

# BIO 410/510 Final Project Workflow

Please submit both a “cleaned-up, report-worthy” html or pdf AND the “all work shown, echo = TRUE” files to Canvas by Wed 3/18

**Points: 40**

## Final project objective

The objective of the final project will be to complete a fully reproducible workflow that uses data to address your chosen question. The project must illustrate all of the following tasks:

- Some form of data access / reading into R
- Integration of multiple datasets to address the question
- Use of dplyr to manipulate and summarize the data in relevant ways
- Initial data visualization with ggplot2
- Final, publication-worthy visualization with ggplot2
- RMarkdown writeup, with final submission as both a clean html or pdf file, and a “show your under-the-hood work” version of the file
- Overall clean and clear presentation of the workflow, code, and explanation

## I. Introduction (Literature review)

The literature review will be around 5 well cited paragraphs that do the following:

### 1. Introduce the problem and explain why

- Set the stage for the problem
- Put the concept and question into context
- Lots of big-picture citations (such as reviews) in the first paragraph

### 2. Past work and data available on the project

- Who has addressed this problem, and what did they do it?
- What are the data available to address this problem?
- How has the data available and/or methods changed recently?

### 3. Purpose of the study

- Further refine your approach (e.g., what data will you combine, how will you address the question)
- Justify why this is needed now (e.g., visualization to test a new dimension of the question or better convey an old one)

### 4. Hypotheses/questions

- List these clearly and in a logical order
- Make hypotheses directionally using predictions (e.g. “I predict N will reduce plant diversity” rather than “I predict N will change plant diversity”)

## II. Approach/Methods

- Provide a description of the data sources, including who collected the data and how it was collected
- Describe how you will use the data to address your questions
- Include R chunks with data import, data tidying, and any important preliminary visualizations (for the “cleaned up” version these will be in non-exported R code chunks; they should be shown in the “all work shown” version)

## III. Results

- Report the key findings (but save the interpretation and contextualization for the discussion)
- Provide evidence to answer all questions or hypotheses posed in the introduction
- Include R chunks that contain data summaries and visualizations
- Have these chunks export captioned, publication-worthy figures

## IV. Discussion

The discussion will be around 3-5 well-cited paragraphs that do the following:

1. Provide a big overview or summary of consequences of strongest results (1 paragraph)
2. Expand thoughts on results and hypothesis (2-4 paragraphs)
3. Discuss the limitations of the approach a/o potential future directions (1 paragraph)
4. Summarize the conclusion or take home message (1-2 paragraphs)

### Goals for this section include:

- Address hypotheses (are they resolved?), questions, aims, and/or limitations
- Discuss the consequences or implications of results
- Make comparisons with previous findings (support or contradict)
- Announce your study’s contribution to the current field
- Draw broader conclusions
- The comprehensive literature review should be in the introduction, here it is necessary to link to past work but no need to introduce too many new citations

## V. Literature cited

Please follow MLA citation guidelines. This will include in-text, parenthetical citations and a literature cited section at the end. Aim for at least 10 peer-reviewed cited works.

**This is a nice reference on scientific writing:** Turbek, Sheela P., Taylor M. Chock, Kyle Donahue, Caroline A. Havrilla, Angela M. Oliverio, Stephanie K. Polutchko, Lauren G. Shoemaker, and Lara Vimercati. “Scientific Writing Made Easy: A Step-by-Step Guide to Undergraduate Writing in the Biological Sciences.” *The Bulletin of the Ecological Society of America* 97, no. 4 (October 2016): 417–26. <https://doi.org/10.1002/bes.2.1258>.