



Grades K-2

Next Generation Science Standards

3-LS2-1 Partial-additional focus on constructing an argument for animals forming groups for survival needed.

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Exploring Marine Science and Aquaculture Grades K-2

Sharks and Minnows

Developed by the University of Maine Cooperative Extension
Revised and formatted by Maine Agriculture in the Classroom

Activity Description:

This activity explores the concept of interconnectedness within an ecosystem and adaptations needed for survival.

Learning Objectives:

Students will:

- Use gross motor skills to play the game, Sharks and Minnows.
- Describe how the population of minnows keeps getting smaller, while the population of sharks keeps growing.
- Discuss what the minnows and sharks need to survive, and describe why fish travel in schools

Essential Questions:

- What is an ecosystem?
- What are predators? Prey?
- What do predatory sharks need to survive?
- What do prey minnows do to survive?
- What happens as the number of predators increases?

Background Information:

All of the organisms in an ecosystem are connected. The success or decline of one species will have an impact on the population of another species that is connected to it. The most obvious example of this connection is a predator-prey relationship, such as sharks and minnows. Animals display a variety of behaviors during predator-prey relationships. These behaviors are adaptations needed to survive.

Vocabulary List:

Predator: an animal that lives by killing and eating other animals.

Prey: an animal that is hunted and killed by another for food.

School: a large number of fish or aquatic animals of one kind swimming together.

Shark: a large usually gray saltwater fish that has sharp teeth and a skeleton of cartilage

Minnow: a very small fish that is often used as bait to catch larger fish



Materials:

- 4 cones (or equivalent “goal” indicator”)

Procedure:

Engage

1. Access the student’s prior knowledge: Ask them to brainstorm the things that they need to survive.
 - a. *What are the things you need to survive?*
 - b. *Are some things more important than others?*
 - c. *Do all animals need the same things to survive? Why or why not?*
 - d. *How do you know?*

Explain

2. Introduce the activity by explaining that ocean animals are all connected to each other in an ecosystem. If one group of animals keeps growing and growing, they will need a food source to sustain themselves. Their survival depends on the availability of food. We are going to demonstrate this idea by playing the game “Sharks and Minnows”.
3. Let the students brainstorm but make sure they understand that sharks eat minnows before starting the game.
 - a. *What is a shark? What is a minnow?*
4. Explain the game rules:
 - a. *To start the game, everybody will line up on one side of the field/gym/area behind the cones.*
 - b. *I will choose one shark to come to the middle of the field/gym.*
 - c. *The shark is very hungry! Everybody else, will be minnows. Sharks love to eat minnows.*
 - d. *When everybody is ready, the shark will say, “Fishy, fishy, come cross our ocean.” When the shark says this, the minnows will all try to run to the other side of the gym/field, behind the cones without getting tagged by the shark.*
 - e. *If you get tagged by a shark, then you become a shark and will stand in the middle on the next round.*
 - f. *Once everybody has crossed the ocean, the sharks will say again, “Fishy, fishy, come cross our ocean” and the minnows will run back across the gym/field.*
 - g. *The game continues until there are only 2 minnows left.*
 - h. *The last minnows left will start the next round as sharks.*
 - i. *Behavioral expectations/rules:*
 - I. *No running - only “swimming” - everyone’s two feet (prey and predator) must stand on the ground at all times. Walking fast is permitted.*
 - II. *Please be honest, if you have been tagged, please take your place as a shark.*
 - III. *Please be careful when tagging somebody, only use one hand to tag.*
 - IV. *No pushing.*
5. Ask the students if they have any questions about the rules.
6. Play a practice round to ensure that the players understand the game rules.
7. After students have played (teachers and adults should play, too!) several rounds, sit in a circle to cool down and have a discussion.

Explore

8. Engage the youth in a discussion about the following:
 - a. *What did the sharks need to survive? What did the minnows do to survive?*
 - b. *What other things they might need to survive, that weren’t part of this game?*
 - c. *What did you notice about the number of sharks after each round? How about the minnows?*
 - d. *Did the game get easier or harder after each round? Why do you think this?*
 - e. *If you get tagged by a shark, then you become a shark and will stand in the middle on the next round.*



- f. Why do you think fish travel in large numbers (schools)? Does it help them to stay safe? How do you know?

Elaborate

9. Elaborate on these ideas by playing a variation of the Sharks and Minnows game.
10. Explain the game rules:
- The object of this next game is for each player (the minnows) to cross the ocean to the other side, pick up a food card, and return back to the side of the ocean where you started.
 - But, there is a predator shark out there, lurking, trying to tag (eat) its prey: the minnows!
 - The hula hoops represent shelter areas where fish like to hide: plants, rocks, docks, underwater debris.
 - You can stop in one of these shelter areas to escape a predator on your journey to get food. You are not allowed to stay there more than 5 seconds. Only 2 minnows can fit in a shelter area at one time.
 - The predator shark is not allowed to “babysit” the shelter areas.
 - Players will continue to play until the food is gone. If a minnow goes out of bounds, runs, or is tagged, then that player is out and must sit on the side.
 - Behavioral expectations/rules:
 - No running - only “swimming” - everyone’s two feet (prey and predator) must stand on the ground at all times. Walking fast is permitted.
 - Please be honest, if you have been tagged, please step to the sideline.
 - Please be careful when tagging somebody, only use one hand to tag.
 - No pushing.
11. Ask for one volunteer to be the predator shark. (Disabled students could act as monitors/referees).

Evaluate

12. After each round of the game, ask students to raise their hands to indicate who collected 1 piece of food, 2 pieces, 3 pieces, etc.
13. After several rounds of play, sit in a circle to cool down and have a discussion.
- Did the hula hoop shelter areas help you escape the shark?
 - Why do you think only 2 minnows could fit in a shelter at one time?
 - What happened to the minnow who couldn’t fit in the shelter when they tried?
 - Was it easier to stay alive swimming in a school or by yourself?
 - We learned that schooling and moving fast can help minnows escape prey; Can you think of any other adaptations that might help minnows escape prey?
 - The second game added hiding, what is important when you hide? (That you blend in, not stick out. This is called camouflage).
 - What helped the shark as a predator? How is the shark able to eat minnows? (Sharks move fast, they are bigger than minnows, they have sharp teeth).

Additional Resources:

The Three Little Fish and The Big Bad Shark by Will Grace and Ken Geist; Audiobook available:

<https://www.youtube.com/watch?v=L5qCLP6P2Lc>

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Shark

Minnow

