A. Overview

In this tutorial, we will use the example research question from your handout:

During which season is the highest abundance of animals present in the limestone gorge vegetation type?

First, we filtered the data in WildCam Lab to include only photos from the limestone gorge vegetation type. To analyze the data to address the research question, we will create a bar graph showing the total number of animals captured in trail camera photos in the limestone gorge in each season. You may have to filter your data differently and make a different type of graph to answer your own question later.

B. Make a Pivot Table

For research questions in which you need to add up the number of animals in a particular category (e.g., number of animals in each season), creating a **pivot table** is a quick and easy way to analyze your data. *If you think your data needs to be analyzed in a different way, consult your instructor for guidance.*

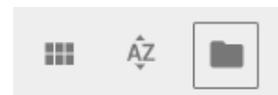1. Open Google Sheets and click the "Open File Picker" button on the top right (Figure 1).

Figure 1: Open File.

2. In the window that appears, click **Upload** and upload the .csv file into Google Sheets (Figure 2).
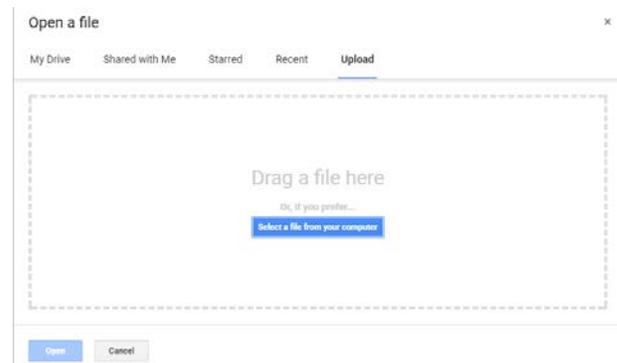

Figure 2: Uploading the .csv file into Google Sheets.

3. Click the **Data** tab and select **Pivot Table** (Figure 3). The Pivot Table will be created in a new sheet ("Pivot Table 1").
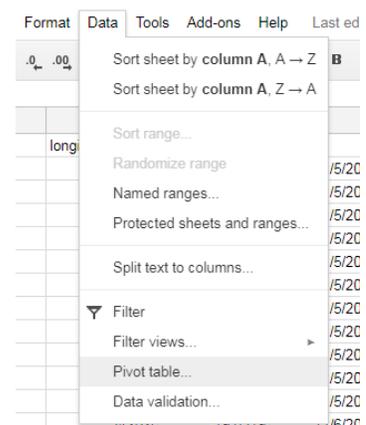

Figure 3: Inserting a pivot table.

4. A new window will open on the right-hand side called the "Report Editor" (Figure 4). The next step is to build the pivot table so that it will analyze the data to answer the research question.
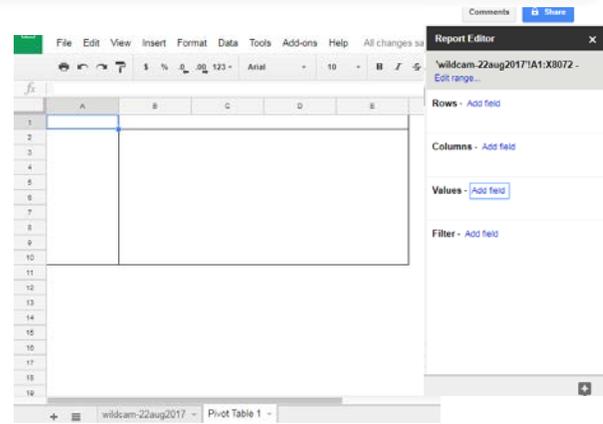

Figure 4: Initial output from creating a pivot table in Google Sheets.

C. Build the Correct Pivot Table

A pivot table can be used to group data by certain variables. In this example, the numerical variable, "species_count," will be grouped by the categorical variable, "season." To build the pivot table, you will follow the steps explained below to place the grouping variable (season) in the ROWS field and the variable(s) being grouped (species_count) in the VALUES field. You can group data by more than one variable, and you can also group more than one variable.

5. Click on the **add field** option of the **Rows** section of the Report Editor to select "season" (Figure 5).

6. Click on the **add field** option of the **Values** section of the Report Editor to select "species_count." Make sure it is summarized by **SUM** (Figure 5).
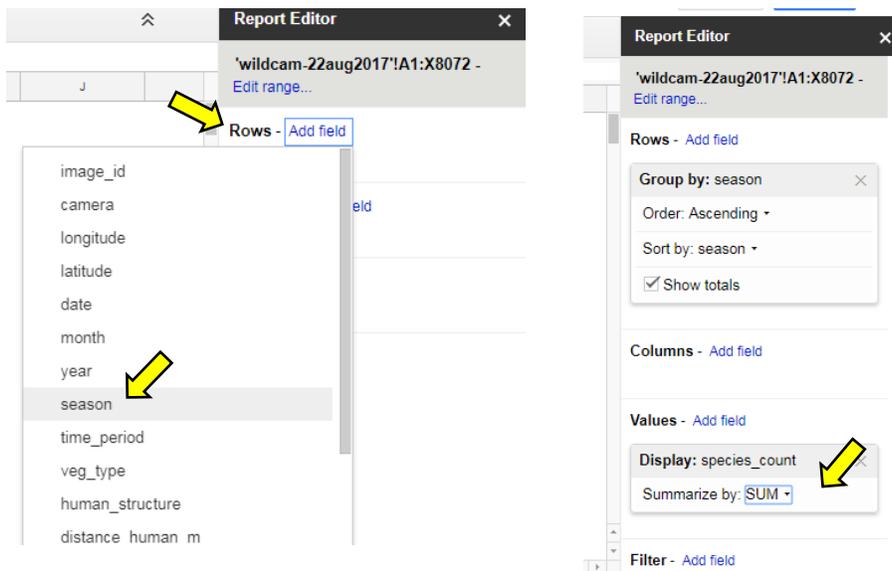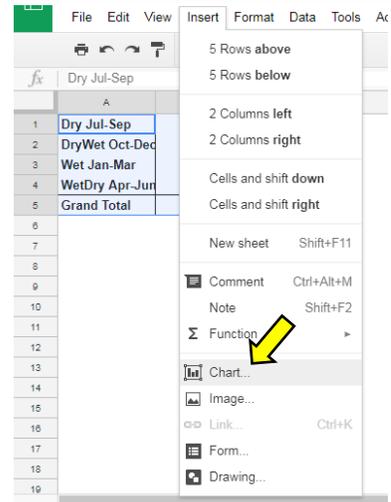

**Figure 5:** Selecting the fields to use in building the pivot table.

D. Create a Bar Graph

7. To create a bar graph, select the data to be graphed, click the **Insert** tab, and select **Chart** from the dropdown menu (Figure 7). In Google Sheets, a suggested chart will be produced.


Figure 7: Inserting a bar graph to graph the data from the pivot table.

8. Under the **Data** tab, use the dropdown menu to select the chart type that best represents your data in the **Chart editor** (Figure 8). You can add, edit, and remove series from your data set in the **Data Range** section of the **Chart editor**.
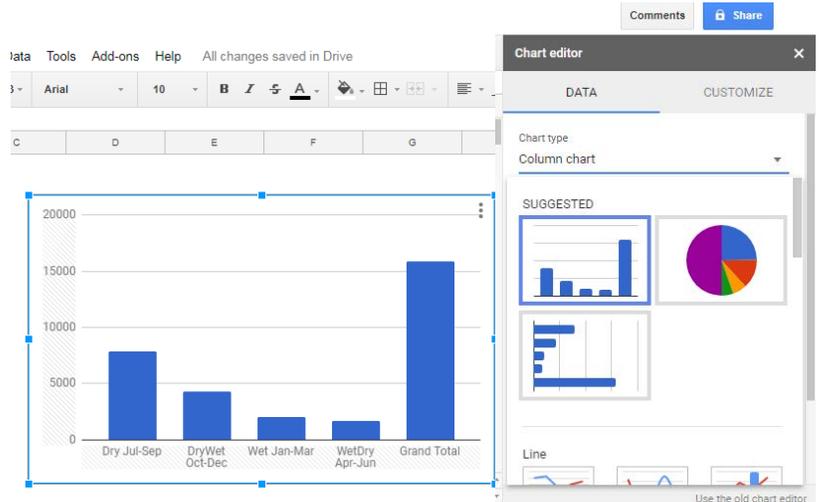
Figure 8: Selecting the chart type that best represents the data.

9. Under the **Customize** tab, customize your graph to meet your instructor's guidelines for any report that is due from this activity (Figure 9).
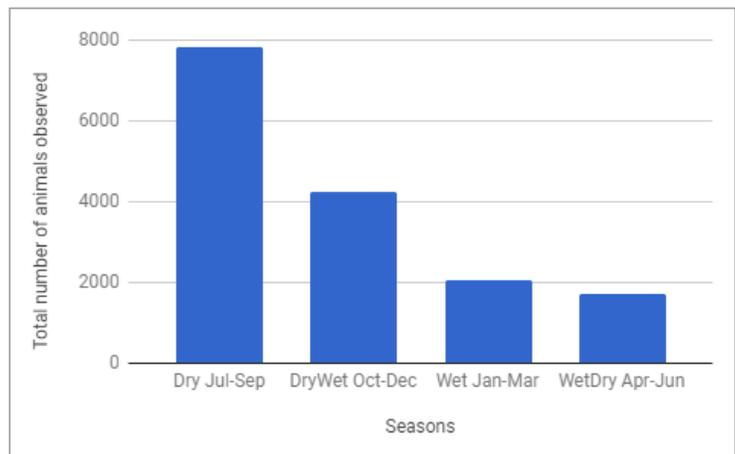
Figure 9: Bar graph of the number of animals photographed in the limestone gorge vegetation type in each season.

E. Answering Your Question

In this activity, you came up with your own testable research question. Now you will use the techniques from this tutorial to create a graph to explore your research question.

First, ask yourself which type of graph you need to create to help answer your question. Which variable(s) are independent variables (Rows), and which ones are dependent variables (Values)?

Step 1: Create a Pivot Table

Once you have downloaded the data from the WildCam lab, follow the instructions in Section B to create a pivot table as you did for the example in the tutorial.

Step 2: Build the Correct Pivot Table

Use the instructions from Section C to build the correct pivot table. You will only select the variables that you need to create your graph. Drag the appropriate grouping variable(s) (your independent variable(s)) to the ROW field. Drag your dependent variable(s) to the VALUES field, and be sure to select the correct calculation (e.g., count, sum, average, etc.). If you are unsure which variables belong in which field, test it out and see if the pivot table makes sense. You can always drag variables back if you made a mistake.

Step 3: Create a Bar Graph

Use the instructions from Section D of this tutorial to guide you. Consult with your instructor to determine whether a different type of graph is necessary to present your data.

Note: These instructions were created based on the Google Sheets version that was accessed in September 2017. Not all features and functions may work the same as Google Sheets is updated.