Ocean HABITAG

LESSON

GRADE LEVEL:
3-12

CATEGORY:
Earth, ecosystems and ecology

TOPIC:
Ocean predator prey relationships and concepts of adaptations for survival. Natural selection processes.

TIME:
Approximately 30 minutes, including discussion.

SETTING:
Indoor or Outdoor; large, flat area such as a gym, playing field, or open and flat sandy beach.

GROUP SIZE:
Whole class

SKILLS:
Role-playing, reading, comprehension, analysing, observing

SUBJECT AREAS:
Science, biology

KEYWORDS:
Habitat, intertidal, tides, prey, predator, seaweed and eelgrass bed, sessile, waves and sand and rocky shores, interconnectedness, juvenile, phytoplankton and zooplankton

Overview

This is a thinking game of tag that introduces students to some of the relationships and interconnections between marine animals and their preferred habitats. This activity is a good place to introduce First People's concept of interconnectedness and First Peoples connections to oceans.

Objectives

Students will be able to:

- Understand interconnectedness of marine life
- Explain ocean predator and prey interactions
- Describe influences of the environment on species survival
- Identify one factor in the process of natural selection

Materials

- Marine species cards (see HCTF Education: *https://www.hctfeducation.ca/wp-content/uploads/2015/10/Ocean-ID-Cards-3-Up.pdf*).
- Ropes or pylons to mark off area.
- Shorter length of rope or other coloured covering to represent eelgrass bed offshore

Inquiry Questions

- How do marine creatures come to live in certain habitats?
- What relationships exist between ocean life forms?
- In what ways do tides and ocean currents affect marine organisms?
- How do marine organisms find food and how do they hide from predators?
- Are oceans connected to land ecosystems and how?

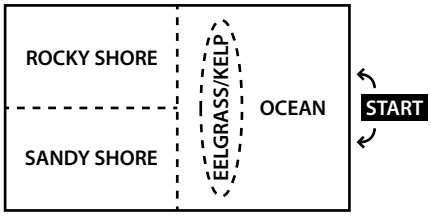
Background

The intertidal zone is the area of the marine shoreline that is exposed to air at low tide and covered with seawater at high tide. Our rugged coastline, wind and unique ocean currents create a wide variety of intertidal habitats like rocky coasts, sandy beaches, underwater eelgrass meadows, mudflats, and estuaries. The diversity and configuration of these areas provide unique combinations of food, water, and shelter that support a variety of life. However, because of the nature of the ocean, with currents and wave action, most adult life can not create nests or rear young the way land dwelling life can. Like plants that reproduce by sending their seeds into the wind, all juvenile life forms spend the first part of their life free floating or swimming in the ocean in the photic zone (surface part of the ocean that sunlight can penetrate from above) whether they are plants like seaweed and diatoms (phytoplankton) or animals (zooplankton) like jelly fish, fish larvae, crustaceans or echinoderms. Those with sessile (immobile) adult stages will eventually settle into suitable habitats such as a barnacle in the intertidal zone. Other adult animals that are mobile settle in their suitable habitats, such as a rock fish at the bottom of the shore or herring within the middle level of the water column. Those who do not find suitable habitats may be eaten or die as a result.

As a result, marine life are adapted to living in harsh conditions and in avoiding predators in each of their life stages. Natural selection has refined these adaptations over time resulting in a high diversity of animals. Some of these adaptations include hard shells of clams, barnacles and mussels, or sea stars who can grow new arms or entire body parts from one arm.

Procedure

1. Set up the game area, large enough for the entire class to run around. Divide a rectangular area with one half as ocean, the other half divided in two horizontally to become two different subtidal or intertidal habitats, one sandy beach, one cobble beach. Use the short rope to create an elongated circle in the offshore ocean area to represent the eelgrass/kelp bed. Option: have objects for rocks in the rocky shore, prey that are not secure on a rock can be picked off by predators that can reach them (birds or fish).



2. Hand out marine species cards to students show each of the areas that are set out and explain that they start out as juvenile life forms that can be tagged by any ocean predator. Their goal is to make it to their species' preferred habitat where they would be able to become adults and avoid some predation. Habitat choices include cobble, sand, or eelgrass bed. Students are safe if they get to these areas without being tagged by a predator. All students must stay within the ocean as they all are juvenile ocean life stages at the start of the game.

3. Discuss the predators in the ocean and what species would be prey for the different types of predators. Assign predator cards to 3-4 students, and set them in place in the ocean area.

4. Tell students to look at their card and information on the back. They then decide which habitat type would be best for them. Students keep their cards with them, as survival tactics of the different species will be discussed at the end of the game. Ask students why they chose the habitat.

5. The game begins with all students in the ocean, with predators and prey separated. When given the sign, the tag game begins, and predators try to catch their prey.

6. Prey are safe if they reach the correct preferred habitat of their species (rocky shore, sandy shore or eelgrass bed) before being tagged by a predator.

7. If tagged by a predator, the prey 'dies' and must go off the play area temporarily. Everyone must always have their cards visible so they can decide if they would be prey for the predator. If a predator tags a prey it doesn't eat the prey is safe to continue the game.

8. After a few minutes of play, see who survived and have everyone come back for a discussion. Then shuffle the cards and play additional rounds.

For additional rounds consider discussing how many prey the predator must catch in order to survive, if they do not catch them they must become prey in round 3. If predators catch enough prey to survive and there are more than 2 predators of one species at the end of the 2nd round, then they can have one of the dead prey to be a predator of that species in round 3. Many species of adult marine organisms have unique ways to have offspring including not needing another of

their species around because they have male and female sex organs or they are not required (hermaphrodites and asexual reproduction, a strategy used by corals and many seaweeds), so all prey that were not turned into predators, will return to the ocean as juvenile life forms even if they found habitats or died as a result of being eaten for this next round.

Further rounds could include a tidal influence such that prey are not able to reach their suitable habitat until the tide is high. Once protected, the next low tide could leave these adult animals exposed to land predators. Other species, such as clams, could survive low tides and hide from predators by digging down into the sand. Some birds and small fish are adapted to searching out and eating animals as the high tide comes in and the animals come up from the surface or out of their hiding spots.

Discussion questions:

- Why did you pick the habitat you are in?
- What adaptations do you have to survive here?
- Could you survive in the other habitats? Would there be seasonal or tidal variations in your habitat?
- Do you have many predators?
- If you died, what happened? Do you think many of your species would succumb to this predator? What strategies does your species have to avoid predation?

What if you were an animal that is both predator and prey, such as a fish? What unique survival strategies would you use that might be different than other animals.

Assessment

1. Make an intertidal mural, diorama or painting/drawing of intertidal habitats showing the relationships between the animals that live there.
2. Describe predator-prey relationships at oceans and why they are necessary.
3. Explain why diversity of habitats supports a wide variety of animals and plants.
4. Hypothesize on the effects of overfishing of an intertidal species or removal of shoreline habitat.
5. Explain the concept of interconnectedness within an ocean environment and why it is important.

Extensions

1. Intertidal habitats are places where different ecosystems overlap. Can students think of other places where this happens? (Riparian areas of creeks, streams, and wetlands; forests and grasslands.)
2. Explore the concept of First Peoples interconnectedness between ocean and land ecosystems.
3. Inquire into sustainable and unsustainable activities at the ocean in the past and in different cultures. Explore how First Peoples lived sustainably along the coast. How can our choices, such as eating sustainably caught seafood, help our oceans? s

References

Adapted from Survival and Habitats Game, by Dianne Sanford
http://www.pac.dfo-mpo.gc.ca/education/lessonplans-lecons/nearshore-zone-littorale-eng.html#life-at-the-nearshore