

Teacher Guide

Activity 3:

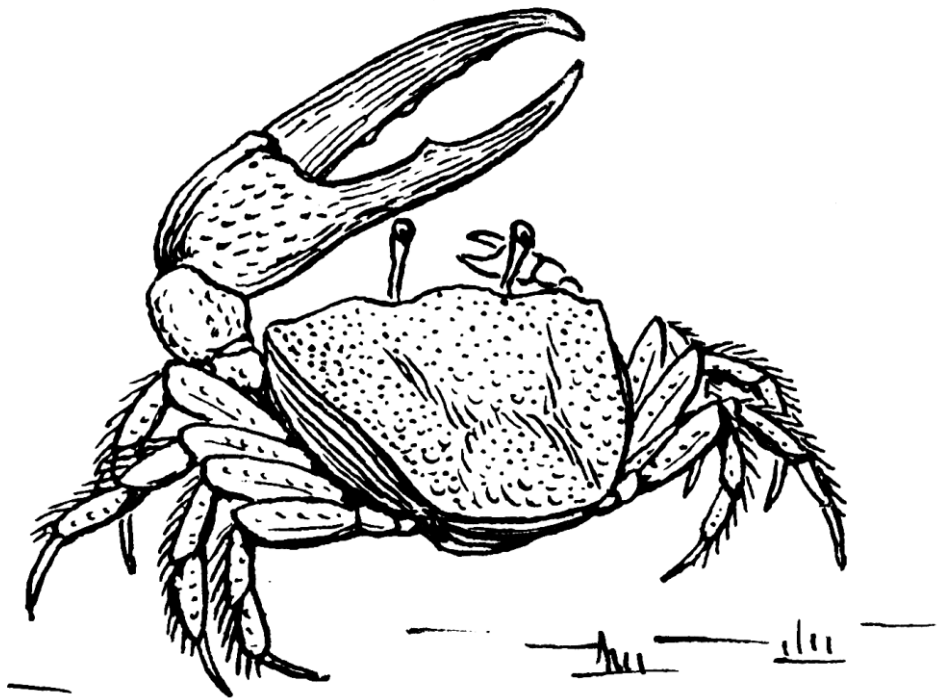
Tide pool biodiversity

(Activities for 3rd+ grade students)

Created by:

Brittany Bennett
Holland Elder
JL Weissman
Jesse McNichol

Nicole Ratib
Suzana Leles
Trang Nguyen



Background

For organisms living on or near the coast, the movements of the **tides** provide both opportunities (e.g., by bringing in or trapping prey) and risks (e.g., of drying out). Because of this, organisms that live on the shore have **evolved** a number of **physical characteristics** and **behaviors** that allow them to survive and thrive in this constantly fluctuating environment. One set of **adaptations** that helps organisms deal with a changing environment **are movement strategies**. Organisms may swim (e.g., fish), burrow (e.g., clams), crawl (e.g., crabs), clamp shut (e.g., barnacles), or fly (e.g., pelicans) their way to safety or resources. The specific body parts an animal has ultimately constrain what kinds of movement strategies it can use.

In these activities we want to get students thinking about movement. How do animals move? Why do they move in the ways that they do? Do animals that live in particular places, or that have particular lifestyles, all tend to move in the same way? How does movement relate to how an animal responds to a changing environment? Movement ecology is a field unto itself, but today we are going to try and get students to make the link between **body part->movement->environment** using a series of simple activities. In all of these activities it is important to emphasize that **different animals solve the same problem in different ways**. **Evolution can take (and has taken) many paths**. Tides, with their regular rhythms, are a natural place to start learning about movement and change.

This activity set consists of two simple, interactive activities suitable for younger students. In the first, students act out the many different ways that coastal organisms move around. In the second, students make model shorelines and consider how animals living on different parts of the shore face different challenges and opportunities with the movements of the tides. The goal is to have students apply their knowledge from the first activity ("animals move in so many different ways depending on how they are shaped!") to the second ("animals that move in different ways will respond to the tides in different ways!"). Depending on where the students are in their education, you may even want to introduce concepts from evolutionary biology (e.g., "mussels have evolved shells that allow them to clamp shut and keep from drying out when the tides go down. This is an example of an adaptation.").

Learning Objectives

By the end of these activities students should be able to:

- Give examples of the many ways that marine animals move and discuss how animals use many different kinds of movement depending on what part of the ocean they live in and what kind of lifestyle they have (e.g., predator, filter feeder, etc.)
- Describe how different body parts enable different kinds of movement.
- Define what tides are and describe the daily challenges and opportunities tides pose for sea creatures living on or near the shore
- Relate the movement strategies of animals living on or near the shore to their strategies for coping with the movement of the tides.

Source material:

- Activities are based in part off "Exploring Marine Science and Aquaculture Toolkit" by The University of Maine Cooperative Extension 4-H STEM Toolkits (<https://extension.umaine.edu/4h/stem-toolkits/marine-science-and-aquaculture/#tidepools>) and "Living on the Edge: Field Guide to the Rocky Intertidal" by WILDCOAST and San Diego MPA Collaborative (<https://healthebay.org/wp-content/uploads/2020/04/Living-on-the-Edge-Field-Guide-to-Rocky-Intertidal.pdf>)

Students will need:

- Cut-out animal cards (see second page of activity 3.1)
- 4" plastic paint trays (for model shoreline, could go bigger if you have time/space)
- Water (room temp is fine)
- Quart container (or something else to hold water in)
- Cup (to scoop water out of shoreline model)
- Marine/shoreline animal stickers (could easily use small animal toys or potentially even student drawings with tape instead – will get wet)

Activity 3.1: Move Like a Sea Creature

Food for thought:

In this activity we are going to think about how different animals move around.

Can animals move in the same ways you can? Which animals can move like you? Which animals can't move like you? Can a clam move like you? Can you move like a clam?

Possible answers: Students will likely make a clam opening/closing motion with their hands in response to this question. The truth about how clams get around is even weirder. This is a good place to show them a youtube video of a clam burrowing (videos of burrowing pacific geoducks are particularly impressive). Scallops do swim in the way one might expect from a clam (look up a video, they are very silly), but not all bivalves are capable of this.

Step 1:

First think about how many different ways you can move your body ... Make sure you have plenty of space to move around and then try some out!

This can be done with whatever part of the body is easiest for students (e.g., hands). For students who may not be able to make such movements, consider having students work in pairs or small groups.

Step 2:

We are going to try out some animal movements! Try to imitate the animals on the movement cards. You can make the movements with your hands, feet, arms, legs, or whole body... it's up to you. If you want, you can ask a friend or family member to help by making the movements for you instead.

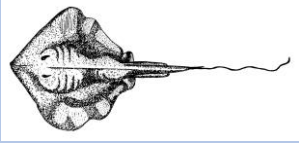
Consider pre-loading youtube videos of each animal moving. Sea stars and urchins may not walk how you expected (they have many tiny tube feet). See included slideshow for some helpful animations.

Let's discuss

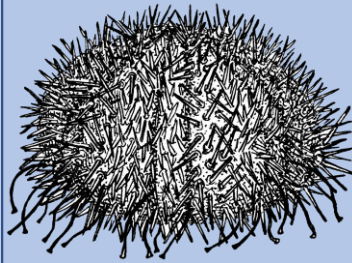
1. Do animals have any special body parts that help them move?
2. Can all animals that live on or near the shore swim?

Good opportunity to go back through each card and point out the specific body parts each animal uses to get around. Hopefully the second question will come easily to students after seeing clams, crabs, pelicans, and sea stars and urchins in the activity.

Activity 3.1: Move Like a Sea Creature



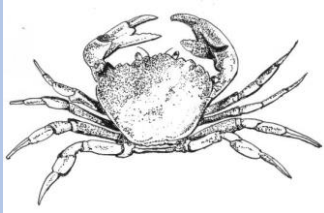
Stingray



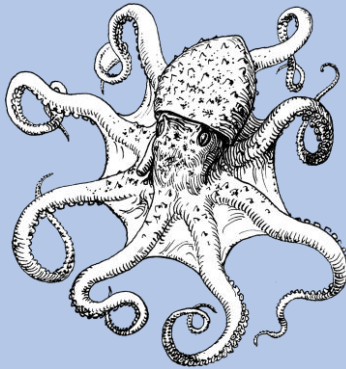
Sea Urchin



Shark



Crab



Octopus

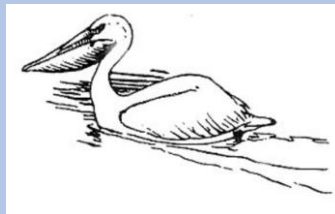


Clam



Philippe Alès, Public domain, via Wikimedia Commons

Jellyfish



Pelican



Starfish

Activity 3.2: Tides coming in and out

Food for thought:

1. What kind of animals live on the beach?
Where on the beach do they live?
2. Which animals eat other animals and which animals get eaten?
3. Some animals need to stay wet all the time... Which ones?

What you will need:

- ☐ Sticker book
- ☐ Black pastic tray
- ☐ Plastic Quart Container filled with water
- ☐ 8oz Plastic Cup

Use the animals from activity 3.1 as examples to prompt students to answer these questions.

Step 1:

we are going to build our very own ocean shores! Use your sticker book to decorate your shore model (black paint tray). The deeper part can represent the ocean where fish and other sea creatures live. The shallower part is the beach.

It might be a good idea to ask students beforehand what where animals live on shore (p1 of this guide has a nice diagram:

<https://healthebay.org/wp-content/uploads/2020/04/Living-on-the-Edge-Field-Guide-to-Rocky-Intertidal.pdf>)

Step 2:

Fill the bottom part of your model (the ocean) with water.

If using a different kind of tray for shoreline could merge steps 2+3

Step 3:

Now we are going to see what happens when the tide comes in. Slowly add water to your shore model. Pay attention to which animals get covered up first. Make sure not to fill over the edge!

Step 4:

Now we are going to see what happens when the tide comes back out. Use the small plastic cup to remove water cup-by-cup from your model. Pay attention to which animals dry out the fastest and which stay underwater for the longest.

Activity 3.2: Tides coming in and out

Let's discuss

1. How do the different animals in your models keep from drying out during low tide? Does this have anything to do with how they move?
2. If you were an animal that lived on the ocean shore, how would you keep from drying out?

Write your answers here:

Try and have students connect back to activity 3.1, using the animals on The cards as examples. What would a clam do? A shark? A crab? A pelican?

Tide Pools

A tide pool is a small pool of water that gets trapped on the shore when the tide goes out. Usually these pools can only be found at low tide. Lots of cool animals call tide pools their home!

