Final Practicum Exam
Winter Term 2023
ES 386

Photo by: https://thatoregonlife.com/2022/01/the-best-tide-pools-on-the-oregon-coast-where-to-find-them/

You are an environmental scientist working for the National Oceanic and Atmospheric Administration (NOAA). For the last two years, your team has been studying tide pools on the Oregon coast to understand how climate extremes influence intertidal species diversity.

Your data collection methods were as follows:
You visited 3 study sites at the beginning of each summer. At each site, you selected 10 plots among the tide pools and recorded the species diversity (Start_spp_div) of each plot. Then, you removed all organisms from 5 of those plots ("cleared") and kept the other 5 plots as is ("control"). You revisited these sites at the end of the summer to record species diversity again (End_spp_div), and then calculated how much the plots had recovered. For example, if a plot had 10 species at the start of the summer but 8 at the end, you recorded 80% recovery in species diversity ("percent_recovery"). Each summer, you also recorded the maximum intertidal sea surface temperature (max_ISST) recorded during heat waves at each site because temperature stress can affect predator-prey dynamics in tidepools as well as the ability of some organisms to re-establish themselves. You did this research for 2 years to accumulate the dataset "tidepool.xlsx".

Task: Your supervisor has asked you to analyze the data and write a brief report on your findings. In particular, they would like to know what factors affected the ability of tidepools to bounce back after being cleared. **Use statistical analysis to answer these questions:**

1. Were cleared plots able to recover to the same levels of diversity found in control plots?
2. Did the 3 study sites differ in their ability to recover from clearing?
3. Did heat waves (high max sea surface temperature) influence tidepool recovery?

Statistically analyze the data provided in "tidepool.xlsx" to answer these 3 questions and write your findings in a concise report. Your report should include the following:

- A brief summary of the data analysis methods you used in Excel and/or R to answer each question. Include a brief explanation of why each of these methods were selected.
- Graphical depiction of your results. Include at least 2 figures with professional formatting and concise, descriptive captions. Be sure to choose figure formats that clearly communicate key findings from your research.
- A brief, concise written summary of your findings for each analysis. Be sure to reference key statistical output to support what you write. (Do not copy-paste the raw output text or tables from Excel or R; instead, select only the relevant information and include it in your written summary).
- A brief 2-3 sentence conclusion that describes key take-aways from your analysis of how tidepool diversity recovers after tidepools are cleared.