

MAR536: Biological Statistics II

R Laboratory Exercise 8

March 29, 2023

Open a new R markdown file. Save it. (name it lastname_lab8.Rmd or something similar)

At the top of the script, add comments with your name and lab 8. Work in pairs or individually. Submit your Rmd and any other files via myCourses before lab next week.

Exercise 1

Use `patchwork` or `grid+gridExtra` to create a 4-panel plot grid with the following characteristics: - space for 4 ggplots - 2 columns & 3 rows - the first column should be twice as wide as the second column - the first plot should appear in the entire first column - plots 2-4 should fill the second column

Exercise 2

Use `ggplot` to create a map of Cape Cod with the following features:

- Longitudes should range from -71°W to -69°W
- Latitudes should range from 41.25°N to 43°N
- Label axes
- Color land
- Add points indicating the locations of Woods Hole, Chatham, and Provincetown
- BONUS Change the map projection

For coastline use:

```
library("rnaturalearthhires") # for scale = large
world <- ne_countries(scale = "large", returnclass = "sf")
```

Exercise 3

Create a multi-panel plot with the following 4 elements: - a map of the 2015 spring NMFS bottom trawl survey catch rates for silver hake off in the Gulf of Maine - a histogram of silver hake catch rate across tows - a histogram of the distances of tows from New Bedford (41.636 N, 70.934 W) - a scatterplot of the silver hake catch rate as a function of depth

stretch goal: include the population density of states or counties on the land map. stretch goal: color code the catch rates by EPU.

Steps:

1. Read in the survey data. (`hake.csv`)
2. Identify the data for silver hake in the spring, in 2015.
3. Create ggplot objects containing each of the 4 plots
4. For the map:
 - map Gulf of Maine
 - add bathymetry (raster in `data/gom_bathy.rds`)
 - plot points corresponding to positive silver hake tows, make the size of the plotting character proportional to the $\log(\text{Biomass})$
 - add point indicating New Bedford
 - add appropriate labels and legend
5. Rely on experience from previous labs for the other plots. For the distances, use `st_distance()`