

## **Climate-forward Statistics Breakout Session:**

All files for this breakout session can be found in the Google folder here:

<https://drive.google.com/drive/folders/1ilvzST--x7oEcXJbZbuDgUcWPqg40IJ4?usp=sharing>

During each activity please comment on the activity on this [jam board](#). There is a separate page for each activity (each different header in the google water journal).

Below is the link for the shortened version of the Google Water Journal that we will work through during the breakout session. All data files and links are embedded in the google slides and also linked below..

**Please download the file and open it up on your computer.**

[Water Journal Slides Short Version](#)

### **Blue Header Slides:**

Topic: Introduction to water footprints, differences between direct and indirect water, histograms, estimation

Data Files: None

Shiny App link: [Shiny App for Blue Slides](#)

This activity will be given during the second week of class when students enter their water usage data. The slides introduce what a water footprint is and explains the differences between indoor, outdoor, and indirect (virtual) water. The purpose of this activity is for students to learn about water footprints, calculate their water footprint, and compare it to others.

### **Purple Header Slides:**

Topic: Water footprints of food; histograms, identifying outliers, boxplots

Data Files: [Foodprint](#)    [Meal Foodprint](#)

Survey Meal Link: [Meal Information Survey](#)

Shiny App Link: [Water Footprint Calculator](#)

This activity introduces students to the water required to produce food. Students will have to create a histogram and answer a few questions about the histogram. Students will identify

outliers. Students will create a boxplot and answer questions about the boxplot. At the end, students will answer a research question using the app and the data files.

### Green Header Slides:

This activity covers the normal distribution. No data files or R Shiny apps are associated with these slides. Students are presented with the parameters of the rainfall for the island during normal years and drought years.

### Orange Header Slides:

Topics: Confidence intervals for one- or two- sample proportion

Shiny App Link: [Drought Simulations Shiny App](#)

This activity investigates whether the islanders will have enough water under “drought” and “extreme drought” conditions. The bar plot calculates the percent of years that islanders will have enough water for a year. Under normal rain years the islanders have enough water for most years so both pre-intervention and post-intervention have “enough water” close to 100% of the time. Students will pick an intervention and compute a confidence interval for the proportion of years that islanders have enough water. They assume independent observations.

### Pink Header Slides:

Topic: One-sample proportion confidence interval and hypothesis testing

Shiny App: [Shiny App Proportion](#)

Data Files: [Water Conservation Survey](#)

This activity covers confidence intervals and hypothesis testing for one-sample proportion. The premise of this activity is that islanders are told that they need to conserve water usage. Students have previously been asked if they are willing to do a certain intervention. The survey is considered a random sample of islanders. For instance, islanders are asked if they would be willing to shorten their showers to less than 5 minutes, on average. The shiny app examines what proportion of islanders are required to reach a target average water usage. For instance, the app might reveal that to conserve 10% of household water usage, 75% of islanders would need to take 5 minute showers. Students then do a hypothesis test and confidence interval to figure out if at least 75% of islanders are willing to do this.

### Cyan color slides:

Topics: Matched-pair confidence interval and hypothesis test

Students were asked to record their water usage at the beginning of the course. Students are then asked to record their water usage after they implement at least one water conservation technique. Students are then asked questions about the data, in particular, about the differences between pre- and post- scores.

**Dark Magenta Slides:**

Topics: Two-sample mean inference

Shiny App: [Two-sample mean](#)

This activity covers hypothesis testing and confidence interval for a two-sample mean. Students are asked to pick interventions to conserve water. The student water usage data assigns randomly the two interventions and computes the **average annual household water usage** for each group. The app calculates a confidence interval and p-value for the two groups.

[End of Session Survey](#)