MAPPING THE DEPTH & POPULATION OF A TIDEPOOL

Subject: Tidepool Ecology **Grade Level:** 9-12 (could be adapted for 5-8) **Time Required:** 1 classroom period, 1 field trip day	**Maine Learning Results Standards:** Science and Technology: B3, B4, J1-3, K1-6 Mathematics: C1-4, F1

Student Learning Objectives

1. Collaborate with other members of a team.
2. Research relevant information which relates to a specified tidepool species.
3. Collect data via a virtual tidepool sampling experience.
4. Record and interpret gathered informati,on.
5. Contribute to the completion of a scientific report and class conference.

Background

One of the most well-known "by-products" of tides are tidepools. Tidepools are small pools maintained by water brought in and flushed out by tides. A wide range of life forms can be found in tidal pool communities. The fauna and flora of tidepools must adapt to constant environmental changes caused by the incoming and outgoing tides. The location of an organism relative to the tide level significantly affects the physical conditions it faces. So, tide pool residents must be able to cope with a highly variable environment. Organisms that live near the top of the high tide line are submerged in water only occasionally. Organisms that live near the low tide line are almost always under water. Many tidepool plants and animals attach themselves to hard, rocky outcrops and are capable of remaining anchored against the intense action of winds and waves. At low tide, tidepool organisms are often exposed to extreme temperatures, harsh winds, and direct sunlight. In general, tidepool organisms must therefore be fairly robust creatures in order to survive**.**

Materials

- tidepool area
- 2 pieces of fishing line or twine, each 2 meters long
- lead fishing weight or metal washer
- meter stick
- field journal
- graph paper
- field guide or organism identifier

Field Trip – Transect Activity

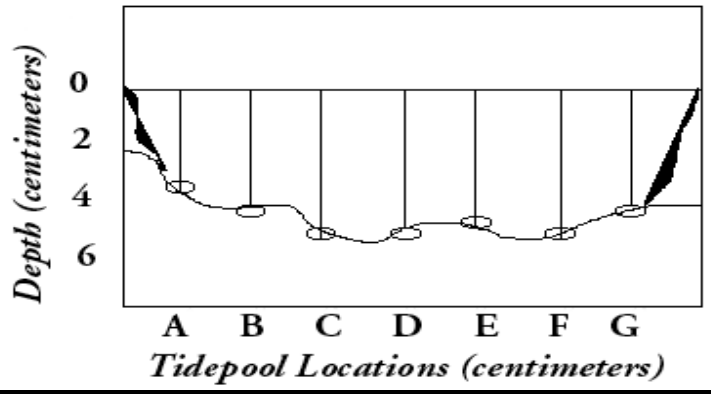
- Investigate an area with many tidepools. Split the class into groups.
- Locate a number of tidepools with varying depth (i.e., bottoms should **not** be flat).

For each tidepool, THE FIRST HALF OF THE GROUP should:

1. Make a depth gauge by tying the weight or washer to one piece of the fishing line. This tool will be used to find the depth of various locations in the tidepool. Do not use the meter stick in the salt water. The paint will discolor or come off completely.
2. Use a felt pen and divide the other piece of fishing line into 20 cm sections.
3. Stretch the marked fishing line from one side of the tidepool to the other (to get the tidepool's length; see diagram below). This "guide line" across the tidepool is called a **"transect."**
4. Using the weighted line, carefully drop the sink into the water at the first mark. This will be station "A". Allow the sink to touch the bottom of the pool. Pull the line until it is taut. Make sure that the sink is still touching the bottom.
5. Hold the line at the surface of the water and pull it out of the water. Be sure not to move your fingers.
6. Use the meter stick to measure the distance from the bottom of the sinker to the surface marking.
7. Record the depth (cm) of station "A" in the field journal.
8. Repeat steps 4 through 7 for each of the markings. Call the subsequent stations "B," "C," and so on.
9. Once you have recorded the depth for all of the markings across the tidepool, repeat the same for the width of the tidepool.
10. Use the graph paper to construct a depth chart. (Refer to sample chart)
11. If the tidepool is relatively wide, you can make additional transects. Be careful to use different station labels for each transect.

For the same tidepool, THE SECOND HALF OF THE GROUP should:

1. Identify and list as many organisms as possible. You can use your field guide to identify tidepool organisms. *[CAUTION: Your tidepool's organisms may or may not be the same!]*
2. Using graph paper, draw the location of the organisms using the station labels that were chosen by the first half of the group.
3. After the field trip, use the field notes to determine the population of each organism and their location within the tidepool.
4. Construct a "pie chart" of the populations for each type of organism. Which had the greatest population? Did the organisms' locations correspond to certain depths within the tidepool?



Example of one depth transect across the length of a tidepool. Stations are separated by 20 centimeters and labelled "A" through "G."

Ecosystem Etiquette

Students should be dressed appropriately for the conditions. They should NEVER work with their backs to the water in the lower intertidal, keeping waves in view. All organisms should be returned to the location where they were found. All disturbed rock, seaweed or other substrate should be returned to its original position. Animals should be treated with respect and care. Carry in, carry out and make every effort to leave no trace!

CROSS-CURRICULAR IDEAS

- **Chemistry:** What is the relationship to the depth of the tidepool and the salinity of the water?
- **Physics/Mathematics:** What is the relationship between the depth of the tidepool and the amount of water found in the pool? Take temperature reading at various depths and graph temperature versus depth.
- **English/Language Arts:** There are many different life forms in tidepools. Pick one and write a "day in the life of" story.
- **Mathematics:** Using data collected in the field, have the students create a class summation of the size of the tidepools studied and number of species found. Create a class graph. Is there any relation between the size and the number of species? What about the size and other variables such as temperature or salinity?
- **Social Sciences:** What is the impact of human activity on tidepool areas?
- **Physics/Mathematics/Biology:** How much force does a wave have? How do biological organisms survive in areas of strong wave action?

Assessment

Have students use cameras and camcorders to record the tide pools. Back in the class room, have students use their journal, along with the images, to construct a visual map and identification of species found. Hold a scientific conference on tidepools, where students discuss their observations, as a group analyze the data gathered, generate questions unanswered by their data, and propose next steps in their investigation.

Vocabulary

Depth gauge: a device to measure depth.

Fauna: is the representative animal or other life of a specific region. Fauna can also be representative of a particular time because of changing weather and climate conditions.

Flora: is the representative plant-life of a specific region. Flora can also be representative of a particular time because of changing weather and climate conditions.

Tidepool: a tidepool is usually found along a rocky coastal region. During high tide, water covers a good portion of the coast. During low tide, the water retreats to the sea. Tidepool are small pools of water hidden between the rocks left by the flowing tides. Tidepools serve as a refuge for marine animals during low tide.