

ESM 206 Assignment 4

Submit ONE stapled hard-copy (per group) of your finalized report (6 - 7 pages total) at the beginning of class on Monday 11/19.

READ THROUGH THE ENTIRE ASSIGNMENT BEFORE YOU START.

For this assignment, **you may work in groups of 1 to 3 people**. You will submit ONE report for the group, and all individuals in groups will be given the same grade. All submitted reports will be graded equally, regardless of how many people were in the group. Make sure that the names of all people in the group are included on the cover page.

You will be creating a 6 - 7 page “Mini-Report” based on the data analysis and statistics you perform. **For this assignment, the writing, presentation, and formatting are as important as accurate calculations and statistics.** You will ONLY be submitting your final report (we will not see your data files, .Rmd file, annotation, etc.). We recommend preparing your entire project in **Rmarkdown**, then either (a) knitting directly to PDF or (b) **knitting to Word**, then finalizing (which may make customization of fonts/spacing/margins easier...).

You and your group members should make decisions about how to best analyze and present the data you are asked to compare (e.g. graph type, number of graphs, appearance, error bars, statistical tests, how you will organize the overall report, etc.). You are also responsible for any ‘behind-the-scenes’ exploratory analysis and assumptions-tests that won’t appear in the final report. Consider creating an outline of your report before putting it together – it should tell a cohesive story.

You will be describing lobster size, abundance and fishing pressure at five Long-Term Ecological Research (LTER) Sites in the Santa Barbara Channel close to the mainland: Arroyo Quemado (AQUE), Naples Reef (NAPL), Mohawk Reef (MOHK), Isla Vista (IVEE), Carpinteria (CARP). The .csv files you’ll need are posted on GauchoSpace (lobster_size_abundance.csv and lobster_traps.csv)

From the data SBC LTER data summary: “This dataset contains two tables. 1) Abundance and size data collected annually by divers in late summer before the start of the fishing season at five SBC LTER long term kelp forest study sites: two within MPAs (Naples and Isla Vista) and three outside (Arroyo Quemado, Mohawk and Carpinteria). 2) Fishing pressure, as determined by counting the number of commercial trap floats. Data are collected every two to four weeks during the lobster fishing season (October to March) at nine sites along the mainland, eight of which are also SBC LTER long-term kelp forest study reefs.”

Familiarize yourself with the data (columns, sites, etc.) by exploring metadata at the following links:

Lobster abundance and size:

<http://sbc.lternet.edu/cgi-bin/showDataset.cgi?docid=knb-lter-sbc.77&displaymodule=entity&entitytype=dataTable&entityindex=1>

Lobster fishing pressure:

<http://sbc.lternet.edu/cgi-bin/showDataset.cgi?docid=knb-lter-sbc.77&displaymodule=entity&entitytype=dataTable&entityindex=2>

Full data citation: Reed, D. . 2017. SBC LTER: Reef: Abundance, size and fishing effort for California Spiny Lobster (*Panulirus interruptus*), ongoing since 2012. Santa Barbara Coastal Long Term Ecological Research Project. doi:10.6073/pasta/81ce20b29614ec99d85d54907eaa3e8e

You are asked to include and discuss the following analyses in your final report:

1. Lobster abundance and fishing pressure (2012 - 2017)

Describe trends in lobster *abundance* (counts) and *fishing pressure* (trap buoys) at the **five locations** from 2012 - 2017. Ignore transect information - we are only interested in evaluating abundance and pressure on the order of SITE. **Note: you are not expected to use regression here - just think of ways to clearly describe annual totals visually and in text, noting important trends, events and differences.**

2. Compare mean lobster size by site in 2017

Compare mean lobster sizes (carapace length (mm)) across the **five sites** for lobster observations collected in 2017. *Warning: the size data are not in tidy format. There are rows that contain size information for multiple lobsters observed (e.g., if the researcher saw 3 lobsters all with carapace length ~ 60 mm, then they will have a single row where COUNT = 3 and SIZE = 60). You'll want to get this into case format - where each lobster has its own row - before doing statistical analyses. There are many ways to do this. One hint: function `expand.dft` in the `vcdExtra` package (it doesn't like tibbles, so you might need to coerce to `data.frame` first).*

3. Changes in lobster size at MPA and non-MPA sites (comparing only 2012 and 2017 sizes)

From the data description (<http://sbc.lternet.edu/cgi-bin/showDataset.cgi?docid=knb-lter-sbc.77>):

“Data on abundance, size and fishing pressure of California spiny lobster (*Panulirus interruptus*) are collected along the mainland coast of the Santa Barbara Channel. Spiny lobsters are an important predator in giant kelp forests off southern California. Two SBC LTER study reefs are located in or near the California Fish and Game Network of Marine Protected Areas (MPA), Naples and Isla Vista, both established as MPAs on 2012-01-01. MPAs provide a unique opportunity to investigate the effects of fishing on kelp forest community dynamics. Sampling began in 2012 and is ongoing.”

At Isla Vista and Naples Reef, the two protected MPA sites (with zero fishing pressure), how do lobster sizes in 2012 and 2017 compare? At the non-MPA sites?

4. Proportions of “legal” lobsters at the 5 sites in 2017

The legal minimum carapace size for lobster is 82.6 mm. What proportion of observed lobsters at each site are above the legal minimum? Does that proportion differ significantly across the 5 sites? *Note: We'll be doing chi-square in labs next week, or go ahead with maximum resourcefulness and check out the `chisq.test()` function on your own!*

DESCRIBE YOUR FINDINGS FROM PARTS (1 - 4) ABOVE IN A COHESIVE 6 - 7 PAGE “PRELIMINARY” REPORT THAT INCLUDES THE FOLLOWING SECTIONS:

1. A professional, well-formatted cover page
2. Introduction – A brief introduction in which you briefly provide the reader with sufficient background information (WITH REFERENCES) to understand what you will be presenting in your report and provide some motivation for the work.
3. Data, Data Analysis and Statistical Methods – A brief summary of the data (source, description) and methods (including programs) used for statistical analyses.
4. Results and Discussion (can have these sections combined, or separate) – The graphical and statistical results of your data analysis, and interpretation of the results. Include both qualitative descriptions of visual observations or trends, as well as statistical results. The order in which you present the graphs, results in text, and statistical results do not have to be in the order that they are listed above. You should organize the data in a way that you think most clearly explains the story you are trying to tell with your results. Make sure that you read the “Communicating Statistical Results” documents on the course website.
5. Conclusion/summary (1 – 2 short paragraphs or bulletpointed summary of the main findings of your work)
6. References (professionally formatted)

IF THERE ARE OTHER GRAPHICAL REPRESENTATIONS, RELATIONSHIPS OR STATISTICAL COMPARISONS THAT YOU THINK WOULD BE IMPORTANT OR INTERESTING TO EXPLORE, YOU CAN INCLUDE THEM. (Not required).

WHAT YOU WILL SUBMIT FOR THIS ASSIGNMENT: Your professional, complete, accurate 6 - 7 page report including all sections listed above. That’s it. We don’t want any other materials you used to complete it. Print in color if that’s how you would intend it to be seen by a boss/client.

You will be graded on:

- The format, appearance, and level of professional presentation of your entire report
- The accuracy, completeness, and professional appearance and communication of your graphs, tables (see above – you do NOT have to include your name in the graphs or tables for this assignment), statistics and figure captions.
- The accuracy, interpretation, and communication of quantitative results
- The accuracy, interpretation and communication of statistical analyses (see documents on GauchoSpace for examples)
- The overall clarity of your report (including how statements in the conclusion relate to the data and statistics presented in the results)
- Your ability to explain and interpret your results in the context of existing peer-reviewed literature (i.e., find and cite valid references that enhance your report)
- How well your report is organized into a cohesive piece of work
- The inclusion and correct formatting of references