, partially open bill from side to side as it walks slowly forward. When its bill touches a fish or other prey, it snaps shut and the Wood Stork raises its head and swallows the fish whole. The speed with which the Wood Stork can snap its bill closed when it touches prey is amazing – just 25 milliseconds! Scientists say this is the fastest known reflex action for any **vertebrate** - that’s an impressive **structural adaptation**. Hunting by touch rather than sight also gives Wood Storks the advantage to feed not only during the day, but also at night. They can also hunt in water that is muddy and has a lot of plants. This allows them to feed without competition from other wading birds who depend on their sight to hunt for food. As you can see, Wood Storks’ **structural** and **behavioral adaptations** work together to help them survive.

In the wetland habitats of the Wood Stork, this feeding technique works even better when fish populations are concentrated in small pools of water during the Everglades **dry season**. Like many Everglades birds, the Wood Stork nests in the winter months of the **dry season** when water levels are lower, and fish are more concentrated. The timing of nesting is a **behavioral adaptation** of the Wood Stork that improves the chances of survival of its young.



What adaptations is the Wood Stork using to hunt for food? (Wikipedia Commons)

The Wood Stork and Its Adaptations Continued



Wood Storks nesting together in tall trees is a behavioral adaptation. (Wikipedia Commons)

Wood Storks have other interesting **behavioral adaptations** for protection. You may have heard the phrase, there is safety in numbers. Wood Storks are social birds and nest in colonies of 100-500 nests. Large numbers of birds all living together means it is more likely some of them will see a predator and raise the alarm by making a clattering noise with their bills. They also build their nests in medium to tall cypress or mangrove trees standing in one to three feet of water. These flooded trees provide a water barrier to protect their eggs and young from ground predators such as raccoons and snakes. Plus, the presence of alligators in the water below provides some safety from predators trying to reach their nests.

A nesting pair of Wood Storks needs over 400 pounds of food during the nesting season to feed themselves and their chicks. That's a lot of fish to catch! Because the fish and other prey upon which Wood Storks depend may be distributed over large areas of their habitats, they need to be able to travel great distances. Nesting Wood Storks have been known to fly over 50 miles one way in search of food.

The Wood Stork and Its Adaptations Continued

This is where their **structural** and **behavioral adaptations** again work together to their advantage. Wood Storks have a wingspan of 5 feet, but only weigh 4 to 6 pounds. With their large wings, they have the ability to soar which allows them to reach high altitudes and travel many miles without having to flap their wings which takes much more energy. Wood Storks use the flapping motion of their large wings to



Wood Storks use soaring flight to travel long distances. (Wikipedia Commons)

reach altitudes of 1000 feet or more. They then use the rising air currents to soar without needing to flap their wings. Wood Storks can glide for miles without flapping their wings. By using air currents, Wood Storks save valuable energy. Some scientific studies have shown that the soaring flight of Wood Storks uses only 1/10 the energy of flapping flight.

The Wood Storks' fascinating **structural** and **behavioral adaptations** for movement, hunting, protection, nesting, and caring for their young have evolved over many thousands of years. These **adaptations** only "work" in healthy habitats. The Wood Storks' survival is dependent upon the protection and restoration of our Everglades. This is especially true of natural seasonal **fluctuations** in water levels. When these natural changes in water levels are disrupted by human water-management activities, Wood Storks fail to nest successfully because sufficient food to feed their young is not available. We can all do our part to ensure the survival of the Wood Stork and all the amazing plants and animals of the Everglades. We can start by sharing with others what we know about why the Everglades is so important.

The Osprey and its Adaptations

The North American Osprey, also known as the “fish hawk” for one of its favorite foods, is a large **raptor** bird in the Everglades. **Raptors** are birds of prey that feed on live, captured prey. There are three characteristics that make a bird a **raptor**. First, **raptors** have strong grasping feet with sharp talons. Raptors also have a hook shaped beak to help them hunt and capture their prey. Lastly, a **raptor's** diet mostly consists entirely of meat. In the Everglades, the Osprey can be found in a variety of habitats. This includes freshwater habitats like the cypress swamp and sawgrass marsh, brackish water habitat of the mangrove swamp, and the hardwood hammock, a dry habitat.

Adult Ospreys have dark brown feathers on top and white feathers on its head and underside. They have a black line across the eyes that extends through the wings. They can reach 2 feet in length with a wingspan of 6 feet. The Osprey is well known for its hunting skills, using its strong senses like vision. These birds can spot their prey when they are flying high in the sky and dive between 30 and 100 feet to reach the water's surface. These skills are influenced by its **structural adaptations**. When it dives, its nostrils shut close to avoid water splashing around in its nose. They will often dive below the water to successfully catch their prey. Ospreys have 4 long toes with short spikes on them that help grip its prey. They are the only **raptor** whose outer toe is reversible.



Ospreys are called fish hawks, nicknamed from their favorite food to catch and eat. What adaptations do you see here that make the Osprey a great hunter? (Andy Morffew, Wikipedia Commons)

The Osprey and Its Adaptations Continued

This means when they are catching fish, their long claws can move around to secure a tight grip on the fish, with two toes in the front and two toes behind. Their feet have spines on them, helping to grasp their prey as they fly over the water. Ospreys always fly with the fish's head facing the front, making it smoother to fly long distances and against the wind. They have feathers that are oily, wet, thick, and packed together. This helps the Osprey shake off any water it has on its body quickly. All of these structural adaptations make the Osprey a strong hunter. In fact, studies show that Osprey's catch fish at least 1 out every 4 tries. Sometimes this success rate is closer to 70%! You can notice another structural adaptation of an Osprey when they are young; they have many spots on their feathers that help them camouflage in their surroundings and hide from prey.



A pair of Ospreys in their nest built on top of a pole in a parking lot. (NASA, Wikipedia Commons)

Ospreys have **behavioral adaptations** that attract mates and protect young from predators. These soaring birds are known for living and building their nests high above ground. They build their nests out of large sticks and grasses. They build their nests in trees but also in manmade structures like bridges, buoys, and power poles. The ideal location is somewhere close to fish but out of reach from

predators like raccoons. Nests can often be used for many years. Putting effort into building a good nest in a safe location is an important skill to attract mates. Male Ospreys attract females by trying to build the best nest. Males will even bring females food so that they do not pair up with other males. Ospreys generally mate for life and have one brood per year that includes 2 to 4 eggs.

The Osprey and Its Adaptations Continued

Ospreys generally mate for life and have one brood per year that includes 2 to 4 eggs. Brooding means to sit upon the eggs for the temperature regulation necessary for safe, successful hatching. Not all of the eggs will hatch the same day. They hatch between 3 and 5 days apart. The oldest chick, typically stronger than chicks hatched a few days after, is strong enough to take most of the food from the parents. In the 1950s-70s, the population of Osprey declined significantly due to pesticide poisoning. Poisonous chemicals led to egg shell thinning, which affected the hatching rate of Osprey eggs and ability to survive. In the early 1970s, bans on specific **pesticides** helped the Osprey population increase. However, Ospreys still face threats such as shoreline development, poor water quality, and prey availability. Everglades restoration will help protect water quality, habitat, and food availability for Ospreys.



*Notice the Osprey's adaptations for flight.
(NASA, Wikipedia Commons)*

Wood Stork Resources:

<https://corkscrew.audubon.org/conservation/wood-stork-life-history>

<https://myfwc.com/research/wildlife/birds/wood-storks>

<https://www.fws.gov/verobeach/msrppdfs/woodstork.pdf>

<https://www.fpl.com/environment/pdf/wood-stork.pdf>

Osprey Resources:

<https://www.nationalgeographic.com/animals/birds/facts/osprey>

<https://www.audubon.org/news/these-adaptations-make-osprey-fantastic-fisher>

<https://animals.mom.com/osprey-adaptations-9293.html>

<https://tetonraptorcenter.org/our-work/education/all-about-raptors/>

<https://www.nps.gov/ever/learn/nature/osprey.htm>

<https://www.allaboutbirds.org/guide/Osprey/overview>

Adaptations Compare and Contrast Chart

Adaptation Questions	Anhinga	Wood Stork	Osprey
What adaptations help me move?			
What adaptations help me find food?			
What adaptations help me protect myself and my young?			

Adaptations Compare and Contrast Chart

Adaptation Questions	Anhinga	Wood Stork	Osprey
<p>What adaptations do I have for breeding and raising my young?</p>			
<p>What other interesting adaptations do I have?</p>			

Adaptations: Structural or Behavioral Chart

Directions: In the chart below, use the right side of the chart to identify whether the listed adaptation is a structural or behavioral adaptation.

Adaptation	Structural or Behavioral?
The Osprey's hooked beak.	
The Wood Stork hunting at night.	
The Anhinga and Wood Stork nesting in colonies.	
The Osprey pair mating for life.	
The Wood Stork breeding in the dry season.	
The Anhinga's bright aqua color around its eye at breeding season.	
The Osprey's reversible outer toe.	
The Anhinga's use of its oil gland for its feathers.	



Name: _____

Adaptations: Short Response Questions

Directions: Using the information you wrote in your chart, respond to the following questions:

1. Describe what a structural adaptation is.

2. Describe what a behavioral adaptation is.

3. Compare and contrast how the structural and behavioral adaptations of the birds help them find food.



Name: _____

Adaptations: Short Response Questions Continued

4. Describe how the behavioral adaptations for protection of the Anhinga and the Wood Stork are similar. How do the Osprey's behavioral adaptations for protection differ?

5. Compare and contrast the adaptations that help these birds move about their habitats.

Adaptations: Structural or Behavioral Chart Answer Key

Directions: In the chart below, use the right side of the chart to identify whether the listed adaptation is a structural or behavioral adaptation.

Adaptation	Structural or Behavioral?
The Osprey's hooked beak.	Structural
The Wood Stork hunting at night.	Behavioral
The Anhinga and Wood Stork nesting in colonies.	Behavioral
The Osprey pair mating for life.	Behavioral
The Wood Stork breeding in the dry season.	Behavioral
The Anhinga's bright aqua color around its eye at breeding season.	Structural
The Osprey's reversible outer toe.	Structural
The Anhinga's use of its oil gland for its feathers.	Structural

Adaptations Compare and Contrast Chart Answer Key

Adaptation Questions	Anhinga	Wood Stork	Osprey
<p>What adaptations help me move?</p>	<p>I have wings for flying; but I also have webbed feet, a fan shaped tail and a streamlined body for swimming and diving in the water. When I swim, most of my body is under the water.</p>	<p>I have wings for flying. My long wings enable me to soar when traveling long distances. I also have long legs for wading through shallow water in search of food. I am not a swimmer.</p>	<p>I have wings for flying high above the wetlands. I am also an excellent diver and can dive from between 30 and 100 feet in the air to reach the water's surface.</p>
<p>What adaptations help me find food?</p>	<p>I am a visual hunter. I spear fish with my sharp beak. I also dive to catch fish.</p>	<p>I do not use my eyes to hunt for food. I use my long beak and feet to hunt for fish. Whenever a fish touches my beak, I quickly snap it shut. This method of hunting is called tactolocation. This allows me to hunt for food day and night.</p>	<p>I am a raptor which means I am a visual hunter with strong grasping feet with sharp talons and a hooked beak to hunt and catch my prey. I can spot my prey from high in the sky and dive into the water to catch them. I have feathers that are oily, wet, thick, and packed together. This helps me shake off any water on my body quickly.</p>
<p>What adaptations help me protect myself and my young?</p>	<p>I nest in large colonies or groups of birds for protection. I also build my nests in trees above water which helps keep predators away.</p>	<p>I nest in large colonies of birds for protection. I also build my nests in trees above water which helps keep predators away.</p>	<p>I build my nests high above the ground in trees, but also in manmade structures like bridges and power poles out of reach from predators.</p>

Adaptations Compare and Contrast Chart Answer Key

Adaptation Questions	Anhinga	Wood Stork	Osprey
<p>What adaptations do I have for breeding and raising my young?</p>	<p>I get a bright aqua color around my eyes when it is time for breeding. If I am a male, I get fancy plumes of feathers on my head and neck which I show off to attract a mate.</p> <p>I also line my nest with soft leaves to make my chicks comfortable. I feed my chicks regurgitated fish!</p>	<p>I breed and raise my young only in the dry season when water levels are lower and food is more concentrated. I also travel long distances to find enough food to raise my young.</p>	<p>If I am a male, I attract females by building a strong nest and bringing them food. We generally mate for life. Not all of our eggs will hatch the same day. They hatch between 3 and 5 days apart. The oldest chick is typically stronger than other chicks and can take most of the food from the parents.</p>
<p>What other interesting adaptations do I have?</p>	<p>Although I am a swimmer, I don't have waterproof feathers. My feathers get heavy with water so that's why you see me swimming with only my neck and head above the water. You can often see me perched above the water with my wings outstretched to help me dry off.</p> <p>Because my feathers are not naturally oily, I often rub oil into my feathers from an oil gland located at the base of my tail.</p>	<p>Wood Storks have a wingspan of 5 feet, but only weigh 4 to 6 pounds. With their large wings, they have the ability to soar which allows them to reach high altitudes and travel many miles without having to flap their wings which takes much more energy. Some scientific studies have shown that the soaring flight of Wood Storks uses only 1/10 the energy of flapping flight.</p>	<p>I am the only raptor whose outer toe is reversible. This means when I am catching fish, my long claws can move around to secure a tight grip on the fish, with two toes in the front and two toes behind. My feet have spines on them, helping to grasp my prey as I fly over the water. I don't want to drop my dinner! Ospreys always fly with the fish's head facing the front, making it smoother to fly long distances and against the wind.</p>

Adaptations: Short Response Questions Answer Key

Directions: Using the information you wrote in your chart, respond to the following questions:

1. Describe what a structural adaptation is.

A structural adaptation is a physical adaptation of an organism that helps it survive and reproduce.

2. Describe what a behavioral adaptation is.

A behavioral adaptation is a learned behavior or inherited behavior that helps an organism survive and reproduce.

3. Compare and contrast how the structural and behavioral adaptations of the birds help them find food.

Aningas and Ospreys use their vision to find food, while Wood Storks find food through tactolocation. Aningas and Ospreys can both dive to catch food.

Adaptations: Short Response Questions Answer Key

4. Describe how the behavioral adaptations for protection of the Anhinga and the Wood Stork are similar. How do the Osprey's behavioral adaptations for protection differ?

Both the Anhinga and Wood Stork nest in large groups of birds. The Osprey usually nests with a mate. All 3 birds build their nests high above the water for protection.

5. Compare and contrast the adaptations that help these birds move about their habitats.

The Anhinga and Osprey can swim mostly underwater, but the Wood Stork cannot. Woods Storks and Anhingas do not dive to catch fish like the Osprey does. Wood Storks find their food in shallow water. Wood Storks and Ospreys have long wings that help them fly distances. Ospreys have sharp claws for flying and catching food, Anhingas have webbed feet to swim, and Wood Storks have long legs to wade in shallow water.