# Part 2: Data Analysis

**Data analysis is the process of inspecting data to generate conclusions. You need to find the specific data you need from a large dataset, arrange the data systematically, graph the data correctly, and interpret the graph to draw conclusions. The LiMPETS database portal can do most of this work for you!**

**LET'S START by pulling up a graph related to your question. Go to the Rocky Intertidal Results page on LiMPETS Website and follow the on-screen instructions to pull up a graph from your monitoring site. More data is usually better so select the option to look at data from "All Schools."**

## WHICH METHOD?

What method should you choose? It depends on what your question is.

- If you are looking at solitary anemones or sea stars select "Total Organism Count." These are abundance data.
- For owl limpets, select "Size Measurement." These are abundance and body size data.
- Select "Vertical Transect" if you want to look at zonation and how things are distributed with tidal height. This method is good if your question might involve climate change, specifically sea-level rise, or if you want to look at interactions between organisms (do two organisms' distributions overlap?).
- If you want to look at organism abundance, the "Random Quadrat" method provides statistically robust estimates of abundance that can be compared over time.

If you are investigating an organism that is surveyed by both vertical transect and random quadrats, look at both graphs. You might find something interesting....

## FINDING (OR CREATING) THE RIGHT GRAPH

Does your question involve change over time? Probably. What time frame? It's best to try a few time specifications and compare graphs — which one demonstrates your point most clearly?

While the LiMPETS website gives you many different graphical views of the data, it may not provide the best graph for your question. For example, if you want to look at seasonality of an organism (and the website-generated graphs only display yearly averages), you must look at the data table view.

Data tables are usually not an easy way to present the data especially for your communication project. To create a graph, copy and paste the data into an Excel, Apple's Numbers, or GoogleSheets file.

## MAKING CONNECTIONS

When you hypothesize why an organism's abundance has changed over time, think about the challenges in the intertidal (temperature, desiccation, wave action, exposure to air and sunlight, competition, and predation). Has a challenge changed (examples: the introduction of a predator, or surge in large storms)? These changes affect the organism's ability to live in the intertidal.

This is when it is good to know some facts about your organism(s). What are its predators? In what zone does it typically live? Does it compete with another organism for space? Go to the Species Page of the LiMPETS website to see the basic facts about your animal(s) or alga(e).

Complete this worksheet using the LiMPETS Website: Rocky Intertidal Data Portal and the Part 2: Data Analysis Handout.

## IDENTIFY WHAT YOU NEED

Before you start generating graphs, answer the four questions below.

1. Monitoring site(s):
2. Organism(s):
3. The organism is monitored with method(s):

☐ Total Counts

☐ Size Measurement

☐ Vertical Transect

☐ Random Quadrats

4. Time frame:

☐ Over 5 or more years

☐ Before, during, and after a specific event

☐ Over a year, monthly, or seasonally

☐ A one-day snapshot (only appropriate with vertical transect data)

## GENERATE YOUR GRAPH(S)

Go to the LiMPETS Rocky Intertidal Results Page and pull up your desired graph. Consider two things:

- If there are not enough data or very few of your organism, rework your question; you can look at another organism, monitoring site, or time frame.
- Is this graph the best way to visualize this data? If not, pull up another view on the LiMPETS website or create your own graph using the Data Tables.

Then, answer the following questions: [These will form the basis of your Figure caption.]

5. The x-axis is_____in_____(units).
6. The y-axis is_____in_____(units).
7. The graph shows a(n) increase / decrease /no change in _____

## MAKE CONNECTIONS

8. Trends in the graph could be due to an increase or decrease in:

☐ Wave action

☐ Extreme high or low temperature

☐ Exposure to air or sunlight

☐ Extreme high or low salinity

☐ Competition

☐ Predation

☐ Food availability

☐ Human impact

9. Another organism that might show a similar trend is:

10. Another organism that might show an opposite trend is:

## EXPLORE POSSIBLE CONNECTIONS

Is the trend you are seeing happening at other sites in California? Use the database to check out other LiMPETS monitoring sites to find out. Go to the LiMPETS website and click "Rocky Intertidal Monitoring Sites" to see a map.

Pull up graphs of the organisms from question 9 and 10 to see if you are right.

Go to the LiMPETS website to explore climate and oceanographic data sources that might explain the trend you are seeing in the data.

Read scientific papers to see if other scientists have found trends similar to what you found in the LiMPETS database. Use Part 3: Summarizing Relevant Research to take notes.