



Beach Substrate Analysis Activity

Grade Level: 6th-12th grade

Subject: Biology, Marine Science

Recommended length of time for unit: 60 minutes each

Overview: This activity will be taking part on the first day of Clam Camp. This activity can be done independently by the students after a brief group introduction and instruction overview. This activity can be completed while students wait for their turn to do their plankton net tow (since there is limited field supplies and due to social distance safety requirements). Students will learn how to determine substrate composition of a beach. This activity will lead into the subsistence shellfish harvest and sample collection that will also take place day one of Clam Camp.

This is a critical thinking activity in which students will hypothesize which substrates shellfish prefer and then make a digging plan based off their assumptions. Students will answer guiding questions and create a substrate map, which should assist in forming their hypothesis and dig plan. Ultimately, this activity should help students with future, independent (with family) subsistence harvesting because they should be better able to predict where shellfish can be found at local beaches after doing this activity.

Objectives/Goals:

- Students will learn substrate terms and how to determine classifications according to size, characteristics, and descriptions.
 - Students will draw a map with substrate composition of site sample location.
 - Students will be able to do this activity independently while socially-distancing outside, on location.
 - Students will hypothesize where and in which substrate shellfish will be found.
 - Students will create shellfish dig plans based off their hypothesis.
 - They will collect species observation data as they dig for shellfish and will present their findings and conclusions to the group.
 - The group will collectively gather shellfish samples for paralytic shellfish toxin testing and will submit the shellfish samples to the lab according to STA-ERL standard protocols.
-

Part One- Background

Materials: Tape measure, Rite-in-the-Rain notebook, pen/pencil, tide chart/tide phone app

Background: Knowing the type of substrate on a local beach can help determine if shellfish and other subsistence resources will call it home. A substrate describes the type of material on the beach. Beaches can be made up of many types of substrates such as mud, sand, pebbles, cobbles and boulders.

Boulders: Boulders are considered large rocks that are 26 cm or more in length. To determine if something is a boulder, use a measuring tape to determine if it is 26 cm or more in length. If a rock is an odd shape measure it on the longest side. Note, it is difficult to pick up boulders because they are so large.

Cobbles: Cobbles are medium sized rocks that are 6 cm - 25.9 cm in length. Use the measuring tape to determine if it is 6 cm - 25.9 cm in length and therefore a cobble. Remember, it is an odd-shaped rock measure the longest side. Until a boulder, you should be able to pick up most cobbles.

Pebbles: Pebbles are small rocks between 1 cm - 5.9 cm in length. Using your measuring tape, determine if the small rock is between 1 cm - 5.9 cm in length, if so then it is a pebble. Pebbles are small rocks and are therefore easy to pick up. Put simply: if you can measure it with your measuring tape, and it is smaller than 6 cm, you are looking at a pebble!

Sand: Sand cannot be measured with a measuring tape, it's too small! To determine if you have sand, pick up a small handful and rub it gently between your hands. Can you see the individual grains or particles? If so, you are working with sand!

Mud: You cannot measure mud with your measuring tape, it's also too small. To determine if you have mud, pick up a small handful and rub it between your hands. Can you see the individual grains or particles? If you cannot then you are working with mud!

Part Two- Beach Substrate Analysis

Hypothesis: Students will hypothesize which common Sitka shellfish species (blue mussels, butter clams, little neck clams, cockles, horse clams) will be found in which parts of the beach based off of their substrate map and the answers to the worksheet questions.

Dig plan: Based on their hypothesis, students will create a dig plan and will present it to a Sitka Tribe staff member supervision this activity. This will help ensure that students maintain social distancing and the group collectively amasses appropriate quantity of each sample species for biotoxin testing. If there is overlap in student's dig plan the students and staff will work together to revise plan according to the needs of the group.

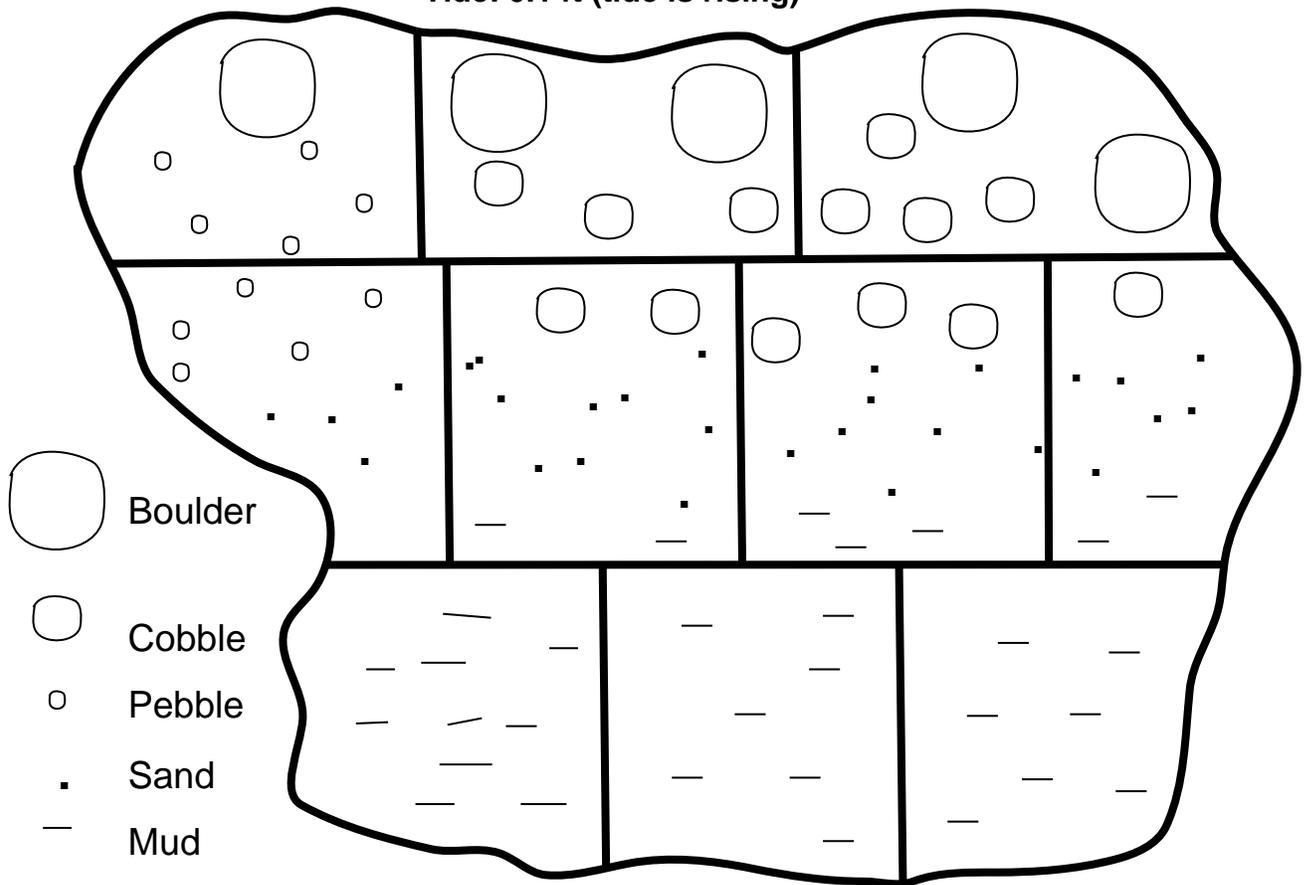
The students will dig holes in their selected areas, and they will collect shellfish specimens for PST testing according to STA-ERL sample protocols detailed on the sample submission paperwork (provided to each student in their folder). The entire student group will submit one sample for each species to prevent overharvesting shellfish at that beach. Shellfish that are not used will be returned to their habitat. Sitka Tribe and overseeing staff need to monitor dig activities and the quantity of each species collect to make sure the sample submission requirements are meet and not exceeded.

Substrate map: Students will estimate the substrate types present at the sample beach. They will use the descriptions in the background information section above to help determine the types of substrate.

Instructions: Travel to the beach during a low tide. Write the date and time in your Rite-in-the-Rain notebook. Use a tide chart to also record the state of the tide and the approximate tide height (in feet) during your visit. Make a sketch of your beach in your notebook. Divide the sketch into 10 approximately equal sections. Students are going to determine the average type of substrate(s) for each section. Using this sketch as a rough map, visit each parcel. Determine the most common substrates per section by observing the overall composition on the beach. Use the tape measure to determine the difference between boulders, cobbles and pebbles. Sand and mud can be determined by using hands and touch since these substrates are too small to measure. Record the substrate observed in each section. Remember to include a key on one side of the drawing and label each substrate type and their corresponding symbol. Draw a large circle to indicate where boulders are present; use a medium circle to show where there are cobbles; make a small circle to illustrate pebbles; put dots to show sand; include a line for mud. Keep in mind that there may be more than one type of substrate per parcel! Students should all receive a copy of the example substrate sketch below. Fill out the questions below the substrate map example. Using your answers and your substrate map sketch, create a plan for digging and harvesting shellfish samples. When your plan is ready share it with a Sitka Tribe staff member so the overseeing staff can coordinate the group's overall collection activities.

Example Beach

Date: 9/15/2020 Time: 3:30pm
Tide: 0.1 ft (tide is rising)



Example Beach is made up of approximately:
10% Boulders
20% Cobbles
10% Pebbles
25% Sand
35% Mud



Beach Substrate Student Worksheet



Questions:

1. Where on the beach do you think you will find shellfish, throughout or in specific areas?

2. Do you think substrate will factor into where certain shellfish populations concentrate? Why?

3. Where do you think you will find blue mussels, horse clams, butter clams, little neck clams, and cockles (refer to the southeast Shellfish species guide for details about species)?

4. Indicate where you plan on digging your holes and present your sketch and dig plan to staff. Which shellfish species do you plan to sample?
