

Beach Sampling Game

Citizen Science Pre-Research Activity

Nanaimo Science and Sustainability Society



Instructor Preparation

Class Level	Grade 5
Objectives	Students will learn about the sampling methodology employed for the Citizen Science Varnish Clam Monitoring project using a model of the beach.
Curricular Competencies	<p>Science:</p> <p>Questioning and Predicting</p> <ul style="list-style-type: none">• Demonstrate a sustained curiosity about a scientific topic or problem of personal interest• Make observations in familiar or unfamiliar contexts• Identify questions to answer or problems to solve through scientific inquiry• Make predictions about the findings of their inquiry <p>Planning and Conducting</p> <ul style="list-style-type: none">• Observe, measure, and record data, using appropriate tools, including digital technologies <p>Evaluating</p> <ul style="list-style-type: none">• Identify possible sources of error• Suggest improvements to their investigation methods <p>Processing and analyzing data and information</p> <ul style="list-style-type: none">• Experience and interpret the local environment• Construct and use a variety of methods, including tables, graphs, and digital technologies, as appropriate, to represent patterns or relationships in data• Identify patterns and connections in data• Compare data with predictions and develop explanations for result <p>Math:</p> <p>Understanding and solving</p> <ul style="list-style-type: none">• Engage in problem-solving experiences that are connected to place, story, and cultural practices relevant to the local community <p>Connecting and reflecting</p> <ul style="list-style-type: none">• Connect mathematical concepts to each other and make mathematical connections to the real world
Materials/Equipment Needed (per group)	<p>Download the Sampling Game packet from NS3 Resources for Teachers webpage (http://nanaimoscience.org/resources-for-teachers/). Each group should have:</p> <ul style="list-style-type: none">• a copy of the protocol, 1 game board (either varnish clams or sea urchins), and the corresponding graphing page (clams or urchins)• 12-inch ruler• Medium sized rubber bands or hair elastics (aprox. 2inches diameter)

Activity

Introduction	<p>To begin this activity, the teacher will need to briefly describe the Citizen Science project:</p> <p><i>Key Ideas</i></p> <ul style="list-style-type: none">• Varnish clams are native to parts of Asia and were likely transported here in the 1990's on ships.• Varnish clams are an invasive species in the intertidal.• Varnish clams have become abundant along the coast of BC.• Scientists don't yet know exactly what impact Varnish clams have on our native species, including on other bivalves.• NS3's Citizen Science Monitoring project is an ongoing project in which students collect data on the number of Varnish clams and on other bivalves. This data is maintained by researchers at VIU who are interested in how Varnish clam populations are increasing.• The data students are collecting is real data that will be used to look at patterns over several years.• This activity is a miniature version of how they will be sampling Varnish clams at Departure Bay.• Students will use a common scientific method of random sampling along a transect. <p><i>Vocabulary</i></p> <p>Invasive Species - non-native plants or animals that have been introduced, either intentionally or accidentally, into the environment from other areas. Invasive species often have no predators in their new environment. They are capable of moving aggressively into an area and using resources such as light, nutrients, water, and space which other plants or animals need.</p> <p>Native Species – those species that originally (over geologic time) come from a given area, in other words, they have developed, occur naturally or have existed for tens of thousands of years in an area.</p> <p>Intertidal – the part of the beach covered by water at high-tide but exposed at low-tide</p> <p>Bivalves – a class of animals with two hinged shells, like clams and oysters</p> <p>Random Sampling - where we select a small group of individuals (a sample) for study from a larger group. Each individual is chosen entirely by chance and each individual from the larger group has an equal chance of being included in the sample.</p> <p>Transect - a straight line or narrow section through an object or natural feature or across the earth's surface, along which observations are made or measurements taken.</p> <p>Citizen Science - the involvement of the general public in scientific inquiry.</p>
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Activity

Split the class so that the students are in groups of 2. Give half the groups the Varnish clam example and the other half the Sea urchin example. Groups should follow the directions given on the protocol sheet to "sample" their game board for their species and fill in the graph. Have students share their results and hypotheses with the rest of the class.

hint for teachers: Rulers should be placed on the board so they run from the green line to the bottom of the page – there is no right or wrong place to set the rulers from left to right. What happens if the ruler was placed on the right hand side of the board? the left side? the middle? This variability illustrates an important concept for sampling natural environments. Species (in our case, Varnish clams) can be distributed in patches but we can't know that in advance nor can we plan to sample every individual. Therefore, we must sample *randomly* so that when we average the data together (i.e. across classes) we have a good idea of the actual number of clams on the beach.



NS3 VARNISH CLAM PRACTICE SAMPLING PROTOCOLS

1. On your sampling board, lay down your ruler (= **transect line**) from the **green line** down the “beach”. The green line represents the “**wrack line**” (where piles of seaweed and debris pile up).

- 0-15cm = UPPER INTERTIDAL AREA
- 15-25cm = MIDDLE INTERTIDAL AREA

2. Place one rubber band (= “**quadrat**”) every 5cm along the transect line, alternating left and right.

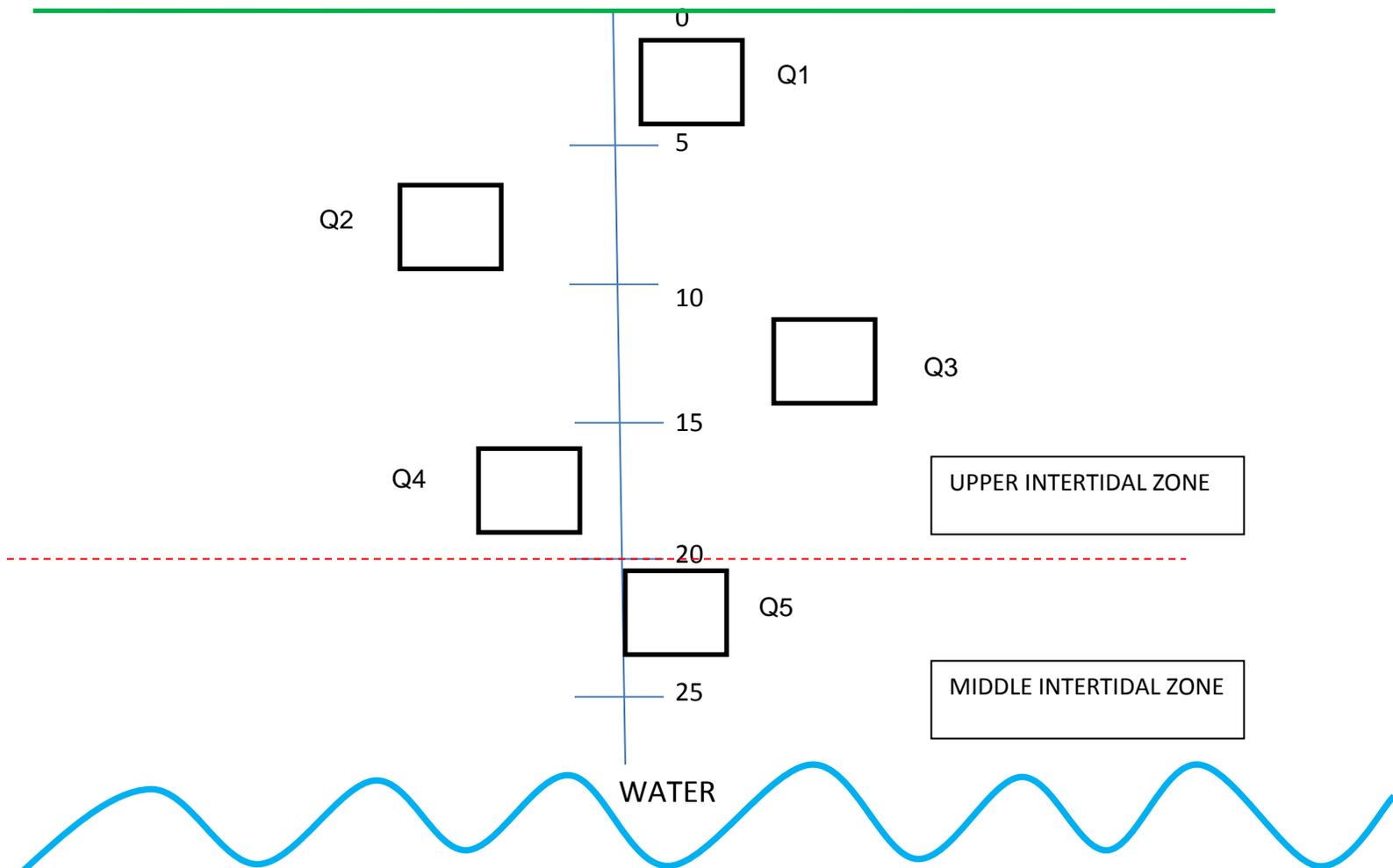
- 1 quadrat between 0-5cm (Q1)
- 1 quadrat between 5-10cm (Q2)
- 1 quadrat between 10-15cm (Q3)
- 1 quadrat between 15-20cm (Q4)
- 1 quadrat between 20-25cm (Q5)

UPPER INTERTIDAL ZONE

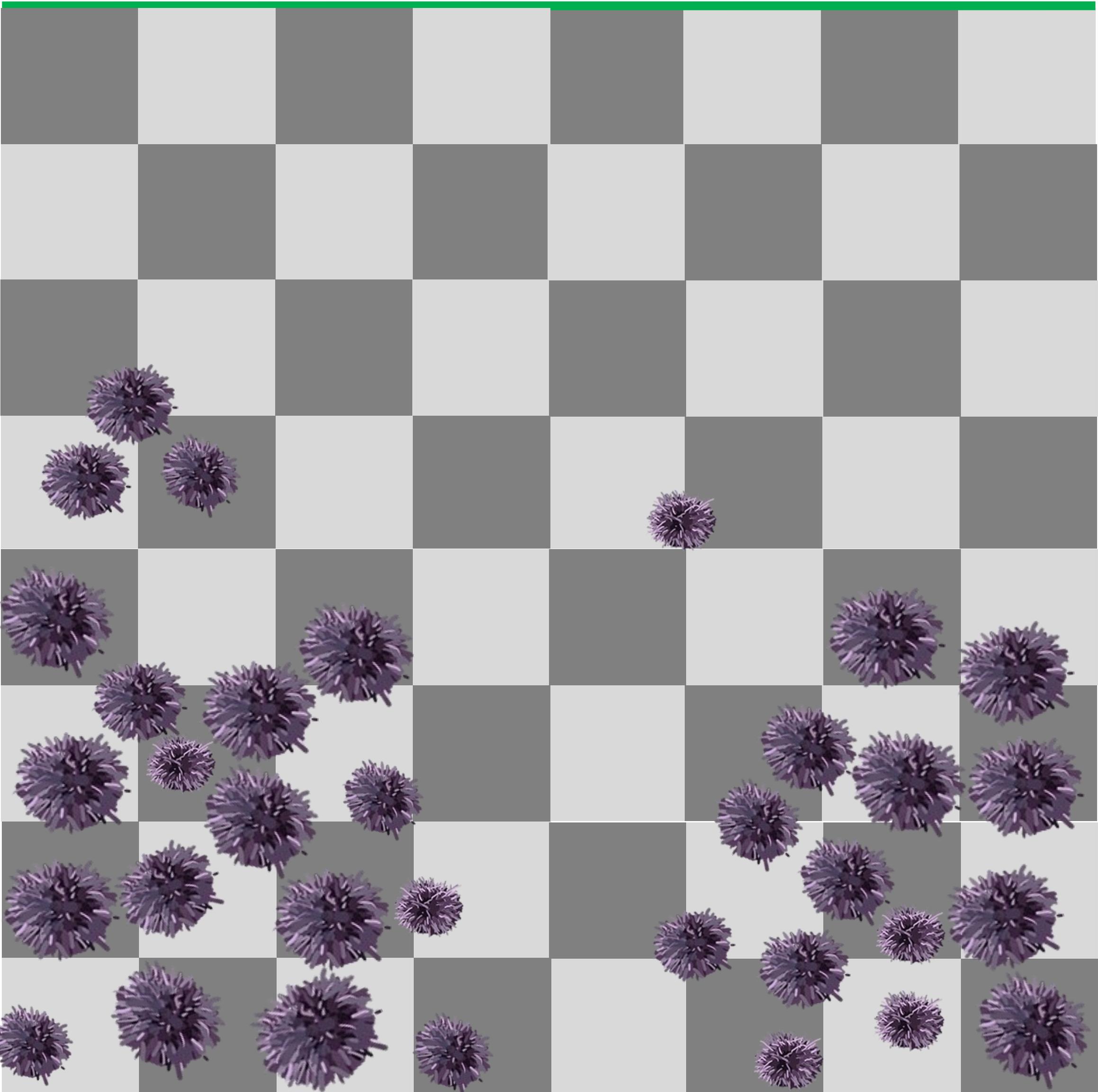
MIDDLE INTERTIDAL ZONE

3. Count the number of animals that are inside each “quadrat” and record in the boxes

WRACK LINE (green line)







Ns3 VARNISH CLAM DATA



1. Graph the data you collected by colouring in the number of clams you counted in each quadrat. (each box=1 clam)
2. What trend do you notice? What questions do you come up with?
3. Colour in what you hypothesize might happen if you sampled two more quadrats (Q6 and Q7)? How would you test it?

