Lab Investigation: Mock Biodiversity Survey

(Written by Lauren Fieberg, Sage Hill School)

Goal: To understand engage in citizen science and understand the role biodiversity surveys play in monitoring Marine Protected Areas.

Materials:
⇒ Quadrats made of pvc pipe
⇒ String (thin)
⇒ Forceps
⇒ Small plastic cups or petri dishes
⇒ Calipers or rulers
⇒ Shells or small objects
⇒ Printouts of the rocky intertidal (images should include a mixture of: mussels, rock, algae, snails, barnacles)
⇒ Student also need notebooks or laptops for data collection

Procedure Prep:
1. Make your quadrant into a 5 x5 grid by tying the string to the PVC. Figure 1.
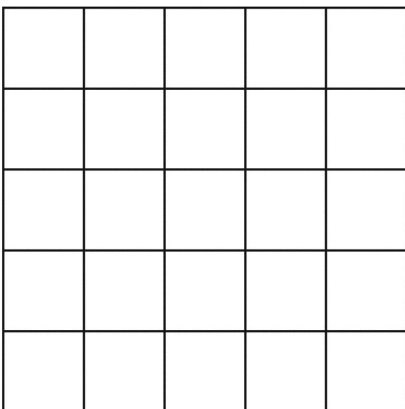

Figure 1. Quadrat with grid.

2. Lay the quadrant over your images of the rocky intertidal and organisms provided and laid out by the teacher ahead of time.

Part 1. Point Contact (Estimated Percent Cover) Point contact surveys allow you to estimate the percentage of each organism or abiotic structure in the ecosystem (percentage of rock v. algae). This will allow you as the researcher to understand which organism(s) are most dominant. Over time this allows researchers to understand how the overall ecosystem structure is changing.

3. Move your finger through each square on the grid and record which species your finger touches in the grid upon first contact. This will be Rock, Mussel, Algae, Barnacles, or Snails. By the end you will have 25 squares of data.
4. Estimate percentages of each by calculating the total number of squares for each species and dividing it by 25 (total # of squares) and multiplying by 100 to get a percentage. The total % at the end of your calculations should add to 100%. See. Example calculation below for guidance. (Ex. If I counted 10/25 squares of mussel * 100 = 40% of the ecosystem is dominated by mussels)

Part 2. Species Richness Species Richness allows you to estimate the overall biodiversity of an ecosystem. It is defined as the total number of different species present in an ecosystem.

5. Count the total number of different species present in the ecosystem and record this value. You may use the forceps and gridlines to help you count and keep track of where you have counted.

Part 3. Species Abundance and health Species abundance allows you to understand how many individuals of each species are present. If this

fluctuates after having established an MPA it is a good sign that populations are happy and healthy. If populations shift in negative directions it forces researchers to look deeper for answers such as: pollution, runoff, pH, natural disasters, El Nino, Seasonality, or Human Impact. Measuring the size of these species provides even more information about how healthy the ecosystem is.

6. Count the number of each species present. Although you do not necessarily know the name of each species, note its characteristics to distinguish between similar groups. Create a new data table for this information.

7. Use the forceps to collect the objects or shells that the teacher laid out in your plot. Use the calipers to measure the lengths of these species. Record your data.

Part 4. Summary and Conclusion. Summarized what you learned about citizen science, and the role of data collection in Marine Protected Areas.

Possible guiding Questions:

1. Did your percent cover (Point contact) play a role in determining species richness or abundance? Why or Why not?

2. How did species richness relate to species abundance? Do you think that high species abundance always means high species richness?

3. Do you think collecting this data long term in actual MPAs would be valuable? Why or Why not?