

# The Intertidal Classroom Zone



**Developed by:** Christopher Shuler

**Time:** Tidepool component: 30 – 40 min.  
Classroom component: 30 – 60 min.

**Level:** Grades 3-5

## **Overview**

This activity introduces participants to tidepool organisms and the ecological concept of intertidal zonation, using hands on exploratory and artistic activities. It reviews these concepts with a creative classroom based post-fieldtrip activity.

## **Oregon State Benchmarks Addressed**

**CCG:** Diversity/Interdependence, Third Grade:  
SC.03.LS.04 Describe a habitat and the organisms that live there.

**CCG:** Organisms: Third Grade  
SC.03.LS.01 Recognize characteristics that are similar and different between organisms.

**CCG:** Diversity/Interdependence, Fifth Grade.  
SC.05.LS.05.05 Describe the living and nonliving resources in a specific habitat and the adaptations of organisms to that habitat.

**CCG:** Organisms, Fifth Grade:  
SC.05.LS.01 Group or classify organisms based on a variety of characteristics.

**CCG:** Diversity/Interdependence, Eighth Grade:  
SC.08.LS.04 Identify and describe the factors that influence or change the balance of populations in their environment.

## **Learning Objectives**

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

1. Understand and depict the three basic intertidal zones.
2. Develop an aesthetic understanding of tidepool structure.
3. Artistically recreate a structurally correct tidepool in the classroom!

## **Recommended Readings:**

- Lubomudrov, Larissa . *The Tidepools are Alive! Oregon's Rocky Intertidal Area.* (brochure). The Oregon Department of Fish and Wildlife Marine Resources Program, 1997.

**Materials Needed: Tide Pool Component:**

- ❑ Tidepool exploration appropriate clothing. Shoes that can get wet, weather appropriate layers, i.e. rain jacket & rain pants, wool socks, long pants, or shorts, fleece & base layers, etc...
- ❑ (Optional) Attached activity handout, front and back page (weather and logistics dependant.)
- ❑ (Optional) Pencils and pens

**Materials Needed: Classroom Component:**

- ❑ Multi colored construction paper, preferably green, grey, blue, and white, orange, red, and purple i.e. tide pool organism colors.
- ❑ Scissors.
- ❑ Markers or crayons.
- ❑ Glue, tape, or poster putty.
- ❑ String to outline tide pool shape on wall

**Background Material**

***Intertidal Zones:***

Oregon's tidepools are areas of rocky coastline that experience daily changes in sea level in response to the tides. Tides on the Oregon coast have about a 12 foot range. This causes a horizontal stratification of habitats, which are called intertidal zones.

There are three generally recognized tidal zones on every coastline in the world.

- The **spray or splash zone** (supralittoral),
- The **mid-tide zone** (midlittoral)
- And the **low-tide zone** (infralittoral).

The **spray zone** is not submerged by normal tides (it is by storm swells) and generally is relatively bare of life. Some small barnacles may persist in this zone and its main inhabitants are insects and salt tolerant lichens.

The **mid-tide zone** is visible during most low tides and is delineated in its upper reaches by the predominance of acorn barnacles and in its lower side by the presence of brown alga. Rock crabs, turban snails, barnacles, aggregating anemones, and California mussels are common and fiercely competitive for space in this zone.

The **low tide zone** has the greatest number of species and includes dense mats of alga, sea urchins, encrusting sponges, green anemones, and sea stars. It is helpful to note that sea stars migrate between tidal zones to feed on mussels.

Tide pools represent a very harsh ecosystem where invertebrates and algae must be well adapted and able to live with crashing waves,

twice daily inundation with salty sea water followed by exposure to drying air and the ruthless ultraviolet rays of the sun.

***Why Tidepool Organisms Have Limited Habitat Ranges:***

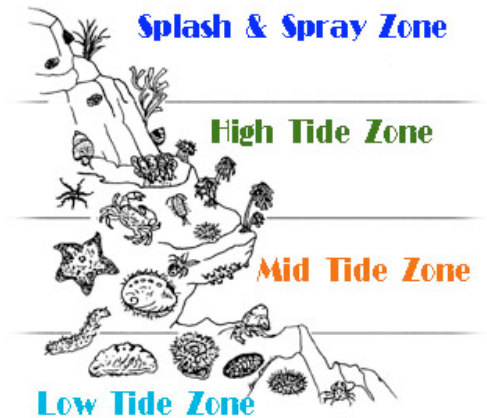
Usually the **upper limit** of an organism's habitat is determined by the amount of time it is able to withstand being out of the water and subject to desiccation (drying out) as well as the sun's ultraviolet rays. An organism's **lower limit** is set by biological controls (predation and competition). For example, if sea stars (The main predator of blue mussels) were experimentally excluded from a tide pool, the mussels would extend their range downwards but not upwards.

**Activity Description**

*Note:*

*This lesson plan contains two modular parts; a tidepool activity and a post-trip activity.*

Prior preparation is recommended but not necessary. An introduction to the background material can be done before the trip, while tide pooling, or afterwards. The students can complete the attached handout during tide pooling, on the ride home, or in the classroom.



**Part I, Tidepools:**

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

1. 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 into the sea.
  - **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. Explain 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.

(Adapted from "On the Hunt for Eco-Relationships, Megan Copley)

**Step 2. Introduction. (5 minutes)**

Prior to tidepooling the background material can be introduced; this is generally best done within sight of the tide pools but not distractingly close to them. This lesson plan recommends an overview of the three intertidal zones and what types of organisms inhabit and delineate them at the very least.

**Step 3. Introduction to Post Trip Activity (5 minutes)**

If using the attached handout pass out handouts and pencils (remember to inform students not to let their materials become tide pool pollution) and instruct students to record their observations in the table provided and/or on the aesthetic diagram. Students should record the type of organisms seen, the relative location, i.e. in which zone, the organism's color, organisms shape, the abundance of the organisms, and any cool fact or trait that they can observe.

If you aren't using the attached handout, students should be instructed to observe and try to remember the aforementioned characteristics of organisms. Inform students that they will later be creating their own tide pool in the classroom and will want to remember these characteristics in order to create a realistic tide pool.

**Step 4. Explore! (20 minutes)**

Once the introduction is clearly understood it is time to go and have some un-structured, but well supervised, exploration of the tide pools!

**Step 5. Conclusion of Tide Pool Component (5 minutes)**

Ensure that students have not been washed out to sea by gathering the group and performing a headcount. Have students share observations of organism locations and forms. Bring the activity together with a "big picture" type discussion of the entire tide pool ecosystem regarding where creatures were and why they were there. Bring up background material and review the concepts of intertidal zonation and habitats. This is also an appropriate time to draw connections between human activities and their effects on tidepool life.

Incorporate questions such as:

*If sea level were to rise what would be the effects on the tidepools?*

(Answer: It would change the narrow habitats of sedentary organisms so they would no longer be able to live where they were)

*What human activities could cause sea level to rise or fall?*

(Answer: Global climate change could cause ice ages, which in turn could cause sea level to fall; or global warming could cause thermal expansion of the sea and cause sea level to rise.)

When finished with discussion, collect handouts (if used) or pass out handouts if they are to be completed as homework/bus-work.

## Part II, Tide Pool in the Classroom.

### **Step 1. Re-introduction to Material (5 minutes)**

Review the background information as well as the student's general understanding of tide pool structure. Handouts can be given back or (if not previously used) passed out for brainstorming.

### **Step 2. Set up. (5 minutes)**

Outline tide pool shape on a blank wall with string and tape (see handout for form) while students gather art materials.

### **Step 3. Create Tide Pool Creatures (20 minutes)**

Have students create one to three anatomically correct tide pool organisms with construction paper using their notes from handouts. If handouts are not available, resources such as the readings listed above can be helpful as well. When students have created their organisms they can tape or glue them onto the tide pool in the appropriate zone. Students can be asked why they chose to place organisms in particular zones as a review and evaluation.

### **Step 4. Conclusion & Clean Up. (10 min)**

Once the tide pool is complete students should be encouraged to take pride in their project and clean up can ensue!

This may also be an appropriate time to facilitate a discussion which draws connections between human activities and tidepool health (see part I).

### **Step 5. Evaluation (optional)**

If a more stringent evaluation process is desired, step three can be performed without the help of notes or teachers in order to ascertain a qualitative evaluation of student learning.

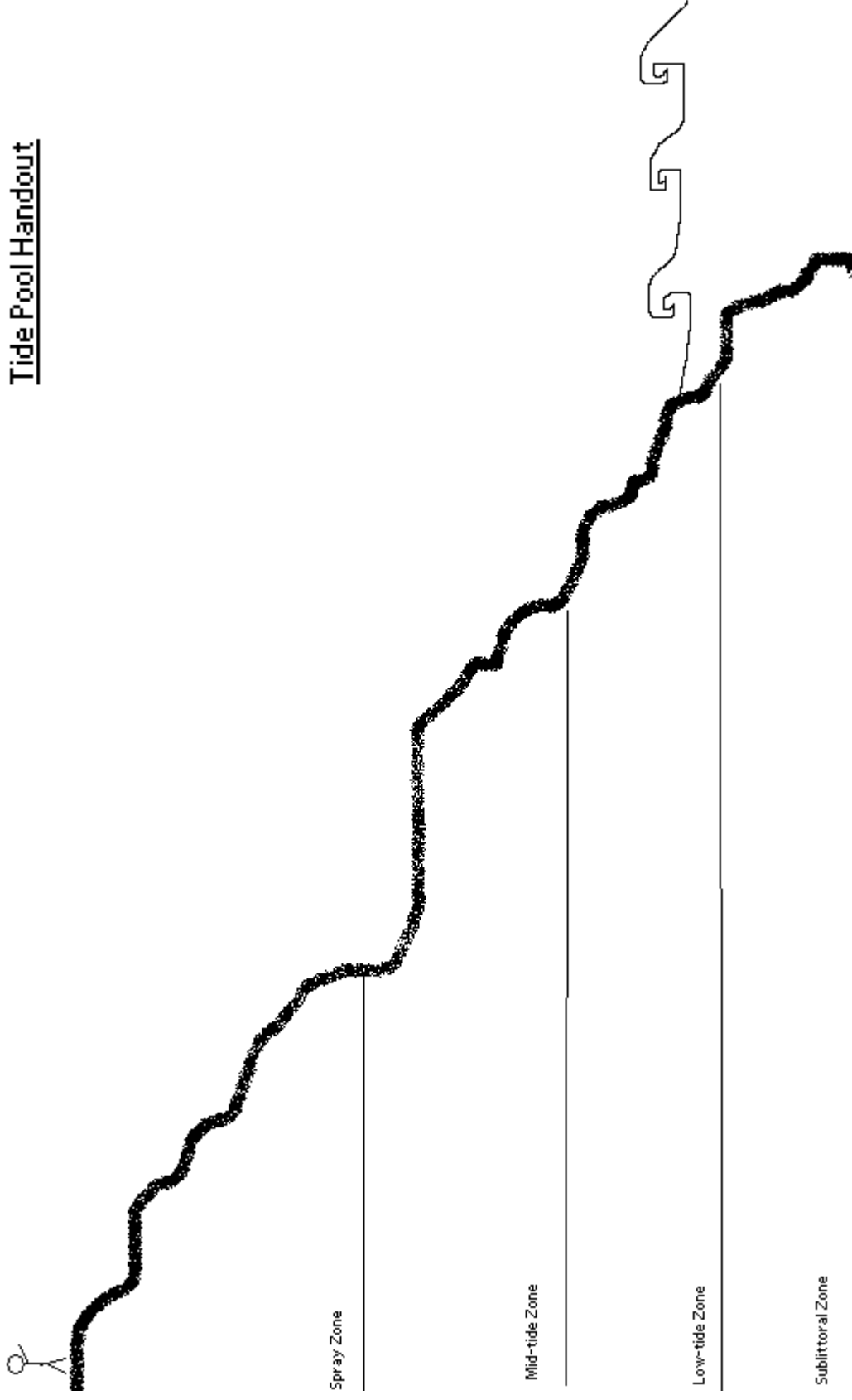
### **Additional Reading/Resources:**

**Lichen, Patricia K. 2001. *Brittle Stars and Mudbugs: An Uncommon Field Guide to Northwest Shorelines and Wetlands*. Seattle, WA: Sasquatch Books.**

This uncommon field guide not only contains descriptions of many of the Oregon Coast's more easily seen species but also includes a cool illustration and cool facts for each one. The author uses stories that are filled with information

ranging from habitats to reproductive strategies to explain the biology and ecology of coastal organisms.

# Tide Pool Handout



Tidepool Handout, page2

Type of Organism	Location of Organism	Color and Shape of Organism	Abundance of Organisms	Cool Fact or Observation about Organism
<u>Spray Zone</u>				