

# Hold onto Your Barnacles!



**Developed by:** Alexa Jefferis

**Adapted from:**

- Olmstead, Adrienne. 2000. *My Nature Journal*. Lafayette, CA: Pajaro

**Time:** 90 minutes

**Level:** Grades 3-8

**Overview**

This activity introduces participants to the many ways plants and animals cope with the harsh and variable seashore environment. An inquiry-based exploration of tidepools will encourage participants to observe, investigate, and ponder the day-to-day life of tidepool organisms. Participants will reflect on what they have learned through a poetry writing exercise.

**Oregon State Benchmarks Addressed**

**Life Sciences (3<sup>rd</sup> Grade):**

- CCG: SC.03.LS.04 Describe a habitat and the organisms that live there. *In this activity students will be able to look at a rocky shore habitat and observe and recognize the organisms that live there.*

**Life Sciences (5<sup>th</sup> Grade):**

- SC.05.LS.05.04 Explain the relationship between animal behavior and species survival. *Students will recognize predator-prey relationships in the rocky intertidal and see what organisms do in order to survive.*
- CCG: Organisms, Fifth Grade:
  - SC.05.LS.01 Group or classify organisms based on a variety of characteristics.
- SC.05.LS.05 Describe the relationship between characteristics of specific habitats and the organisms that live there.
- SC.05.LS.06 Describe how adaptations help a species survive.

**Learning Objectives**

By the end of this activity, participants will be able to:

1. Discuss how tidal zone organisms cope with stresses imposed by the physical environment.
2. Define adaptation, desiccation, wave stress, and salinity.
2. Define and give examples of generalist and specialist species within the tidepools.

**Materials Needed**

- 1 journal and pencil per student.
- Poetry-writing instructions handout for each student

## **Background Material**

A rocky shore is a harsh environment in which plants and animals must cope with crashing waves as the tide moves in and out twice each day. Organisms in high tide and spray zones must also contend with longer periods without ocean water, extreme temperature changes, and increased exposure to freshwater from streams and/or precipitation.

- **Generalist species:** Because organisms in these higher tidal zones have to endure harsher environmental conditions they tend to be generalists, able to withstand a high degree of variation in environment. Generalist species of crab, for example, can tolerate a wide range of salinity. Because being a generalist is less common, requiring more adaptive tolerances, there tends to a higher number of organisms, but a lower number of species represented in the higher tidal zones.
- **Specialist species:** Organisms in the lower tidal zones have less stresses and restraints and therefore tend to be specialists, filling a very narrow niche within the ecosystem. In the low and middle tidal zones there are more species represented, but a lower number of organisms present due, in part, to competition and predation.

Tidepool creatures have different ways of coping with wave stress, and desiccation (drying out).

- **Barnacles:** Many barnacles live in the spray zone and protect themselves from drying out by retracting their bodies inside a hard, volcano-shaped shell. They have a special cement, keeping them tightly fastened to rocks as waves rush over them.
- **Limpets:** Limpets are also protected from the hot sun beneath a hard shell, and their heavy suction action anchors them to rocks as waves flow over their flat bodies.
- **Anemones:** Anemones also hold on by suction and conserve water, when exposed air, by folding up into themselves.
- **Mussels:** Mussels close their shells tightly when exposed to the sun and air. They hold onto rocks by secreting a liquid that turns hard in water, resembling roots.
- **Sea stars:** Sea Stars have hundreds of tube feet with suction cups they use to cling to crevices or the undersides of rocks, in order to hold on and avoid desiccation.
- **Crabs:** Crabs hold on by wedging their flat bodies in rock crevices. Crabs also avoid drying out by hiding in or underneath rocks.
- **Sea Palms:** Sea palms have flexible stems that allow them to bend and sway in heavy wave action.

## **Activity Description:**

### **Step 1. Discussion of Tide-pool Safety and Etiquette (5 min):**

1. Welcome participants to the tidepools and explain the following **safety rules:**

- ❑ Explain that **the ocean is not a swimming pool.** There are lots of dangers such as strong waves, drift logs, wobbly rocks, and cliffs that could hurt someone badly if not careful.
- ❑ **Don't turn your back on the ocean:** large sneaker waves could knock you over and pull you down.
- ❑ **Keep an eye on the tide level:** the last thing you want is to get stranded in a tide pool area, swimming back in the ocean is not a good idea and should be avoided.
- ❑ **Do not step on drift logs:** a drift log is strong enough to pull you over.

- **Watch your step:** the intertidal is full of loose rocks and slippery seaweed. Make sure to step carefully and slowly. No running!
2. Reiterate the following **tide pool etiquette:**
- Explain that the **tide pools are home to many organisms**. Therefore we must **not take anything out of the tide pools**. If you pick up an organism, make sure to put it back exactly where you found it. How would you like it if someone took you away from your home and didn't put you back?
  - **Put rocks back if you flip them over.** By not doing so, you could hurt an animal that uses that rock for shelter by removing them from water or exposing them to predators.
  - **Watch your step.** There are lots of animals living on the rocks and we don't want to hurt them by stepping on them.

### Step 2. Tidepool Exploration (60 min)

1. Lead participants in an exploration of the tidepools by starting at one end of the tidal zone and working towards the other. Have participants gather around a tidepool as you point out various organisms. Using the method of inquiry, guide students to discover how various organisms are suited to their environment.

Sample questions to ask:

**Q:** How is the body of this crab shaped and how might that help it to avoid drying

out or being swept away by a wave?

**A:** Crabs have flat bodies, allowing them to hide under rocks and in the crevices between rocks

**Q:** What is the difference between these anemones under water and those that are

out of water? Why do you think they close up when they are out of the water?

**A:** To avoid drying out (this is called desiccation)

**Q:** Pick up a sea star and allow participants to see the underside. What are all these

tiny things on the underside of the sea star? Do you think they help it hold on to

the rock? How?

**A:** Tube feet suction sea stars to the rock.

### Step 3. Gauging Understanding (20 minutes).

- Have students sit next to a tidepool with their notebooks and follow the handout instructions on writing a haiku or cinquain poem.
- Allow them 10 minutes to write

- Instruct participants to form groups of two to four. Have them share their poem in small groups as you circulate and observe the interactions and degree of tidepool knowledge exhibited by the poems.

**Step 4. Wrap Up (5 minutes)**

- Have participants come back to for one large group again.
- Ask if anyone has a poem they would like to share with the rest of the group.
- If time still remains, have the students form a large circle and do a circular whip (Start with one person and go around the circle), in which they quickly name their favorite tidepool organism.

**Additional Reading/Resources**

McCrae, Jean and Laimons Otis. 1989. *Plants and Animals of Oregon's Rocky Intertidal Habitat*. Oregon Department of Fish and Wildlife. Newport, OR. USA

## Poetry Writing Instructions

Sit by a tidepool and take ten minutes to write a poem, using one of the following two styles, about a tidepool organism. Try to incorporate something about how this organism copes with its environment.

- **Haiku** (pronounced “hi-co”)  
A haiku poem has three lines  
Line 1 = 5 syllables  
Line 2 = 7 syllables  
Line 3 = 5 syllables

**Example:**

Darting dragonflies  
Fly over rushing water  
Fish watching below

- **Cinquain** (pronounced “sin-kwane”)  
A cinquain has 5 lines  
Line 1 = 1 word: title  
Line 2 = 2 words: describe title  
Line 3 = 3 words: describe action  
Line 4 = 4 words: describe feeling  
Line 5 = 1 word: similar to title

**Example:**

River  
Green blue  
Rushing singing falling  
Happy soothed quiet excited  
water