UNIVERSITY of WASHINGTON

BASA Model Sensitivity App

Mindy Dai, Trinity Hinshaw, Veronica Lee, CL Roberts

December 11, 2024

Problem Statement

- Working with a BASA (Bayesian age-structured assessment) model that predicts herring stock
- Model requires an input parameter for mortality
- How sensitive is the model to a change in the mortality value?
- Goal: create an app where a variety of users can explore the BASA base model and its sensitivity

Users and Use Cases

- Primary user and technician: CL Roberts
  - Will use the app to inform his dissertation work
  - Interested in generating residual values and statistics between the base model and mortality-adjusted model
- Secondary users: Ecosystem researchers
  - May want to extend the app's relevancy to their own population work
- Tertiary users: Board members for agency
  - Want to evaluate the BASA model's quality and advocate for fishing interests

Technologies Used: Overview

- Built the app using Shiny for Python
- Created the UI components using Shiny
- Created technical components, along with corresponding tests, in Python modules
  - Run the BASA model using the set mortality value
  - Change the mortality parameter
  - Plot both base and adjusted model outputs for biomass
  - Calculate percentage error between the models' biomass outputs
  - Plot the percentage error values

Technologies Used: Shiny App

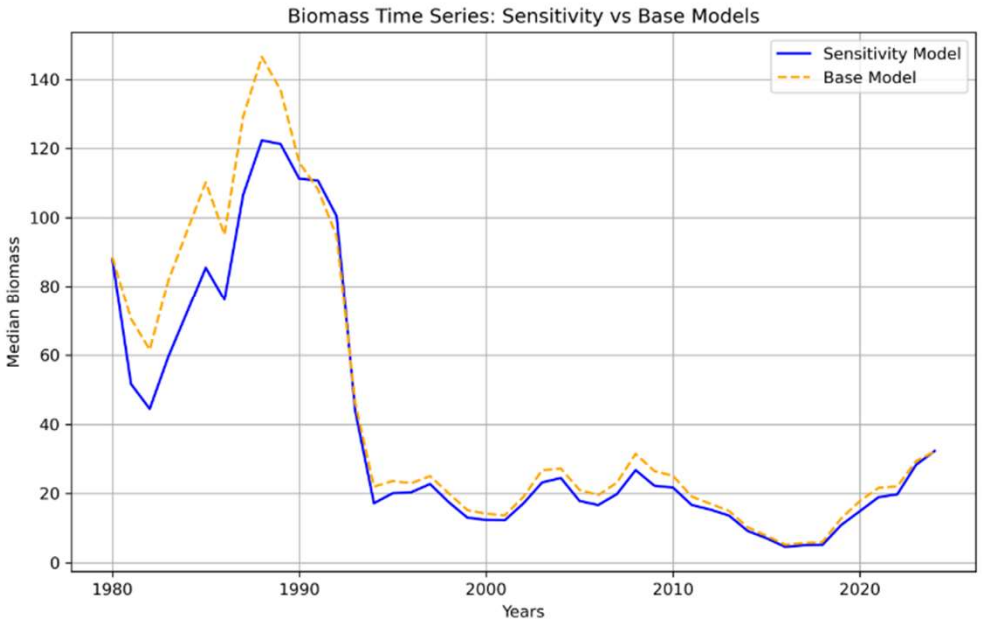
Natural Mortality

0 | 0.25 | 0.5

Run Model

Welcome

Comparison to base model biomass



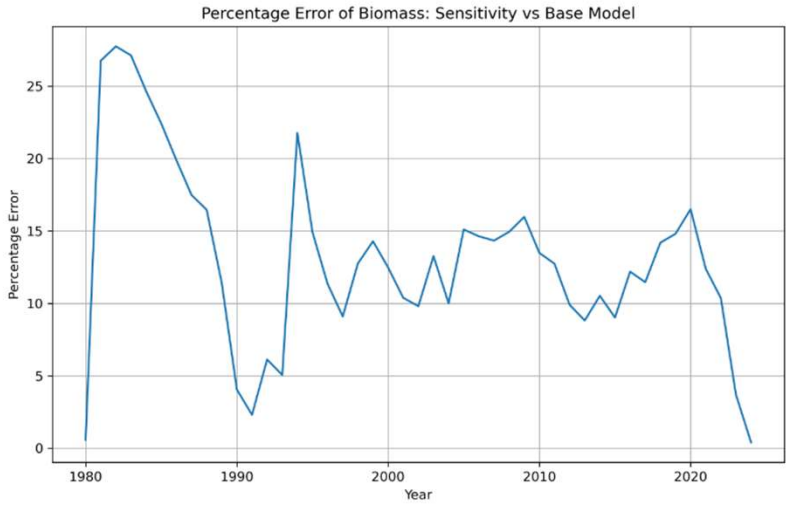
Technologies Used: Shiny App

Natural Mortality

0 0.25 0.5

Run Model

Error analysis



Mean Percent Error	Min Percent Error	Max Percent Error
13.06%	0.4%	27.75%

UI components

Tab j

Mortality slider

Other UI elements

Action Button

py modules

modify_mortality()

modify_other_params()

Writes sensitivity-j dir

run_basa()

read_biomass()

read_biomass()

sensitivity_comparison()

Download button

Writes analysis outputs to csv

plot_sensitivity_comparison()

plot_sensitivity()

Value boxes

Plots

Downloads folder

Major Challenges

- Learning how to use git pull, stash, and merge for successful simultaneous group coding
- Connecting the component modules to each other
- Calling on functions from the component modules within our test modules
- Using the component modules in the Shiny app
- Finding a way to run the Shiny app on computers other than the main user's laptop

Next Steps

- Building a virtual environment, rather than just providing information on dependencies and necessary steps to run the app in the README
- Expanding on the test modules to add more complexity, especially more edge tests
- Work on the app so that users can have different tabs open for different sensitivity runs of the model
- Add different parameters for other sensitivity considerations

Where to Access

- GitHub Repository:
  - https://github.com/cl-roberts/pws-herring-basa/tree/sensitivity/sensitivity