**Objective**

The goal of this project is to have you identify and answer a research question using some of the modeling and statistical methods that we have been covering in class. This will be an opportunity for you to pursue a topic that interests you while integrating the various course topics. Working on topics related to your Masters thesis is acceptable! But, it may not be an analysis that you have already conducted.

**Research questions**

You may come up with any research question you choose, but you will need to be able to address the question with some of the modeling methods we cover in class. You may want to look ahead in the syllabus to see what other topics we will be covering in the coming weeks which you could use for your project also. Make sure to choose a tractable problem that reflects your interests. Below are some examples of possible project topics:

* How would salmonid population growth rates change under different climate change scenarios, as modeled by a simple age (or stage) structured Leslie Matrix model (aka Life Cycle Model)? *E.g., Crozier et al. 2008 (doi: 10.1111/j.1365-2486.2007.01497.x)*
* How sensitive are biological reference points like F0.1, Fmax, and FX% (calculated with YPR or SPR analyses) to observed variability in growth rates (i.e., weight at age), different fishery selectivity curves, or different natural mortality rates for a specific species?
* What are the effects of different covariates on the catch rates from a fishery, and what would be the best approach to standardize the Catch-Per-Unit-Effort?
* Do growth rate parameters (from length-weight and age-length models) for species X obtained from the Chesapeake Bay trawl survey data differ from those obtained from the South Atlantic Ocean?
* How are krill population dynamics and demographics influenced under different climate/environmental scenarios?
* How is the occupancy of salmon in a river system affected by various covariates?

You have a lot of flexibility in what you can choose, and hopefully you’ve already had some ideas on questions of interest and how class material can benefit your research. I am available to discuss any project ideas you may have! ***You will be providing me with a short synopsis of your research question and proposed analytical plan, and I will provide constructive feedback.***

**Data -** To answer your research question, you will need data. Your data may be from your own research, a colleague’s research, online databases, literature, reports, etc. Remember that you can also create simulated data to use! There are no restrictions aside from the ethical use of the data with appropriate citation.

**Project Report Guidelines**

A project report will detail your analysis and your findings. Please limit your report to 3 *single-space* pages of text (not including figures, tables, or references). Include the following sections, as you would in a manuscript or report:

* **Introduction** – briefly provide the context for your research question, why it is important or of interest, and what your hypotheses and expectations were. In the past, some students have devoted to much space to this; the core of the project should be the methods, results, and discussion.
* **Methods** – describe the data, study design, analytical approach, model(s) with equations, diagnostics, etc.
* **Results** – present your findings and results of the analysis. Include: appropriate graphical exploration of your data; an evaluation of model assumptions (and other diagnostics) and any remedies that were needed (transformations, different distributions, etc.); Interpretation of the results of the statistical model (e.g., significant vs. non-significant predictors); Appropriate figures and tables for the analysis.
* **Discussion/Conclusion** – address how the results answer the primary research question, how it compares to your expectations or literature, and what the main conclusions are. Please address any ways the analysis could be improved if there were some weaknesses or concerns.
* **References** – if you use public datasets, or if you cite other studies (e.g., for methods or comparisons), include a bibliography.
* **Tables/Figures** – do not imbed these within the text, but leave this as a separate section (for example, include figures of data with fitted models, diagnostic plots for assumptions, or other pertinent figures and tables).

**Grading -** The project is worth 15% of your overall course grade and will use this rubric:

|  |  |
| --- | --- |
| **RUBRIC** | Max Points |
| Project synopsis | 5 |
| Question/idea | 10 |
| Intro | 10 |
| Methods | 15 |
| Results | 20 |
| Discussion | 15 |
| References | 5 |
| Grammar | 10 |
| Organization & clarity | 10 |
| TOTAL | 100 |

**Due dates:**

**3/18/24** - A synopsis of the research question and methods

* Submit via Canvas a description of your research question, planned methodology, brief description of data & data source, modeling approach(es), and hypothesized results. The synopsis should be 200-400 words long and is 5% of the project grade. Please be as informative and clear as possible so I can provide the best possible constructive feedback to help guide your project.

**5/3/24** – Project reports are due (submitted via Canvas)