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# Wings in the Water

## Teachers Guide

### Grades 3<sup>rd</sup>-5<sup>th</sup>

**Program Description:** Come discover what makes rays truly unique and how they are adapted to the many different habitats in the oceans. Close-up observations of the different kinds of rays and their adaptations will leave your students with a greater knowledge of these sometimes misunderstood animals.

#### **Enduring Understandings for Wings in the Water:**

- Animals have special adaptations that help them survive in their unique habitats.
- Scientists utilize a classification system to organize living things according to their characteristics.
- There is a difference between a fact about a subject and an attitude.

#### **Objectives:**

- Students will classify organisms according to their physical characteristics.
- Students will investigate the adaptations that allow an animal to survive successfully in its habitat.
- Students will compare and contrast sharks, rays, and fish.
- Students will be able to critically distinguish between something being a fact and an opinion or attitude.

#### **Georgia Performance Standards**

##### **Third Grade**

S3CS4: Students will use ideas of system, model, change, and scale in exploring scientific and technological matters.

a. Observe and describe how parts influence one another in things with many parts.

S3L1: Students will investigate the habitats of different organisms and the dependence of organisms on their habitat.

d. Explain what will happen to an organism if the habitat is changed.

ELA3LSV1: The student uses oral and visual strategies to communicate. The student

a. Adapts oral language to fit the situation by following the rules of conversation with peers and adults.

b. Recalls, interprets, and summarizes information presented orally.

##### **Fourth Grade**

S4CS4: Students will use ideas of system, model, change, and scale in exploring scientific and technological matters.

a. Observe and describe how parts influence one another in things with many parts.

S4L1: Students will describe the roles of organisms and the flow of energy within an ecosystem.



- c. Predict how changes in the environment would affect a community (ecosystem) of organisms.

S4L2: Students will identify factors that affect the survival or extinction of organisms such as adaptation, variation of behaviors (hibernation), and external features (camouflage and protection).

- a. Identify external features of organisms that allow them to survive or reproduce better than organisms that do not have these features.

### **Fifth Grade**

S5CS4: Students will use ideas of system, model, change, and scale in exploring scientific and technological matters.

- a. Observe and describe how parts influence one another in things with many parts.

S5L1: Students will classify organisms into groups and relate how they determined the groups with how and why scientists use classification.

- a. Demonstrate how animals are sorted into groups (vertebrate and invertebrate) and how vertebrates are sorted into groups (fish, amphibian, reptile, bird, and mammal).

### **Before coming to the aquarium, the student should:**

Have a working knowledge of the following vocabulary:

**Adaptation:** the changing over time of the structure, function, or behavior of an organism, which enables it to be better-suited to its environment

**Camouflage:** an animal's ability to blend in with their surroundings

**Cartilage:** a firm, elastic substance found in the bodies of humans and other animals

**Classification:** the grouping of organisms into categories on the basis of evolutionary or structural relationships between them

**Fish:** a cold-blooded aquatic vertebrate that has gills, varied fins, and scales

**Gills:** the respiratory organ for aquatic animals that breathe water to obtain oxygen

**Habitat:** the area where an organism or ecological community normally lives

**Predator:** an organism that lives by preying on other organisms

**Prey:** animals that are killed and eaten by other animals

**Vertebrate:** having a backbone or spinal column

### **Pre-visit activities:**

**Fact or Attitude: Rays in the Spotlight:** Students will discuss the difference between a scientific fact and personal attitude regarding animals and discover how that can drastically alter how animals are seen and treated.

### **Post-visit activities:**

**Where's My Ray?:** Students will understand the meaning of camouflage and how this adaptation helps protect animals from possible predators

# Fact or Attitude: Rays in the Spotlight

**Objectives:** Students will identify the relationship between statements that are facts and statements that are attitudes in relation to how people might perceive a specific type of animal.

**Grade:** 3<sup>rd</sup> – 5<sup>th</sup>

**Duration:** 30 minutes

## **Materials:**

A copy of the “Ray Survey” and “Ray Meters” for each student

A white board

## **Background:**

Looking at particular topic purely scientifically can sometimes be difficult. Many issues involve opinions, facts, theories, and data. When learning about or considering a topic, it is important to be able to distinguish the difference and understand the values of both facts and opinions. Many groups of animals in the ocean are caught between facts and opinions; the ray is no exception.

For an animal that feeds on small fish and shellfish, the ray gets the most attention for its barb. This serrated keratin spine that grows on the tail is what stingrays use to defend themselves from predators. Bottom dwelling rays generally have their barbs half way down the tail and can use it to quickly whip at something that it thinks is attacking it. For example, while hiding under sand in shallow waters, a ray can easily be stepped on by a beachgoer. The majority of ray stories have to do with stings, including much rarer cases of a ray barb entering the body somewhere other than the leg or arm. With such an abundance of stories of human harm from an animal, it is understandable why it can begin to acquire a bad reputation amongst people.

## **Procedure:**

1. Introduce the definition of a fact (something that actually exists; reality; truth) and the definition of an opinion (a belief or judgment that rests on grounds insufficient to produce complete certainty, a personal belief). Write the two words for the whole class to see on the board.
2. Under each word on the board, write “What do you believe?” under “Opinion” and “What do you know?” under “Fact”. Discuss the difference between the two when talking about specific things: The best sports team, the most dangerous animal in the world, etc.
3. Introduce the concept that many peoples’ knowledge of different animals comes from both facts and opinions. One of these animals is the ray.
4. Hand out the Ray Survey for each student and ask them to circle each answer as they see fit.
5. After each student finishes their survey, give them a copy of the Ray Meter to fill out based on their answers on the Ray Survey.

6. Once all students have completed their Ray Meters, discuss the variation in the students' opinions and knowledge of rays. Line up the students based on how many scored 1 to 10 in opinion, and discuss what each end of the line represents. Then rearrange the line based on knowledge, from 1 to 7. Ask if the students can detect any relation between knowledge scores and opinion scores. Ask the students with high knowledge scores where they got their information from, and to share some of those sources.

8. Discuss with the students how the difference between fact and opinion can affect animals in the wild and how we treat them, and review the importance of knowing the difference between fact and opinion.

**Assessment:**

Have the students identify other animals or subjects that people might have both opinions of and know facts about. Have the student record five facts on a chosen topic and compare them to five opinions of the same topic to see if there is a difference.

# RAY SURVEY

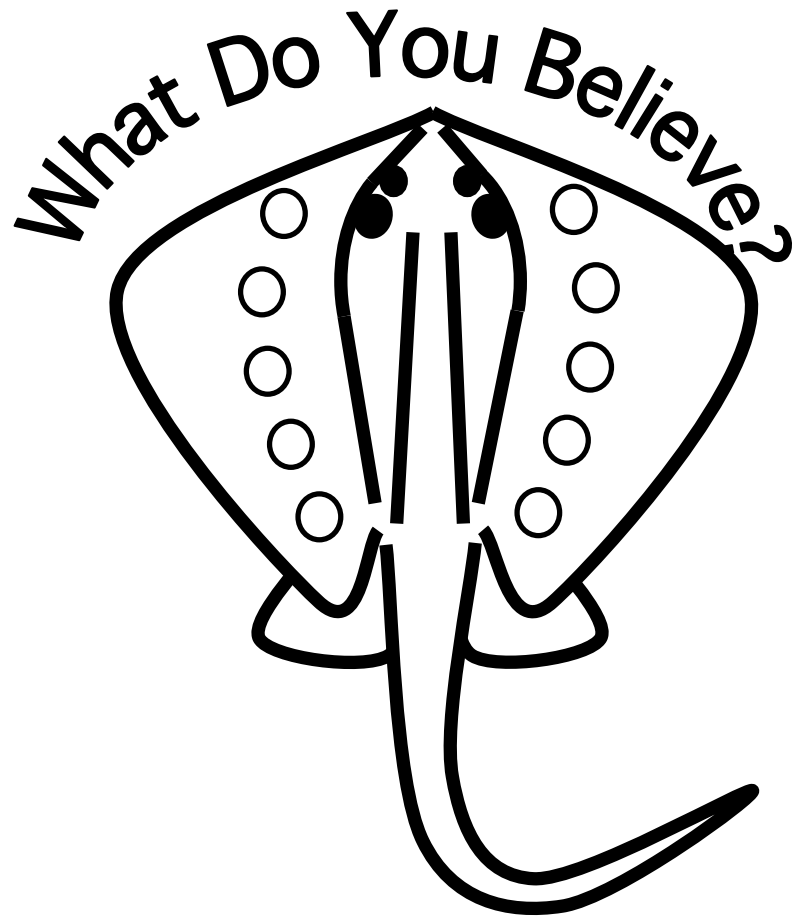
## What do you believe?

1. Rays are scary.....Agree/Disagree
2. People who swim in oceans where rays live are crazy.....Agree/Disagree
3. Rays are a little frightening, but not bad.....Agree/Disagree
4. All rays that swim near the shore should be killed.....Agree/Disagree
5. Some kinds of rays don't seem scary at all.....Agree/Disagree
6. Rays are interesting..... Agree/Disagree
7. The world would be better off with no rays.....Agree/Disagree
8. Rays are mean.....Agree/Disagree
9. I worry about people killing too many rays.....Agree/Disagree
10. The ocean is a better place with rays in it.....Agree/Disagree

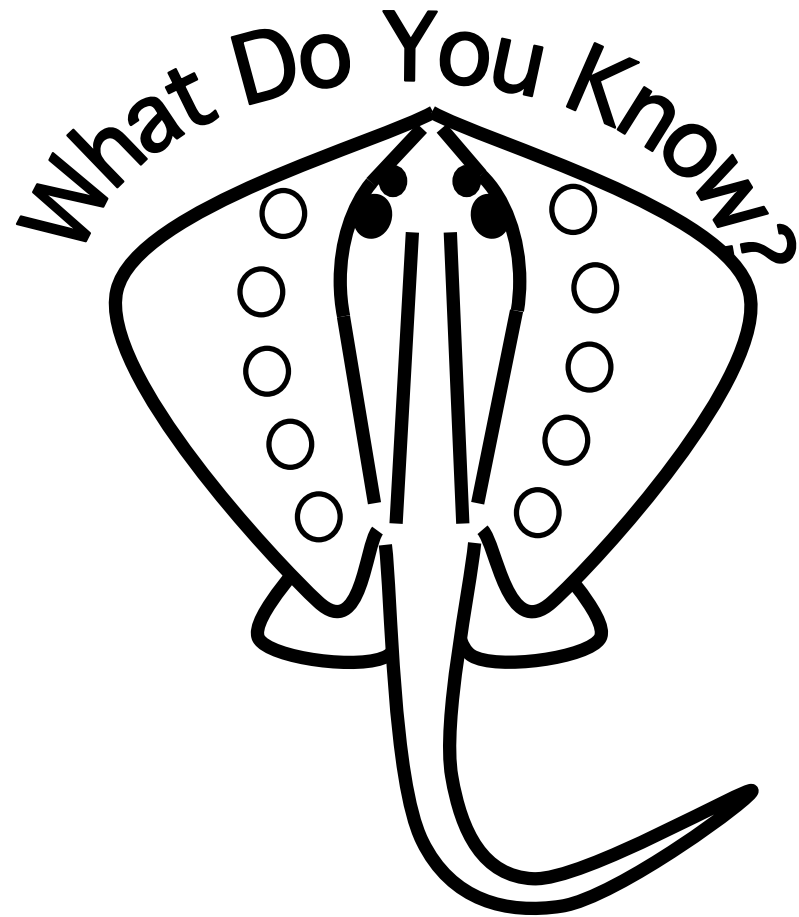
## What do you know?

1. Rays are a kind of fish.....True / False
2. Almost all rays live near the coast where people swim.....True / False
3. If you see a ray while in the water, it will sting you.....True / False
4. If a ray stings you, you will die.....True / False
5. There are fewer than 100 species of rays.....True / False
6. Stingrays only use their barb to protect themselves.....True / False
7. Some rays are over ten feet wide.....True / False
8. Some people eat rays.....True / False
9. There are fewer ray attacks now then ever before.....True / False
10. Rays have no predators in the wild.....True / False

Compare the answers you gave on your survey with those below. Color in a dot on the ray meter for every answer you gave that matches the numbered answers below. For example, if you had 6 matching answers, fill in six dots in a row, starting on the top left.



(1) disagree, (2) disagree, (3) agree,  
 (4) disagree, (5) agree, (6) agree, (7)  
 disagree, (8) disagree, (9) agree, (10) agree



(1) true, (2) false, (3) false, (4) false,  
 (5) false, (6) true, (7) true, (8) true, (9) false,  
 (10) false

## Answers to "Ray Survey"

- 1. TRUE.** Rays are a special kind of fish. Most fish have hard bones like humans do. Rays and sharks skeletons not made of bone, but cartilage instead. This allows them to swim gracefully and quickly. You can feel flexible cartilage in your nose and ears.
- 2. FALSE.** Rays live in many different parts of the ocean, some stay near the shore, some swim across the deep ocean.
- 3. FALSE.** Rays rarely attack humans. Most rays hide under sand and can be mistakenly stepped on by a person in the water. When they do, the ray can sting the person in defense.
- 4. FALSE.** When a stingray defends itself, it will whip out its tail and try and sting with a barb that is located halfway down their tail. This barb is hard like your fingernails and sharp. The barb will stay in the wound while the stingray swims away. There is some venom in the barb that will make the wound hurt even more, but is not fatal if hit by a stingray.
- 5. FALSE.** There are around 513 species of rays in the world, which greatly outnumbers their cousin the shark that only has around 360 species.
- 6. TRUE.** A stingray will use its barb to protect itself from predators. It will strike out with its barb and then swim away. A ray will never hunt with its barb.
- 7. TRUE.** The manta ray can be up to 25 feet wide!
- 8. TRUE.** Some cultures will eat the wings of the ray or use it in soup. The cartilage gives little flavor, and is used mostly for texture.
- 9. FALSE.** Even though we know more and more about rays now than ever, there are more people than ever before. More people means more chances of stepping on a stingray and being stung.
- 10. FALSE.** Sharks are a very important predator to rays, keeping their population at a healthy number. Without sharks in the ocean, we would have even more people stepping on even more stingrays!

### Where's My Ray? (Post-Visit Activity)

**Objective:** Students will understand the meaning of camouflage and how this adaptation helps protect animals from possible predators.

**Grade:** 3<sup>rd</sup> – 5<sup>th</sup>

**Duration:** 20 minutes

**Materials:** paper, markers, crayons, colored pencils, any other decorating medium you would like to include, tape, stingray worksheet printed on card stock

**Background:** **Camouflage** is a way that many animals hide from their predators or trick their prey. While there are many different kinds of camouflage, they all serve to protect them from other animals. Some animals have **counter shading**, where the top of their body is dark and the bottom is light to provide them two different modes of hiding depending on whether they are above or below a predator. Examples of these types of animals would be sharks, penguins and stingrays.

**Procedure:**

1. Hand out the “Where’s my ray?” Worksheet to each student.
2. Have each student pick an area in the classroom as a habitat for their stingray.
3. After writing their name and the area of the classroom on the underside of their ray, have the student color and decorate the stingray to match its chosen habitat. Be sure to have the students cut out their ray and hand it to the teacher.
4. When the classroom is empty, put up the rays around the room for the students to find when they return from the vantage point of their seats.
5. Record the locations of the rays and discuss which rays were easier to find and which were more difficult. Why? Ask the students to think of some other ways a stingray could protect itself. For example, sharks alone can use sensors, tassels around their face, quick bursts of speed, or sharp teeth.

**Assessment:** Assess students participation in the activity and ability to create a camouflaged individual.

**Extension:** Have students’ research different types of rays and how their habitats may differ. Discuss how camouflage changes from one habitat to another.

## WHERE’S MY RAY?

**Name:** \_\_\_\_\_

**Camouflage** is an adaptation that many animals have to help them blend into their surroundings. Animals may have colors or patterns that copy the habitat in which they live.

**Instructions:**

1. Find a place in the classroom where you would like to “hide” your stingray.
2. Write the area of the classroom and your name on the underside of your ray.
3. Decorate and color your ray to camouflage in this area.
4. Cut out your ray and hand it in to your teacher.

