

# Teacher Guide

## Session 3:

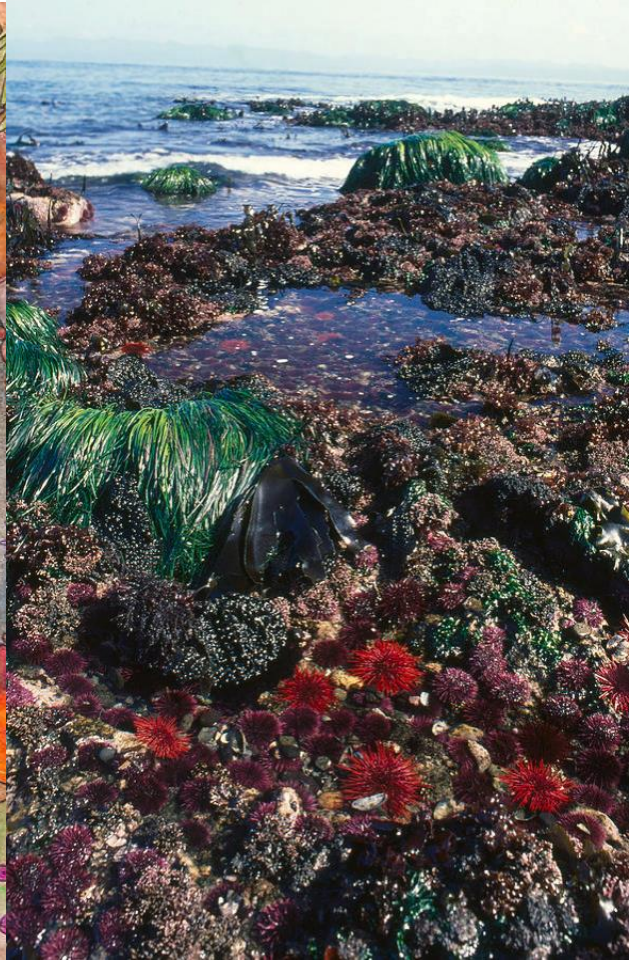
### Tide pool biodiversity

*(Activities for 5<sup>th</sup>+ grade students)*

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# Learning Objectives

**Goals:** Students will get experience calculating a simple biodiversity index using a tide pool as a sample habitat

## Learning Objectives:

Upon completion of this activity, students will:

- Be able to define biodiversity
- Understand why biodiversity is important to ecosystem health
- Visually identify species found in a tide pool habitat (using simplified “Transect Sampling” approach)
- Calculate tide zone habitat’s biodiversity level using a simple equation
- Speculate on the overall health of a tide pool habitat

## Overall steps:

For each habitat, students will examine 8 sub-sections of a tide pool habitat study site (as assigned). They will then:

- Use identification key to identify and record the species in each section of the study site
- Count and record on the worksheet the number of each species in each section of the two study sites and how many sections they are found on each site
- Calculate the total number of each species on the whole study site
- Use this information to calculate a basic biodiversity index for the tide pool habitat using worksheet provided
- Speculate on the overall health of the two tide pool study areas

## Source material:

- Biodiversity of a tide pool habitat <https://www.exploringnature.org/db/view/Biodiversity-of-a-Tide-Pool-Habitat-Inquiry-Activity>
- Helpful video about tide pools: <https://www.youtube.com/watch?v=fk4-GTrBtJY>

## Students will need:

- 1 ruler
- 1 pencil
- A tide pool organism key
- Printed worksheets
- 2 images of 2 study sites

# Activity 1: Evaluate tide pool biodiversity

## Food for thought:

1. Have you ever been to a marine tide pool before?
2. Can you guess how many types of living creatures you can find at a tide pool?
3. Do you know how scientists study the biodiversity of the tide pool?

## What you will need:

- ☐ 1 ruler
- ☐ 1 pencil
- ☐ A tide pool organism key
- ☐ A worksheet (next page)
- ☐ 2 images of 2 study sites

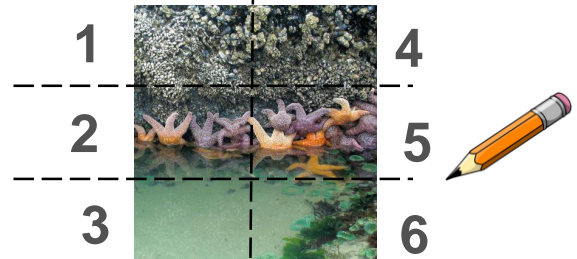
### Step 1:

Start with Study Site A. Use the tide pool organism key to identify the organisms and count the number of each organism you see. Fill in the numbers!



### Step 2:

Draw the transect sampling lines to split Study Site B into 6 small equal-size grids (3 rows x 2 columns). Number each grid from 1 to 6



### Step 3:

Identify, Count and Fill in the number of organisms you see in Study Site B to the worksheet

Species name	Grid 1	Grid 2	Grid 3	Grid 4
Acorn barnacle	1	2		

## Let's discuss

1. Which study site has more types of organisms?
2. Which study site has more total organisms (including organisms of the same type)?
3. As a result, which study site is more diverse?

**Add your final answers here (after filling the 2 worksheets)**

*This activity is self explanatory, and the teacher can ask one student to fill in one organism or one site at a time then take turn.*



# Activity 1: Evaluate tide pool biodiversity

## Identifying Tide Pool Organisms



**Acorn Barnacle** (*Balanus glandula*) are common Pacific Northwest barnacles found in high and mid-intertidal zones. The dangling cirri extend out of the opening (operculum) to grab tiny plankton. It closes in low tide when it is exposed to air.



**Clams** are bivalves – two shells attached by powerful hinge. They feed on plankton which they bring in through a straw-like siphon. The plankton is filtered out of the water and the water pushed back out by another siphon.



**Chitons** have eight overlapping shell plates and an oval shape. They can roll up into a ball when threatened. They feed on algae and are found in intertidal zones.



**Giant Kelp** (*Macrocystis pyrifera*) is the largest seaweed and marine algae.



**Green Anemone** (*Anthopleura anthogrammica*) are green because of microscopic algae that live symbiotically inside them. They are found alone or in groups in tide pools.



**Hermit Crabs** (*Pagurus spp*) are scavengers and use different species of snail shells for protection, moving to successively larger shells as they grow.



**Periwinkles** (*Littorina spp*) are marine snails that graze seaweed found on seaweed or rocky shores in high and middle intertidal zones or on shore.



**Whelks** (*Nucella spp*) are predators of barnacles and mussels using the rasping radula to drill holes in barnacles, mussels, limpets, and other snails.



**Pacific Blue Mussels** (*Mytilus trossulus*) are filter feeders that eat plankton. They prefer low wave action in mid-intertidal to subtidal zones. They live in tight clusters attached and covering rocks.



**Limpets** have a cone-shaped shell and graze on algae. They are found in the high intertidal zone among barnacles, mussels, and whelks attached to rocks.



**Red and Purple Sea Urchins** (*Strongylocentrotus spp*) eat algae and kelp and are found in low and sub-tidal zones. They have movable spines which they can use in self-defense.

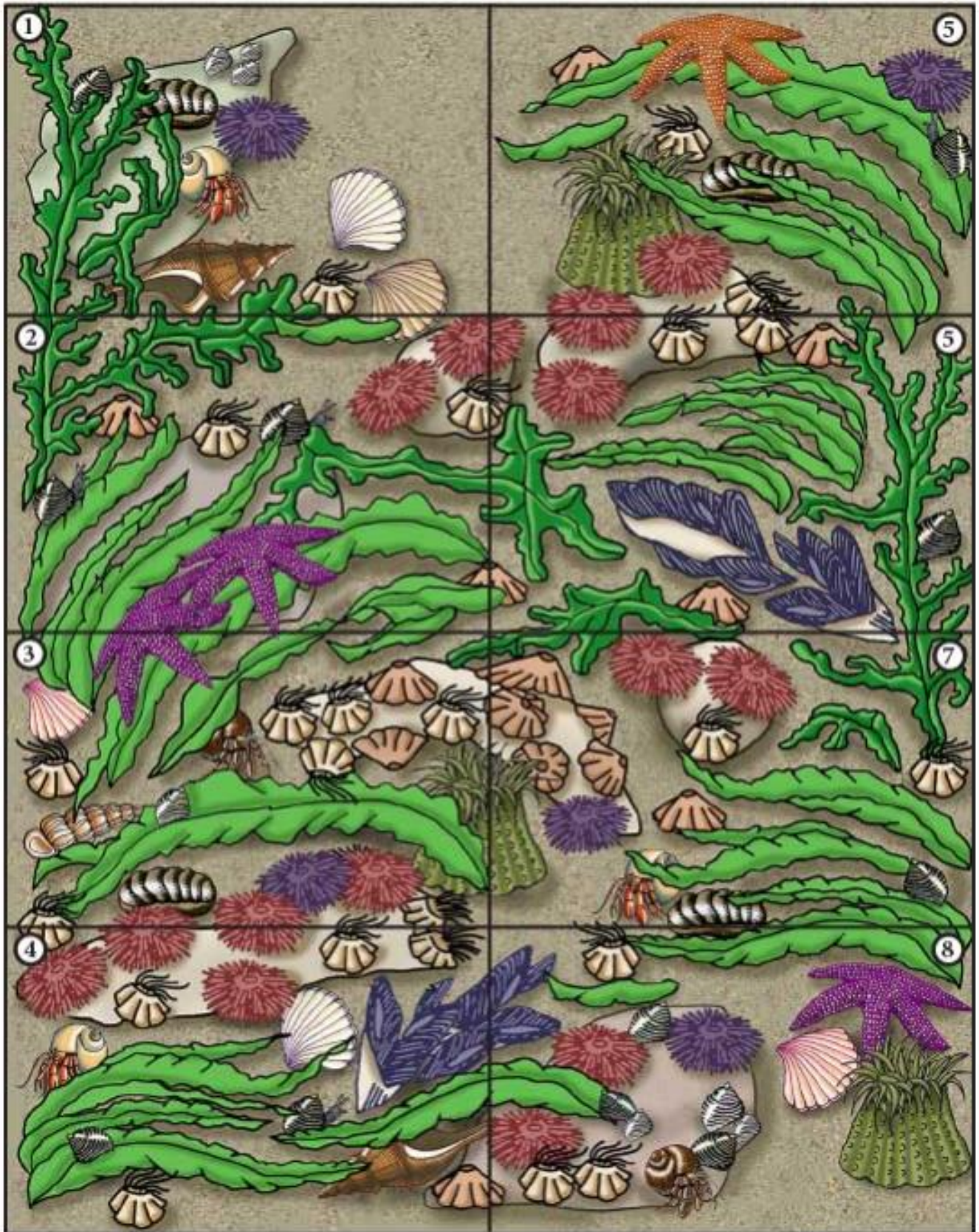


**Purple and Ochre Stars** (*Pisaster spp*) are common sea stars found in the intertidal zone. They prey on bivalves (clams/mussels). They have suction-like tube feet that they use to pry open prey.



# Activity 1: Evaluate tide pool biodiversity

## Study Site A



# Activity 1: Evaluate tide pool biodiversity

## Worksheet for Study Site A

1. List the name of all the organisms that you see in Study Site A in the first column
2. Fill in the number of each organism that you see in each Grid

Species name	Grid 1	Grid 2	Grid 3	Grid 4	Grid 5	Grid 6	Grid 7	Grid 8
Acorn barnacle	1	2						
N1= Total # of organisms								
N2= Total # of organism types								
Diversity index =N2/N1								

3. Per Study Site A (combination of all 8 grids):
- N1 = ..... Biodiversity (Lo, Med, Hi)

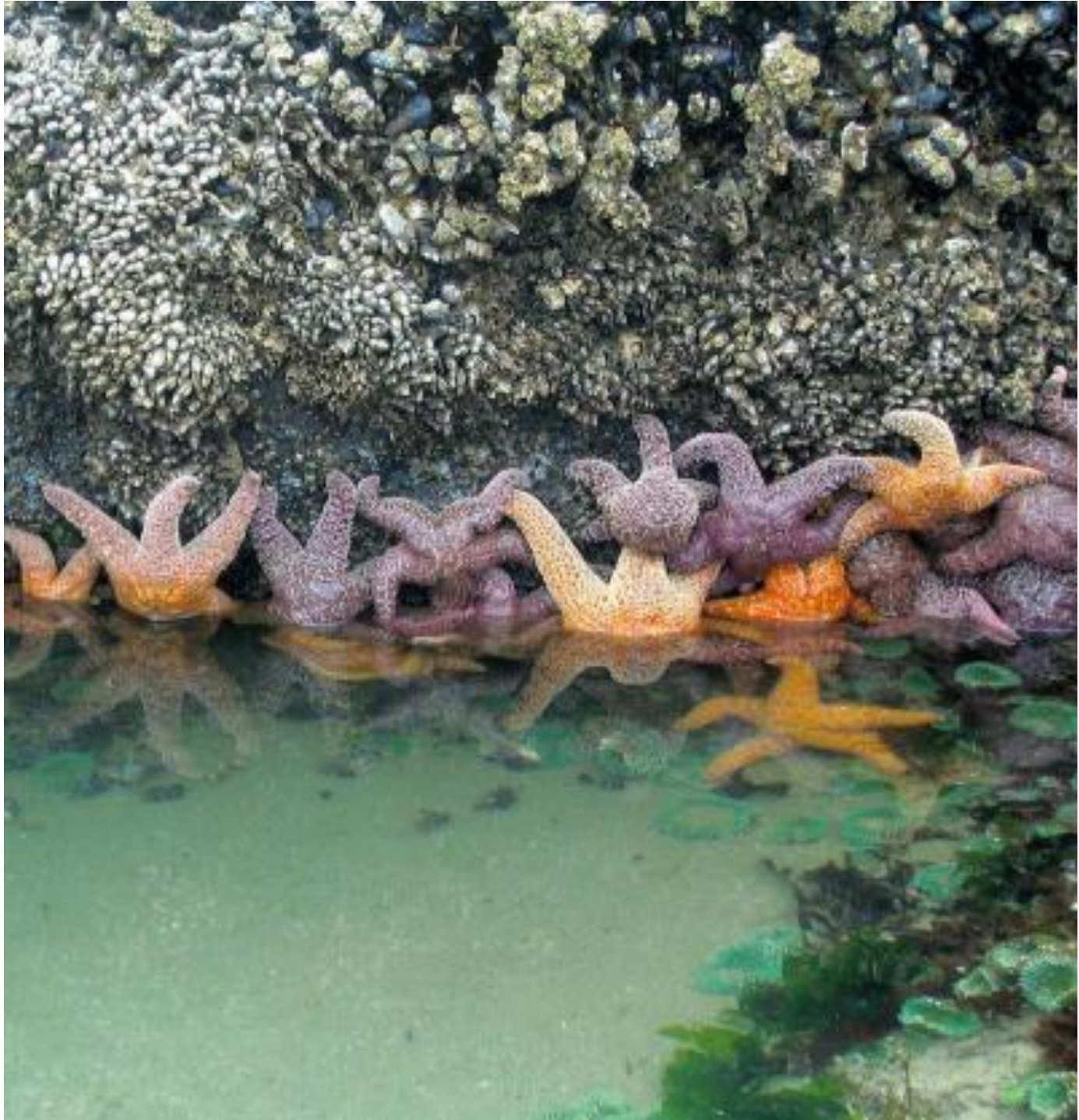
N2 = ..... Biodiversity:

Diversity index = .....



# Activity 1: Evaluate tide pool biodiversity

## Study Site B



# Activity 1: Evaluate tide pool biodiversity

## Worksheet for Study Site B

1. List the name of all the organisms that you see in Study Site B in the first column
2. Fill in the number of each organism that you see in each Grid

Species name	Grid 1	Grid 2	Grid 3	Grid 4	Grid 5	Grid 6
N1= Total # of organisms						
N2= Total # of organism types						
Diversity index =N2/N1						
Biodiversity (Lo, Med, Hi)						

3. Per Study Site B (combination of all 6 grids):

N1 = ..... N2 = ..... Diversity index = .....



# Activity 2: Human impacts on the tide pool

## Food for thought: <sup>diversity</sup> What you will need:

1. As beach-goers, what you wish to do to protect the tidal habitat?
2. As a fisherman, what can you do to protect the tide pool organisms?
3. As city leader, what can you do to protect the beach and tide pool?

- ☐ 1 pencil
- ☐ A worksheet (next page)

### Step 1:

Let's divide into 3 groups to represent different groups of people to discuss our environmental action!

1. Group 1: Beach-goers
2. Group 2: Fishermen
3. Group 3: City leaders

### Step 2:

Among your group, let's discuss in 25 minutes the following questions for the tide pool in Southern California coast.

1. What is the issue?
2. What is the goal of your group?
3. What skills will we need?
4. Who could influence the decision?
5. What are the actions?
6. How will we find out what people think and feel about the issue?
7. How can we make people more aware of the issue?
8. What information do we need and where we will find it?

#### SHOW RESPECT FOR SEASHORE CREATURES



- ✳ Tread carefully.
- ✳ Leave creatures where you found them.
- ✳ Leave attached seaweed in place.
- ✳ Handle creatures with care - close to the ground with wet hands.
- ✳ Carefully put rocks back to the same position you found them.
- ✳ Limit your collection of empty shells as other creatures use them as homes.

#### AVOID DISTURBING WILDLIFE



- 👁 Keep your distance from seabirds including penguins.
- 👁 Keep your distance from seals and sea lions.
- 🔍 Use the zoom on your camera or binoculars for close viewing.
- 🐾 If sea lions approach you - back away slowly.
- 🐕 Keep dogs under control.

#### BE CAREFUL AND KEEP SAFE



- ⚠ Check tide times to avoid being cut off by rising tide.
- ⚠ Do not explore the seashore alone.
- ⚠ Watch for changing weather.
- ⚠ Look out for waves - never turn your back to the ocean.
- ⚠ Beware of slippery and uneven rock surfaces.
- ♻ Pick up any rubbish found on the shore and dispose of it appropriately.

**Let's share the action sheet from your group to the class!**

*The teacher's responsibility here is to facilitate the discussion among groups and provide summary with some possible action items gathered from the group*

# Activity 2: Human impacts on the tide pool diversity

Group that you belong: **Beach-goers**  
**City leaders**

**Fishermen**

(draw a circle)

## ENVIRONMENTAL ACTION ACTIVITY SHEET

What's the Issue?

What's our Goal?

What skills will we need?

Who could influence the decision?

Evaluation  
of action

Action

Evaluation  
of plan

How will we find out what people  
think and feel about the issue?

How can we make people more aware of the issue?

What information do we need and where will we find it?