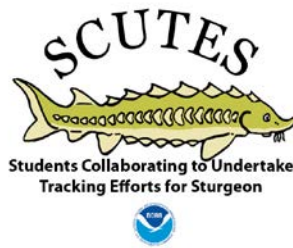


<b>Topic/Lesson:</b>	<b>Adaptation</b>
<b>Objectives:</b>	<p>Students will be able to:</p> <ul style="list-style-type: none"> <li>• Understand what animal adaptations are.</li> <li>• Explain why adaptations are important.</li> <li>• Name specific adaptations that Atlantic sturgeon use to survive.</li> </ul>
<b>Materials:</b>	<ul style="list-style-type: none"> <li>• Adaptation information paper</li> <li>• A paper copy of the Adaptation Board Game</li> <li>• Dice (one per group)</li> <li>• Board game instruction paper</li> <li>• Adaptation cards</li> <li>• Player pieces</li> </ul>
<b>Vocabulary:</b>	<ul style="list-style-type: none"> <li>• Adaptations – physical and behavioral</li> <li>• Physical – camouflage, mimicry, chemical defenses, body coverings and parts</li> <li>• Behavioral – instinctive vs. learned</li> <li>• Atlantic sturgeon</li> <li>• Barbels, scutes, ventral mouth</li> </ul>
<b>Procedures:</b>	<ol style="list-style-type: none"> <li>1) Begin class by asking small groups to list all of the clothes they wear for each season. On the board list fall, winter, spring, and summer.</li> <li>2) When groups seem to be finishing up, go around and have them share their lists. Write the answers on the board.</li> <li>3) Ask students why the clothing items are different depending on the season. Have class discussion on how we make adaptations to help us survive and stay healthy. What would happen if we didn't adapt to the seasons and wore flip-flops in the winter?</li> <li>4) Next, lead the discussion to animals and the adaptations they make in order to survive. Have students name any adaptations they can think of for any animal and list on the board.</li> <li>5) Read the adaptation paper out loud as a class to increase students' knowledge of adaptations and learn about specific Atlantic sturgeon adaptations.</li> <li>6) Explain that for today's activity students will be playing an adaptation board game in pairs or small groups. Read</li> </ol>

	<p>instructions for the board game out loud.</p> <ol style="list-style-type: none"> <li>7) Before answering questions, teacher and volunteer will simulate how to play the game and the process. Next, answer any questions students may have.</li> <li>8) Pair/group students off and have them collect necessary materials for playing the game. As an option, students may color the black and white board games and player pieces.</li> <li>9) It is up to the teacher’s discretion whether to allow students to use the adaptation paper previously read while playing the board game.</li> <li>10) Teacher walks around to assess and assist students playing the game.</li> <li>11) Teacher gives five minute warning before having students stop and clean up playing materials.</li> <li>12) For homework, students will complete a writing assignment stating what would happen if sturgeon were not able to adapt to changing conditions.</li> </ol>
<p><b>Accommodations/ Modifications:</b></p>	<ul style="list-style-type: none"> <li>• Preferential seating</li> <li>• Peer partnering</li> <li>• Multiple step instructions</li> <li>• Teacher modeling</li> <li>• Use of adaptation fact paper while playing or diagram</li> </ul>

Students Collaborating to Undertake  
Tracking Efforts for Sturgeon





## Sturgeon Adaptation Board Game Instructions

**Number of Players:** 2 to 4 players

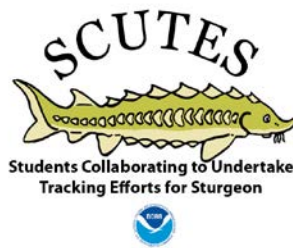
**Materials Needed:**

- Paper copy of board game
- Dice (one per group)
- Adaptation cards
- Adaptation fact sheet (use at teacher's discretion)
- Player pieces or game markers (any small manipulatives)

Groups should cut out the adaptation cards. Color the board game and player pieces (optional). Place the cards facing down in the pick up pile. All players' game markers begin on start. Player one rolls the dice. Player two chooses an adaptation card and reads it out loud to player one. Player one must answer with the correct sturgeon adaptation in order to move the amount of spaces previously rolled. Some adaptation cards may not have a question or scenario, but may tell the player to move forwards or backwards a certain number of spaces. If the player is asked to state an adaptation, and is unable to answer correctly, they do not move from their space, and their turn is over. The card is then placed face down in the discard pile.

Player two then rolls the die. If there is a player three, they would pick up an adaptation card and read it out loud. If there is not a player three, then player one would read the card out loud. Player two must either answer with the appropriate adaptation or follow the directions on the card. Player two will move if they answer correctly, or end their turn if they answer incorrectly. If there is a player three they would then take their turn and so forth.

The first player to reach the river wins!



## **Adaptation Information**

All animals have adaptations that help them survive. An adaptation is a change in an animal's physical structure or behavior that helps it to survive in its habitat or ecosystem. There are two major kinds of adaptations. The first kind of adaptation is called a physical adaptation. The second type of adaptation is called a behavioral adaptation.

Believe it or not, physical adaptations, or changes to the animal's physical body, usually occur by accident! Sometimes an animal can be born with a mutation or a change. Even though this change or mutation shouldn't have happened, it did, and sometimes actually helps that animal survive better than the other animals without the mutation. Here is an example about a bird named Ben: One day little baby bird Ben hatched from his egg and came out with a beak that is longer than his parents' beaks. All of Ben's brothers and sisters laughed because Ben had a longer beak than the rest of them. Ben's longer beak was created as a mutation or a change. However, because Ben had a longer beak, he was able to catch more food than the birds with shorter beaks. Ben is now healthier, will live longer, and has a better chance to reproduce and pass on his genes for a longer beak. In a number of years, the longer beak will be found in almost all of this bird species.

Some other examples of physical adaptations are camouflage; mimicry; chemical defenses such as venom, sprays or inks; and body coverings like beaks, claws, teeth, feet and plates. Camouflage is when an animal's body covering is a special color or shape that helps it to blend into its environment. Mimicry is an adaptation where an animal that is harmless, looks like or "mimics" another animal that is harmful in order to protect itself. For example, a harmless snake that cannot hurt other animals will look like another snake that is dangerous, so that other predators will stay away. Chemical defenses such as sprays, and venom help keep predators away. Think of a skunk. If a dog sees a skunk in the backyard it may immediately and quickly try to run toward the skunk. The skunk protects itself by lifting its tail and spraying in the dog's direction. Most times, this will stop the dog from attacking or hurting the skunk. The last type of physical adaptation is body coverings. This category includes body parts that help the animal to survive. Some examples are webbed feet, sharp claws, whiskers, sharp teeth, large beaks, wings, striped fur, bright feathers, and scales.

Behavioral adaptations are different because they are related to an animal's actions and not just a physical body part. Some of these behavioral adaptations are instinctive, meaning they just happen naturally, and some are learned, meaning the animal must be taught to do it. Instinctive adaptations include behaviors like hibernation, migration, finding shelter, gathering food, raising young, and self defense. Animals are just born with the natural ability to do these things. Learned adaptations are behaviors that animals would not do naturally and on their own. Animals must learn to do these

things by interacting with their environment or ecosystem. If a mother tiger learns a new behavior and adapts in order to survive, she must then teach her offspring this adaptation, because it will not be passed on naturally to the next generation as instinctive behaviors are. Think of dolphins that do tricks. Dolphins are not born with the ability or knowledge to perform tricks, but are able to learn them with enough practice and experience.

Atlantic sturgeon, like all other animals possess various adaptations that help them survive in their habitat or ecosystem. Many parts of a sturgeon's body are specially formed to help them. A sturgeon's mouth is ventral, or under their head, to help them feed off of the bottom. The mouth is also sucker-shaped to help them vacuum up small animals. The barbels near a sturgeon's mouth help them to sense food in murky water. Sturgeon's eyes are small so they must rely on their barbels to find food. The sturgeon's body shape is rounder, and they are flat bellied so that they can rest on the bottom while feeding, and be less noticeable to predators. Sturgeons have a special color that helps them blend in to their surroundings. They are dark on top so they are less visible to predators above them, and lighter on their belly so they are less visible to predators below. This type of camouflage is known as countershading. Sturgeons' bodies are also covered with rows of bony plates (scutes), which also cover their heads. These scutes or bony scales help to protect sturgeon, acting like a type of armor. The sturgeon's bony scutes and large size help protect it from predators.

Atlantic sturgeon also adapt by migrating. Although as adults they spend the majority of their time in the ocean, they return home to their natal river (return to the river in which they were born) to spawn. This is an instinctive behavior that they naturally perform. Atlantic sturgeon have many challenges to face as they attempt to return to their natal rivers to spawn. Many years ago, dams were built in some rivers such as the Merrimac and Kennebec. These dams block the Atlantic sturgeon from returning to their spawning habitat. In order to overcome this problem, some sturgeon are able to adapt by finding another appropriate spawning habitat. In other cases, sturgeons may return to their natal rivers to find that the spawning habitat has been destroyed by something such as dredging. Some sturgeon may adapt and search for new, appropriate spawning grounds, but some may simply not spawn that year.

Since Atlantic sturgeon migrate so much, they never spend a great deal of time in one area. This helps Atlantic sturgeon to have a defense against disease outbreaks that might be terrible for fish populations that spend most of their lives in one environment or habitat. This adaptation might help Atlantic sturgeon survive certain diseases that other fish that do not migrate cannot.

It has been said that if a sturgeon is hooked or caught it will try to defend itself by lashing its tail. This long and strong tail is capable of injuring the fisherman and damaging the fishing equipment. If the fish is strong enough it just might free itself from capture. This type of defense is an instinctive behavior.

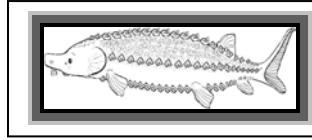
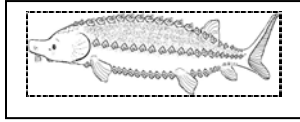
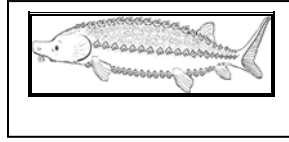
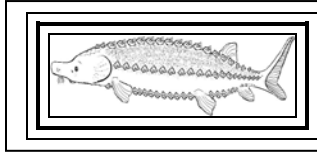
Atlantic sturgeon, like all animals have many adaptations, both behavioral and physical. These adaptations help the sturgeon to survive in an ecosystem that is constantly changing. Just like humans, if sturgeon did not make these necessary adaptations, their survival and health would be in danger.

## Adaptation cards

<p><b>What adaptation do Atlantic sturgeon perform when it's time to spawn?</b></p> <p>Atlantic sturgeon perform natal homing, where they migrate back to their native rivers to spawn.</p>	<p><b>OH NO! There is a dam blocking your way!</b></p> <p><b>You must return to the ocean!</b></p> <p><b>Move back two spaces!</b></p>
<p><b>What behavior do Atlantic sturgeon exhibit to try and escape capture?</b></p> <p>Atlantic sturgeon lash their strong tail.</p>	<p><b>Which adaptation helps Atlantic sturgeon be less visible to predators?</b></p> <p>Atlantic sturgeon are dark colored on the top and light colored on the bottom (countershading).</p>
<p><b>You were able to escape a fishing net!</b></p> <p><b>Move forward one space!</b></p>	<p><b>What adaptation helps Atlantic sturgeon rest on the bottom while they are feeding?</b></p> <p>Atlantic sturgeon's body shape is rounder and their bellies are flat.</p>
<p><b>Explain the adaptation that makes feeding off of the bottom easier for Atlantic sturgeon?</b></p> <p>Atlantic sturgeon's mouths are ventral, meaning they are located under their head.</p>	<p><b>Name the adaptation that helps Atlantic sturgeon avoid some dangerous illnesses that cause other fish death.</b></p> <p>Atlantic sturgeon migrate a lot and never spend a lot of time in one area.</p>
<p><b>Which adaptation helps Atlantic sturgeon vacuum up food from the bottom?</b></p> <p>The Atlantic sturgeon have a sucker-shaped mouth.</p>	<p><b>Trouble! Trouble! Dangerous red tide is heading your way!</b></p> <p><b>You can't migrate today!</b></p> <p><b>Move back one space!</b></p>
<p><b>Name the adaptation that helps Atlantic sturgeon sense food in dark, murky water, even though their eyes are small.</b></p> <p>Barbels help Atlantic sturgeon sense food.</p>	<p><b>Explain the adaptation that Atlantic sturgeon might use if a dam is blocking their route back to their native rivers on their way back to spawn.</b></p> <p>Atlantic sturgeon might look for another appropriate place to spawn that year.</p>

<p><b>There is dredging going on in your native river. You give up on spawning for this year. Go back to start!</b></p>	<p><b>Which adaptation helps protect Atlantic sturgeon from predators like armor?</b></p> <p>Hard, bony plates, called scutes help protect Atlantic sturgeon.</p>
<p><b>There is a gillnet in the river. Watch Out!</b></p> <p><b>Move back one space!</b></p>	<p><b>What is the definition of adaptation?</b></p> <p>A change in an animal's physical structure or behavior that helps it to survive in its habitat or ecosystem.</p>
<p><b>Name two kinds of adaptation.</b></p> <p>Physical and behavioral.</p>	<p><b>True or False. Physical adaptations usually occur on purpose.</b></p> <p>False. They usually occur by accident.</p>
<p><b>Name three of the four types of physical adaptations.</b></p> <p>Possible answers: Camouflage, mimicry, chemical defenses, and body coverings.</p>	<p><b>True or False. Some animals may have behavioral adaptations by being taught by other animals.</b></p> <p>True.</p>
<p><b>Name two types of behavioral adaptations.</b></p> <p>Instinctive and learned.</p>	<p><b>Name four examples of instinctive adaptation.</b></p> <p>Possible answers: Hibernation, migration, finding shelter, gathering food, raising young and self defense.</p>
<p><b>LOOK OUT! You swim off course in order to avoid a ship from striking you.</b></p> <p><b>Move back three spaces!</b></p>	<p><b>Hooray! Humans have minimized pollution in your river.</b></p> <p><b>Move forward two spaces!</b></p>

# Player Pieces





# Sturgeon Adaptation Board Game

**Ocean START**

River That  
Way ←

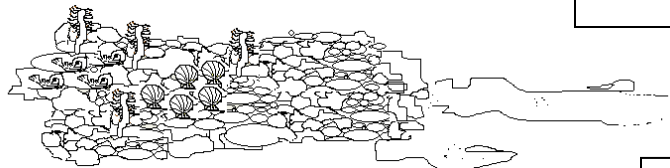
Ocean This  
Way →



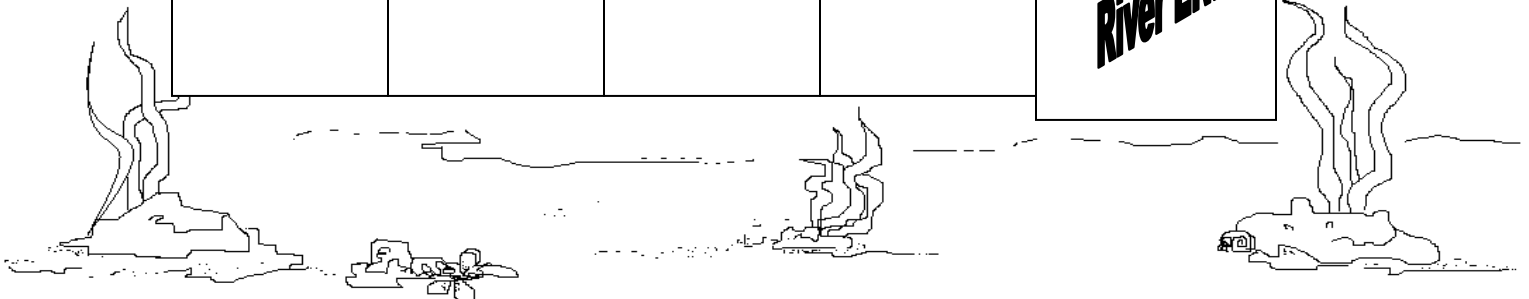
**Adaptation  
Cards**



**Discard  
Pile**



**River END!**



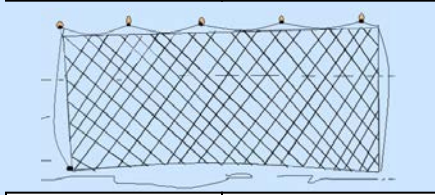
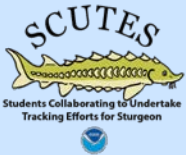
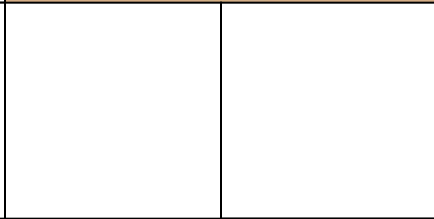
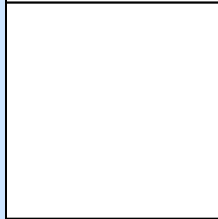
# Sturgeon Adaptation Board Game



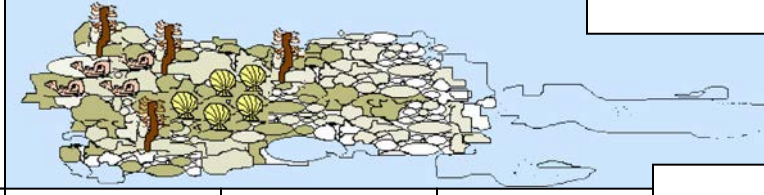
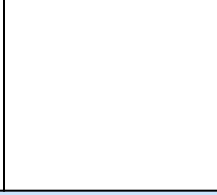
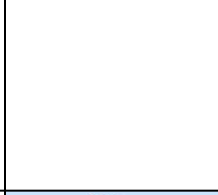
**Ocean START**



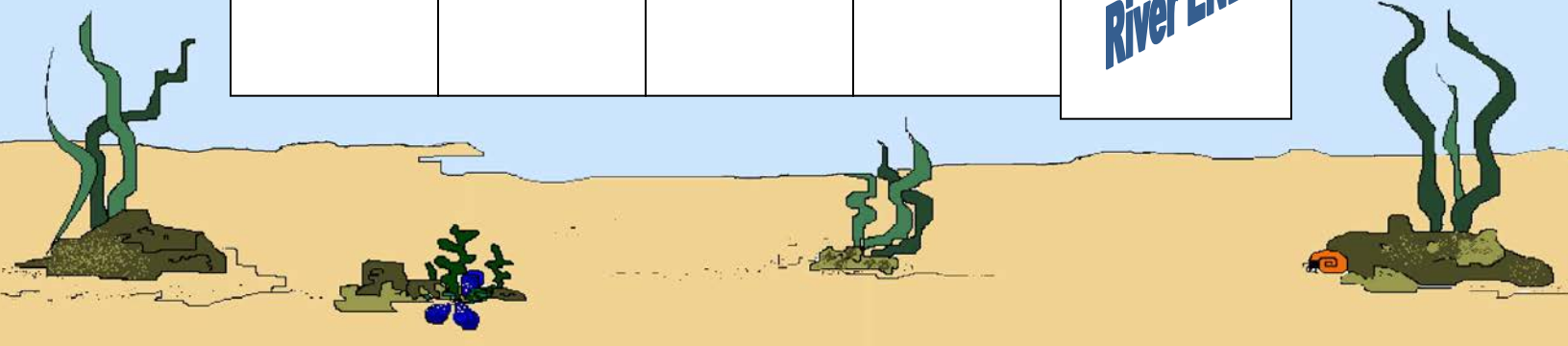
**Adaptation Cards**



**Discard Pile**



**River END!**



# Player Pieces

