SAN ANTONIO
RIVER AUTHORITY

A SCIENTIFIC INVESTIGATION

The Channel Catfish

EDUCATIONAL ACTIVITY

A Scientific Investigation
The Channel Catfish

OBJECTIVES

- Students will investigate the effects of pollutants on an organism. They will ask questions, make predictions, identify and explain a problem, and propose a task or solution. They will communicate by writing and/or drawing in a story/science journal.
- Students will be able to identify that it is a living organism with basic needs and specific structures of the fish that help it to survive in its environment.

TOPICS

FOR AGES 5 +

TEKS ALIGNMENT:
"…students explore patterns, systems, and cycles within environments by investigating characteristics of organisms, life cycles, and interactions among all components of the natural environment. Students examine how the environment plays a key role in survival. Students know that when changes in the environment occur organisms may thrive, become ill, or perish."

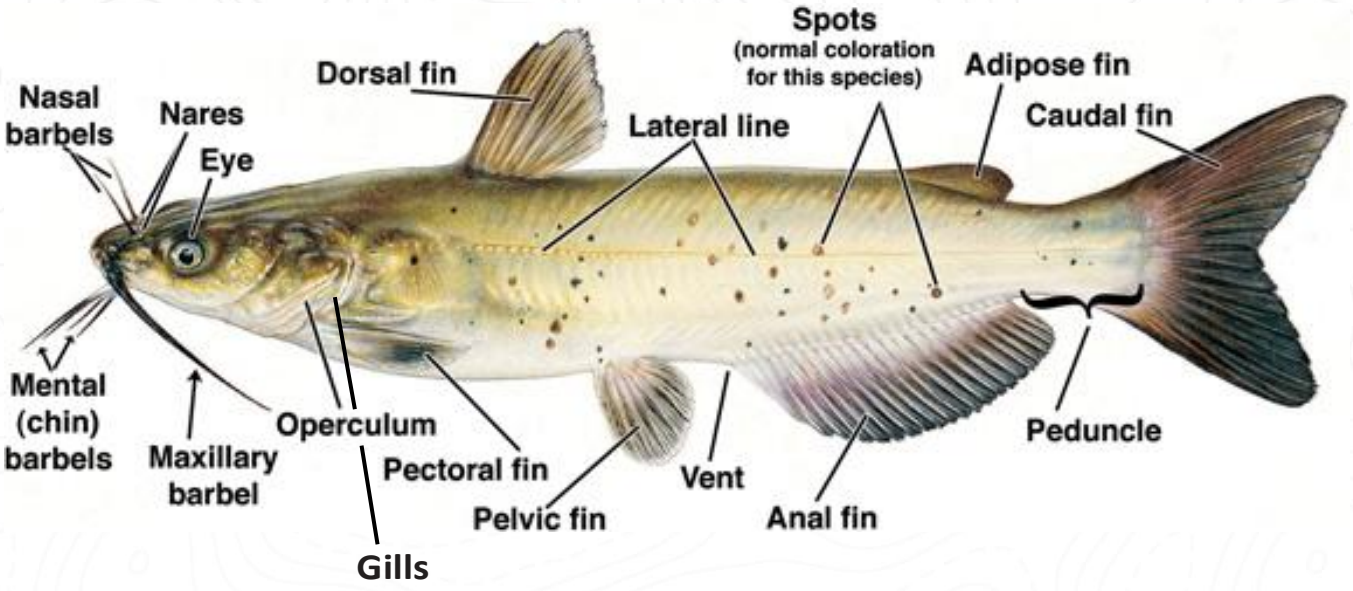
Kinder: They understand that all organisms have basic needs that can be satisfied through interactions with living and nonliving things.
2.A-E; 3.A&B; 4.A&B, 7.B&C, 9.A& B

BACKGROUND MATERIAL

The San Antonio River provides an environment with diverse and rich ecosystems. Its waters flow from the springs of our aquifer 240-miles through south Texas to the Gulf of Mexico. Many diverse living organisms depend on our river for life, such as birds, fish, mammals, insects, reptiles, amphibians, trees and plant life. These organisms interact with the living and nonliving components. All animals have basic needs of food, water, air, and shelter. All plants have basic needs of light, air, water, nutrients and space. The river ecosystems provide all the necessary living and nonliving components to enable the organisms to thrive. A balance occurs when these organisms interact with other organisms. If this balance is disrupted many organisms may be threatened.

For example, the elegant Great Egret is a large white bird with a long neck, thin black legs and a yellow bill, see photo in the top right. It thrives along our river because it has plenty of food, water, and shelter. It uses its long pointy bill to catch small fish and other small aquatic animals that live in the water. The trees along the river provide shelter to the Great Egret as a safe place to roost and build its nests. When the ecosystem is healthy there is a balance. The sun provides the light that the plants need, small insects get their energy by consuming plants, the small fish get their energy by eating the insects, and the Great Egret eats the small fish. There is a healthy food chain, but what happens if something, such as pollution disrupts the food chain?

A Channel Catfish



One organism that we will focus on is the channel catfish. It has also been called, “Forked-Tail Cat, “Fiddler”, “Spotted Cat”, or “Lady Cat.” If you look at the diagram above, you probably can infer why it earned these names. This fish lives in rivers, streams, or lakes with muddy bottoms. The San Antonio River is a perfect habitat for the channel catfish! It can find plenty of food to eat along its muddy bottom, such as snails, insects, crawfish, fish and plants. The water is murky which allows protection from its predators.

It has specific body parts, structural adaptations, to help it survive. All fish have gills which help them to breath underwater. Fish open and close their mouths allowing water to flow in and back out over the gills. The gills have many capillaries, blood vessels, which causes them to look very red. When the water passes over the gills the oxygen in the water is absorbed. Another adaptation of this fish is its dorsal and pelvic fins which have very sharp spines. If the spines puncture the skin, there is a venom that causes swelling and an increased blood flow in the area of the injury. Humans need to be very careful in handling this fish because the cut can be painful. It is interesting that the smaller catfish have the sharpest spines and can inflict the most damage. It is another way that the small catfish is protected from its many predators. In addition to protect it from its predators, its color blends in with the muddy waters. This is called camouflage, and it helps it to hide from its predators and surprise their prey. Since visibility is low in muddy water, they cannot see well. Instead, it has an amazing ability to hunt for food by using its sensory organs of smell and taste. The catfish has taste buds all over its body and on its long whiskers, called barbels, and there are 25 million taste buds per square millimeter on the barbels! That is a lot of taste buds! Catfish swim along the dark bottom and use their whiskers to smell for food.

Channel catfish have many adaptations that help it to survive in clean water, but sometimes our river gets polluted! Non-point source pollution is the leading cause of pollution in our river and poses a serious threat to all living organisms. Non-point source pollution can enter our river from anywhere on the land in our watershed. It is difficult to track where pollutants come from, because the San Antonio River Watershed drains over 4,194 square miles of land including the majority of Bexar, Wilson and Karnes Counties, the central portion of Goliad County and parts of 13 other counties. Visit our What in the World is a Watershed lesson for better understanding. During a rainstorm, the water may run down our streets and into the storm drains or ditches. The pollutants that are on our land may be picked up by the rain run-off and be carried into our storm drains or ditches and flow directly into our river. This is how many pollutants get into our river.

In the video of Freddie the Fish, several pollutants enter its habitat and cause problems. The first pollutant discussed comes in the form of **sediment** due to all the trees that are being "knocked down." The trees' roots are very beneficial for holding the soil in place. Unfortunately, without roots of plants and trees, the soil may easily be eroded and swept into the river by water or wind. Too much sediment in the water can block out the sunlight that all the aquatic plants must have to survive. In addition, the roots are no longer able to soak up the rain, so more runoff occurs. And finally, shade is no longer provided. Without shade, temperatures will increase. If the water gets too hot, the amount of dissolved oxygen will decrease, and the aquatic organisms may perish. It's hard to imagine that there can be so many negative consequences to removing trees in our watershed!

Another pollutant in our river and one of the biggest problems that keep us from being able to swim in it, is dog waste. *Escherichia coli (E. coli) is* bacteria that normally lives in our intestines. It is found on all wildlife and domestic animal waste. In the city of San Antonio, there are 2 million dogs. That is a lot of dog poop on the land if no one picks it up! The waste enters our waterways during a rainstorm if it has not been disposed of properly. It poses a serious threat to our health and the environment. *E. coli* may reduce the levels of dissolved oxygen in the water, thus threatening all aquatic life. Our scientists collect E. coli data regularly in our river, visit our Water Quality, E. coli Dashboard. We need your help. Please pick up dog waste and put it in the trash.

Another pollutant is nutrients from fertilizers. Fertilizers are used to help our plants grow and the grass to be green. People use fertilizers on their gardens, crops, and golf courses. This can easily enter our rivers from a rainstorm. It can cause more plant growth which may result in a decrease of sunlight. Which may decrease the amount of oxygen in the water. We need your help. Please encourage others not to fertilize right before a storm so we can prevent it from being taken by the rain runoff.

Litter is a common pollutant in the San Antonio River. Any litter on the land may end up in our river after a rainstorm. If there is litter in our river it will also be carried down and deposited at the San Antonio Bay, and ultimately the Gulf of Mexico. In 2019 alone the San Antonio River Authority collected 115,785 pounds of trash, this is nearly 58 tons! This poses a great threat to our wildlife as they may become entangled in it or mistakenly eat it. Plastic is a very serious problem. Plastic is made mostly from oil or natural gas. Research studies show fish are attracted to the smell of plastic. Fish may ingest tiny amounts (microplastics)of plastic and it may end up in their tissues. Microplastics can cause liver problem. We need your help. Please pick up litter and recycle it or put it in the trash. Don't let our aquatic wildlife eat it!

There are all kinds of chemicals that can enter our river through rain runoff, such as herbicides and pesticides. Fuel and oil from vehicles is another serious pollutant. If the oil enters our river many organisms may die. If the oil gets on the gills of fish, they will not be able to breathe.

To learn more, watch our 3-minute video, “Little Fish Tell a Big Story”

We need your help in keeping our land clean so that we may have a clean river. Clean land means clean water. Human activity causes many negative effects on our river. All the organisms in our river, San Antonio Bay, and the Gulf of Mexico need your help. Be River Proud.

KEY TERMS

Adaptations are specific physical or behavioral characteristics which help an animal or plant survive in its environment.

Camouflage is a physical adaptation, such as body color patterns, that helps the organism to blend into its environment for protection.

Erosion is the process of wearing away rock, sediments, and soil and it being moved by wind, water or ice.

Fertilizer is chemical or organic nutrients that facilitate health and growth of plants.

Gills are respiratory organs in fish and other aquatic animals that allows oxygen to be taken from the water.

Habitat is a home for plants and animals.

Microplastics are extremely small pieces of plastic debris in the environment resulting from the disposal and breakdown of consumer products and industrial waste.

Non-point source pollution is pollution that comes from a combination of many sources rather than a single source. Non-point source pollution usually enters the water as stormwater runoff.

Point source pollution can be traced back to a single source, such as a factory; the pollution generally flows from a single source.

Offspring are the young born of living organisms.

Omnivore is an animal that eats both plants and animals.

Organism is a form of life such as an animal, plant, or fungus.

Perish means to die.

Predator is an animal that catches and eats other animals.

Prey is an animal that is eaten by its predator.

Runoff is water that is not absorbed by the land but runs off the land into storm drains and river.

Sediment is loose particles of soil, clay, and sand in water, such as rivers. These earth materials may be taken away by wind or water through the process of erosion.

Soil is organic matter that has decomposed built up over time. It contributes nutrients to plants.

Pollutants are substances that are harmful to the environment.

Watershed is an area of land that drains to a single point, such as a river, a lake or a stream.

MATERIALS

Access to Video
Optional: Story script and instructions are provided if you wish to act it out.
Copy of the students' story journal based on level
Paper
Pencil
Colors
Watershed Wise Poster in English or Spanish

PROCEDURES

1. Explain to students that they are going to use the "story journal" (for grades 2-3 it is a science journal) to tell the story of the channel catfish in the San Antonio River. Pass out journals. Explain and read aloud.

2. Share our ecosystems 2 minute video.
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3. Share information, appropriate for learning abilities, provided in "Background Material."

Talking points:

- All living organisms (plants and animals) interact with non-living elements of our environment, such as air, water, soil, and sunlight.
- All living organisms interact with living elements of our environment. They depend on each other for food.
- All animals and plants are living organisms. They have basic needs and reproduce. Animals basic needs are food, water, air, and shelter. Plants basic needs are light, air, water, nutrients and space.
- Animals and plants have babies (offspring).
- The river offers a perfect habitat for many organisms. Show picture of organisms on first page.
- A healthy river contains diverse living and nonliving elements that create a healthy habitat for the fish, insect and plant species that inhabit the river.
- There are many food chains in a river ecosystem. Show picture of the Great Egret food chain.
- Fish have specific body parts that help it to survive. Show fish diagram, point out mouth, gills, dorsal and pectoral fins, tail. Discuss the functions of each part.

3. Show the video, Freddie the Fish, or act it out.

- Explain that the fish in the video is not real, sometimes scientists use models to represent the real world. We are using a model because we do not wish to hurt our fish or river.

GUIDING QUESTIONS
for Kindergartners and First Graders
Allow students to ask questions.

1. How did this video make you feel? Why?
2. Ask what kind of fish is it? (Channel Catfish)
3. Was the fish in the video real? (No, it was a model)
4. Have you ever seen a live fish? Where? (perhaps an aquarium)
5. Are real fish living organism? Why? (Yes, because it has basic needs and have babies)
6. What must fish have to live? (Food, water, shelter)
7. Where does it live? (mud bottom rivers, ponds, streams, and in the San Antonio River)
8. What did the water look like before it got polluted? What did it look like after it got polluted? (color, clarity?)
9. How do fish breathe underwater? (they have gills)
10. Can you breathe underwater? (people have lungs)
11. What is making the fish sad? (litter, dog waste, oil, fertilizer, sediment)

12. Why is it causing a problem? (fish cannot breathe if its gills get covered in oil, E-coli bacteria can get inside the fish, fertilizer and sediment can kill other living organisms that the fish may need for food and then the entire food chain may be affected).
13. What can we do to help our little fish? (pick up litter and recycle it, pick up dog waste and throw it in the trash. Watershed Wise Poster

GUIDING QUESTIONS FOR SECOND GRADERS

GUIDING QUESTIONS FOR THIRD GRADERS

EVALUATION

Story/Science Journal

ENRICHMENT

Students may create their own story about any of the living organisms that live along or in our river. They will illustrate.

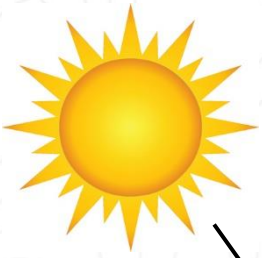
Be sure to include:

- Who (living organism)
- What are its basic needs to survive?
- How does it get its food?
- What is the problem?
- What is the solution.

SUSTAINABILITY TIP:

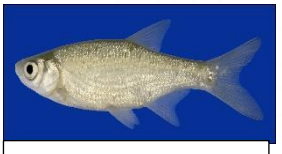
- If you do the optional activity of Freddie the Fish, be sure to recycle any of the materials used.
- Reuse the water for a plant.
- Please recycle plastic, paper, and metal.

SIMPLE FOOD CHAIN OF GREAT EGRET
(arrows represent the flow of energy)



Water Primrose

Mayfly Nymph



Texas Shiner

Great Egret