Amazon Aquatic Life

Objective:

1. The students will demonstrate an understanding of the interactions between populations or species and their natural habitat.
2. The students will evaluate the environmental benefits of the biological organisms in an ecosystem.
3. Students will compare and contrast the interdependent and competitive relationships in organisms within an ecosystem.

Performance Objectives:
Grade 6: Strand 3 - Concept 1 PO 1, 2; Strand 4 - Concept 1 PO 6
Grade 7: Strand 3 - Concept 1 PO 1, 2 and 3; Strand 4 - Concept 3 PO 2 and 6
Grade 8: Strand 4 - Concept 4 PO 1 and 4;
NGSS: MS – LS2
CCSS 6-8 WHST. 2; WHST. 6 and 9.
CCSS 6-8 RST. 8

Grades: 6-8

Key Vocabulary:
- **Neotropical**
- **Ectothermic**
- **Interdependent**
- **Tributaries**

Related Literature:

Walking the Amazon
Ed Stafford

The Amazon: River in a Rainforest
Molly Aloian

Three Rivers
John Hemming

Background Information:

One of the longest rivers in the world, the Amazon River, is home to thousands of living organisms and a life-sustaining ecological feature covering a vast area of South America. The Amazon River is known to be second only to the Nile River in length but carries a record volume of water along its path through several countries. This valuable water source flows through Peru, Bolivia, Venezuela, Colombia, Ecuador and Brazil as it makes its way over 4,000 miles to the Atlantic Ocean. The Amazon River is the source for numbers of **tributaries** along which

clusters of people live and flourish as a result of the river's resources. A variety of ecosystems exist along the length of the river, including the largest tropical rainforest in the world and even some dry grasslands. Amazon plants and wildlife range from the most microscopic species to various large aquatic species. The uniqueness of the region is enhanced by the diverse cultures of native people living and working along the Amazon River. (Refer to the maps.)

The origin of the famous river is high in the Andes Mountains of Peru. There are more than 1,000 tributaries, streams or rivers that flow from the main river and 17 of those are over 1,000 miles long. The Amazon River contributes nearly one-fifth of all of the fresh water that flows on Earth. In addition, the Amazon Basin is so vast that it continues to be the location for exploration and discovery for potential new species. Some scientists believe that the Amazon Basin contains more species of fish than the Atlantic Ocean. Many of these species include electric eels, stingrays, pink dolphin and manatees.

Scientists believe that the Amazon River, with its enormous amounts of fresh water, provides an abundance of solid particles that flow into the Atlantic Ocean every year. These particles are loaded with minerals and nutrients that provide food for fish both in the river and the ocean. According to the World Wildlife Federation, the brown waters of the Amazon River can be seen far out into the ocean, even before the continent is in sight. Some of the aquatic animals living in the vast river are 200-pound catfish; anaconda snakes; piranha fish, the most ferocious fish in the world; and over 2,000 other species of fish.

(Public domain photos)

Piranhas are known for their razor-sharp teeth and aggressive nature when it comes to finding and eating food. Considered "ferocious" fish, they can grow to about 12 inches long and some live up to 25 years. Their diet consists of mainly insects and other fish. These stocky fish live in the fresh water of the Amazon River.

The banks of the Amazon River provide numerous habitats for a wide variety of animal and plant life. Both aquatic and land-loving species populate the river's edge and interact with the humans that thrive on the abundance of the river's resources. The many arteries of the Amazon River are impacted by seasonal changes; for example, annual floods affect the ecology and inhabitants of the

region. The enormous volume of water and the rapid speed at which the water flows expands the width of the river and its tributaries during the flood season. Animals, plants and humans endure significant changes in their lives as the river goes through this transformation. In contrast, the dry season causes the river banks to subside and, in some areas, the water flows very slowly. As seasons change, so does the river, and thus the **interdependent** relationship between river, animals, plants and humans becomes critical for the survival of each group. The fragile ecosystem of the Amazon River region, which many believe to produce much of the Earth's oxygen, is vulnerable to any type of climate change, atmospheric contamination, natural disaster or any disregard for the preservation of the natural environment.

The fish in the Amazon River are well adapted to the fresh water aquatic ecosystem. As the center of diversity for **Neotropical** fishes, the Amazon River is the ideal ecosystem for over 5,000 known species for fish. These aquatic wonders get their name (Neotropical) from the tropical location of the Amazon River. (See maps.) Many of the world's leading ichthyologists have studied the various species in the region and considered the area one of the most diverse in the world. The aquarium fish at **Butterfly Wonderland** represent many of the types of fish found in the Amazon River. The Tinfoil Barb, Ruby Red Oscar and Giant Gourami are only a few of the beautiful aquatic fish to observe and enjoy.

Fish are called **ectothermic**, aquatic vertebrates and are categorized by their type of skeleton. The body temperature of an "ectothermic" animal is regulated by the surroundings, such as water temperature for fish. This means that fish must adapt to the water temperature to survive because they cannot regulate body temperature internally. Being "aquatic" means that they live in the water and process oxygen through the gills. Tropical fish, for example, are called "bony" fish because they have a skeleton made of bone. Sharks and rays are in a different group because their skeleton is made of cartilage. Generally, fish have skin covered with scales and their limbs are modified into fins for swimming. The scales protect the skin and internal parts of the fish. Even the body shape of the fish tells a story about how it lives. Fish with streamlined bodies are usually fast swimmers and capable of catching prey with great speed. Many tropical fish have a more flattened body as they do not require as much speed but need to fit into small crevices in rocks for

protection. Other types of fish use their color to camouflage themselves for protection.

There are different fins on a fish: pectoral fins, pelvic fins, dorsal fin, caudal (or tail) fin and anal fin. These fins help the fish move in water and provide stability and support for the body of the fish. The pectoral fins are usually responsible for turning while the pelvic fins add stability and are used to slow the movement of some fish. The dorsal fin may be either a single or a split fin and is used for sudden direction changes keeping the fish stable in the water. The caudal fin, or tail fin, is responsible for propelling the fish in the water, and the anal fin adds stability.

The tails of fishes vary in shape depending on the type of fish and its anatomy. Most fish are visual predators and have fairly large eyes to help them locate food. Bony fish have no eyelids.

The Oscar is an interesting fish that exhibits the common features of all fish.

The Oscar: Ocelli species from the Cichlid family a resident of South America can grow up to 18 inches long and 35 pounds. Wild species are generally dark in color with yellow spots on the caudal peduncle and on the dorsal fin. These slow-moving fish often take shelter under submerged branches. (Public domain photo)

Sources: Newman, Arnold. *Tropical Rainforest*. Checkmark Books, 1990; PBS/NOVA; Monterey Bay Aquarium; US Department of Natural Resources; Hubbard's Fish anatomy; Sea World; Encyclopedia Britannica; Wikipedia; World Wildlife Federation; Wikipedia;

Butterfly Wonderland

Rivers of the Amazon Aquatic Life

(Photos taken at Butterfly Wonderland. By: Linda Hoyer)

Tropical Fish and Stingrays

Native to the tropical regions, tropical fish are found in fresh and saltwater environments. While the Earth's surface is only .01% freshwater, 40% of all species are found in freshwater environments. Tropical fish found in the Amazon River are freshwater fish.

Many tropical fish are bright in color and can be found in different shapes and sizes. The body shape of the fish is generally related to the natural environment in which the particular type of fish lives. Color can also be related to the environment, especially in fish that camouflage themselves for safety. Tropical fish are vertebrates and use gills to breathe and fins to swim. Fish have been on Earth for millions of years. There are more than 25,000 species of tropical fish found in the world today, and an estimated 15,000 species yet to be identified.

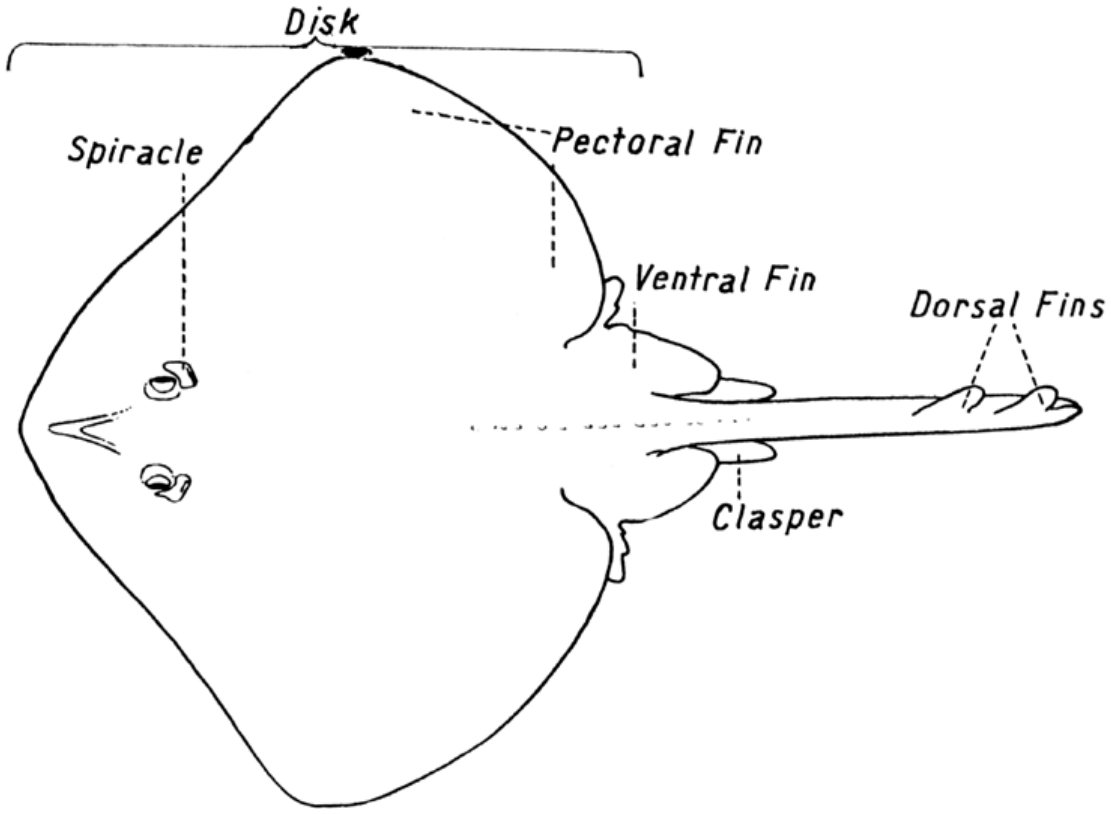
Tropical fish have become a favorite for many hobbyists who enjoy creating aquarium environments. The fish aquarium business is world-wide and provides a unique way to learn about tropical fish.

There are several species of fish that do not have a bony skeleton. Those fish have cartilage which supports the structure of the body. Stingrays are a group of fish with cartilage instead of a bony skeleton. Stingrays are found in shallow coastal waters in temperate climates. Much of the time stingrays are inactive and buried in the sand. Their flattened body has a pectoral fin, ventral fin and connects to the tail. Their body shape also allows the stingray to conceal itsself in the environment.

There are eight families of stingrays, each with specific traits. Most stingrays have a barb on the underside of their tail which they use for self-defense. A stingray's eyes look out from the dorsal side. Its mouth, nostrils and gill slits are on the underbelly. They use their sense of smell to detect prey, similarly to sharks. Stingrays eat mainly mollusks, crustaceans and some small fish. The mouth of the stingray has two crushing plates that can break the shells of their prey.

Stingray Swimming

(Stingray Swimming by **Petr Kratochvil**)



Procedures and Pre-Activities:

1. State the learning objective.

2. Read related literature on the Amazon River.

3. Review vocabulary.

4. Show the location of the Amazon River on a map of South America.

5. Present background information up to the notation to refer to the map.

6. Hand out the map titled: Amazon River Experience. Discuss location, elevation and tributaries of the Amazon River on the map.

7. Continue the background information.

8. Discuss the inhabitants of the area (human, plants, animals) and their interdependent relationship. Call on students to explain how survival depends on each community within the relationship. Ask students to give other examples of interdependent relationships.

9. Quiz: use the map titled: South America. Have students label the map per directions. (Optional – use colored pencils to identify the river, etc.).

10. Review the information of the external anatomy of the fish (use fish diagram). Review each type of fin and the function.

11. Students should be prepared to observe the fish in the aquariums along with the touch tank. Paying close attention to the external anatomy of the fish, students should observe how each different fin functions to move the fish in all directions. Students watch the motion of the fins and the tail and explain their observations when they return to class. Students may want to observe the differences in how the fish move and how the rays move and compare the external anatomy of both. Hand out **Tropical Fish and Stingrays** along with picture and diagram. Discuss how rays differ from tropical fish.

12. Hand out worksheets: **How Fish Swim** and **Location, Location, Location**. Students complete their observations at **Butterfly Wonderland**.

Reflection and Assessment:

After visiting **Butterfly Wonderland**, discuss the experience in the Rivers of the Amazon Aquatic Life.

Activity: Divide students into small groups (3-5). Give each group a 3x5 index card. In groups, students discuss the external anatomy of the fish and the patterns of movement within the aquariums. On the 3x5 card, each group lists 5 significant observations that they recall from viewing the fish in the aquariums. They should consider:

Physical Structure and Function

Fins and Movement

Habitat Variations

Compatibility of species in tanks

Upon completion of the task, each group presents one or two observations to the class. Class discussion follows the presentations.

Quiz: Students complete the quiz titled: Label the parts of the fish.

Biome Activity: Students may need to do research on the internet to describe all of the features of the two different biomes in the activity. Students use their research to complete each section of the biome activity sheet. In a compare and contrast essay, students write about the biomes.

Writing Activity: Students write a Compare/Contrast essay about tropical fish and stingrays. Include structure and function, habitat, compatibility in ecosystem.

Optional Activity: Students use the internet to label the flags of the countries through which the Amazon River flows. (This can be done as a team game; the first team to finish wins.)

Optional Activity: Build an Amazon Aquatic Ecosystem. This is a class project which can involve participation, observation, prediction, analysis, estimations, and creating charts and graphs to monitor the organisms in the ecosystem. Please refer to specific aquarium guides to create an Amazon-style freshwater aquarium with plants and fish that cohabitate well in the environment.

Materials: Colored pencils (optional); 3x5 index cards; handouts; aquarium equipment.

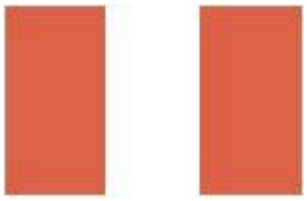
Amazon River Experience

South America

Locate and label the countries, the Amazon River and the oceans.

South America Map (**Key**)

Flags of the countries through which the Amazon River flows (**Key**)



Flag of Peru

Flag of Bolivia

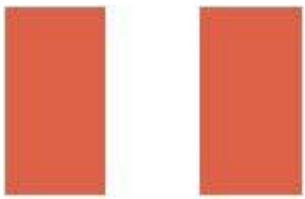
Flag of Venezuela

Flag of Ecuador

Flag of Columbia

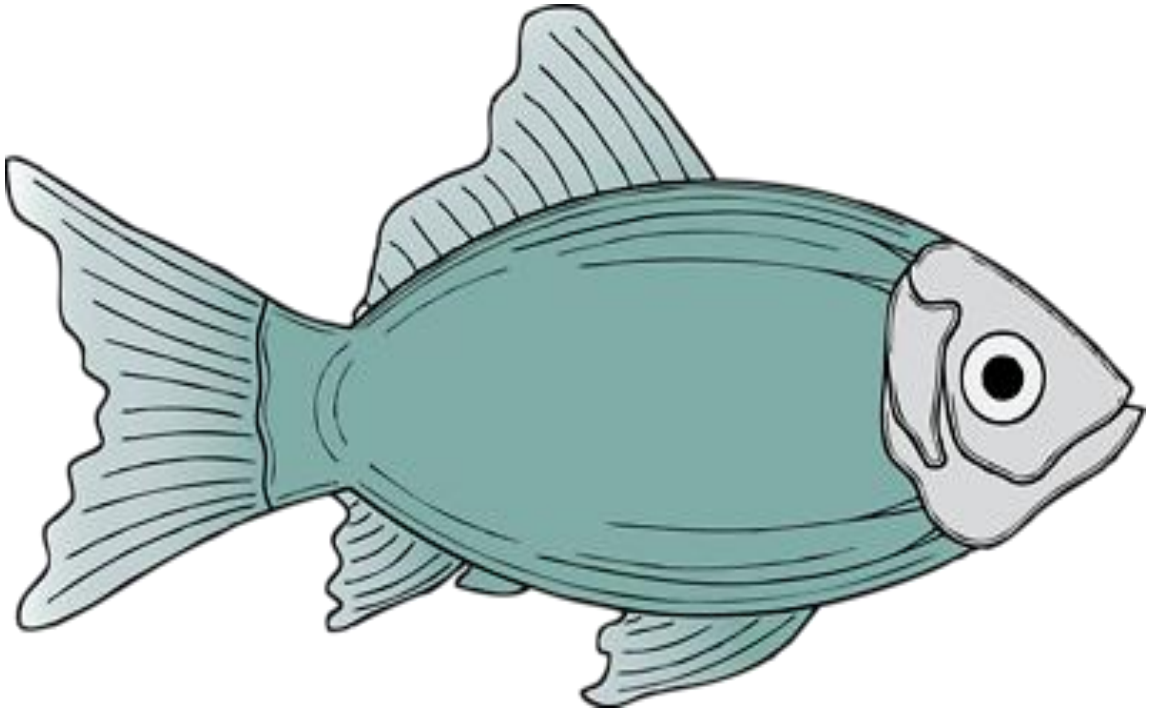
Flag of Brazil

Flags of the countries through which the Amazon River flows.



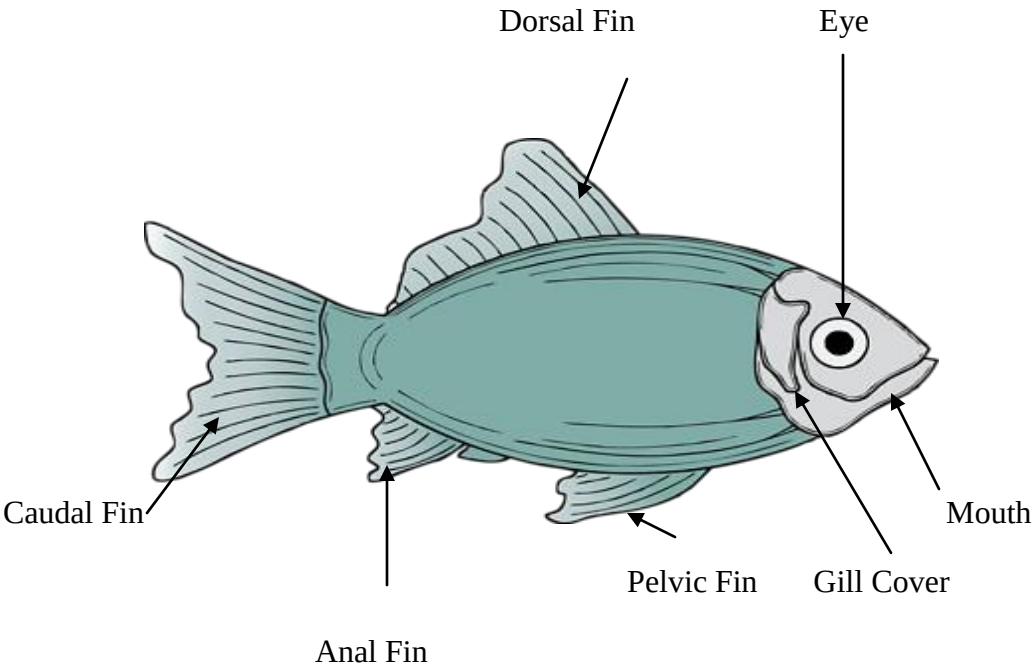
Label the flags

Label The Parts Of The Fish



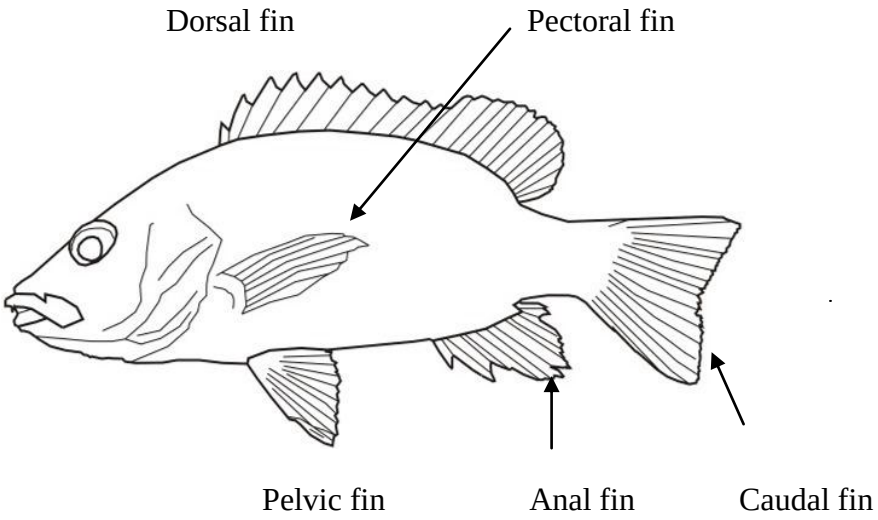
1. Gill Cover
2. Caudal Fin
3. Mouth
4. Eye
5. Pelvic Fin
6. Anal Fin
7. Dorsal Fin

Label the Fish (Key)



How Fish Swim

The diagram below shows each of the fins, and in some fish, certain fins may be longer, shorter, wider or more elaborate depending on the particular type of tropical fish. Select a fish at **Butterfly Wonderland** to observe. As you watch the fish swim, determine which is the primary fin used to propel the fish through the water. Write the name of the fish on the appropriate lines below. Continue to observe eight fish (one in each aquarium). What similarities did you observe in the groups of fish named in each box?



Pectoral Fin: _____

Dorsal Fin: _____

Caudal Fin: _____

Pelvic Fin: _____

Anal Fin: _____

Location, Location, Location

The Rivers of the Amazon Aquatic Life Experience at **Butterfly Wonderland** displays numerous freshwater fish living in communities much as they would in the waters of the Amazon River. As you observe the aquariums and the touch tank, find the following types of fish and describe their environment.

Tinfoil Barb

Description Location Features of the environment

Emerald Mellenium

Description Location Features of the environment

Bala Shark

Description Location Features of the environment

Giant Gourami

Description Location Features of the environment

Silver Dollar

Description Location Features of the environment

Stingrays

Description Location Features of the environment

Ruby Red Oscar

Description Location Features of the environment

Biome Activity

Biomes are areas on earth with similar climate, plants and animals. There are 5 major types of biomes on earth: aquatic, desert, forest, grassland and tundra. Two types of biomes are listed below. Describe the characteristics of each biome. Compare and contrast the Desert Biome and the Rainforest Biome.

Desert Biome

Location:

Weather:

Plants:

Rainforest Biome

Location:

Weather:

Plants:

Animals:

Insects:

People and their activities:

Animals:

Insects:

People and their activities: