Homework: Week 5 (Due Monday, October 28, 2024)

FW 599: Multivariate Analysis of Ecological Data

Instructions

Please submit all homework assignments to Canvas as an **R markdown document** (Markdown or Quarto) including **visible code** and **relevant output**. A tidy *.pdf document is preferable to an *.html or a "raw" *.qmd file. Note that homework questions are intended to directly accompany lab exercises, building up to the final class project. Consequently, it is in your best interest to answer them thoroughly and thoughtfully.

Questions

Question 1) Conduct a Principal Component Analysis (PCA), Correspondence Analysis (CA), Principal Coordinate Analysis (PCoA), and Nonmetric Multidimensional Scaling Analysis (NMDS) using your dataset.

- **1a.** Were you able to successfuly apply each of these analyses to your dataset? If not, explain why.
- **1b.** Which transformation or standardization procedures, if any, did you use prior to each analysis?
- **1c.** Did you remove any outliers prior to running the ordination procedure? Are there any apparent outliers in the biplot(s) that appear to warrant further examination?
- **1d.** Which ordination procedure is the most appropriate for your dataset? Defend your answer based on what you know about the strengths and limitations of each procedure.
- **1e.** How does the choice of ordination method influence the interpretation of your data?

Question 2) For the PCA, PCoA, and/or CA, interpret the meaning of the principal components in the context of your dataset. What do the first few principal components explain about the variation in your data? How do these components relate to the original variables? Are there any variables that are strongly correlated with the principal components?

Question 3) Do a little digging and find at least **one** creative way of presenting your ordination output that we did not discuss in lab or in class. How does this approach allow you to interpret your data more effectively?