

Urban Prairie Restoration Case Study – Data Analysis and Interpretation

Your names:

Urban Prairie Restoration Case Study – Data Analysis and Interpretation

Today, you will analyze the data from the Commons Ford project to determine whether the restoration treatments worked to increase bird diversity, decrease invasive plant diversity, and increase native plant species diversity.

Open the following dataset: [Urban Prairie Data.xls](#)

You will work with your group to calculate summary statistics about bird and plant abundance and diversity and then draw graphs to test the predictions about how the restoration treatments affected these variables.

We'll start with the bird dataset. Open the document and click on the tab that says "Summarized Data-Birds".

These data were collected on three different dates over the winter of 2010-11, 2012-13, 2013-14, 2014-15, 2015-16, and 2016-17. We will use the first year to keep it simple (2010 = 2010-11). The column that says "ABUNDANCE" is the total number of birds that were seen during each sampling session. The column that says "RICHNESS" is the total number of different species that were seen. So, for example, if 5 scissor-tailed flycatchers were seen, the abundance would be 5 and the species richness would be 1.

You will make bar charts of the average abundance and diversity of birds seen at this site each year. First, you need to calculate the average and standard deviation of each of these variables by year. You can use commands to do this easily in Excel. The commands you will use today are:

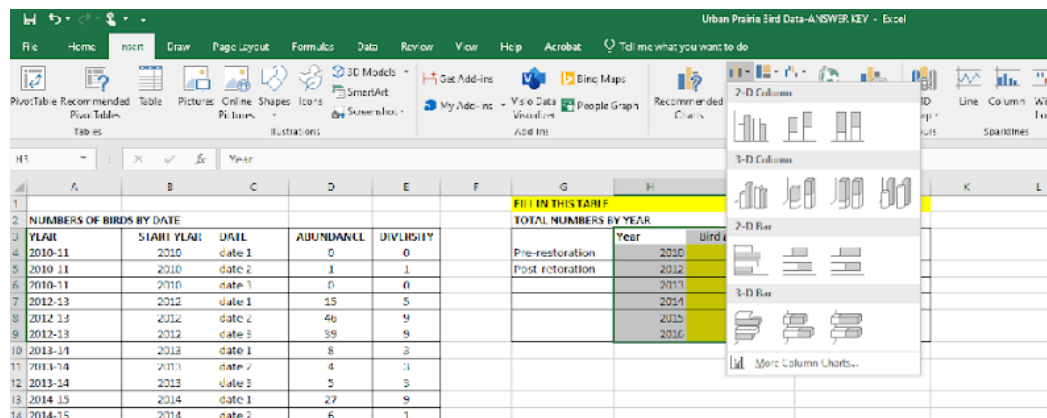
=AVERAGE(cell_i:cell_x)
=STDEV(cell_i:cell_x)

Where cell_i is the first cell in a column or group that you want to get the average of and cell_x is the last cell. For example, to calculate the average number of birds seen in 2010 on the three sampling dates (date 1, 2, 3), which are the values in cells #D4, D5, and D6, you would enter **=AVERAGE(D4:D6)**. Use this formula to get the average of all the birds seen in each year fill in the highlighted area of the table on the right. The correct answer is **0.33**. Next, you need to get the standard deviation of abundance for each year. Enter **=STDEV(D4:D6)** to get the standard deviation of bird abundance on the three dates in 2010. The correct answer is **0.58**. If you did not get the correct answer, try to figure out what you did wrong. Ask for help if you need it. Use these formulas to calculate the average and standard deviation for all years and fill in the two columns I and J with these values. Do the same thing for RICHNESS and enter the values in columns K (mean) and L (stdev) of the table.

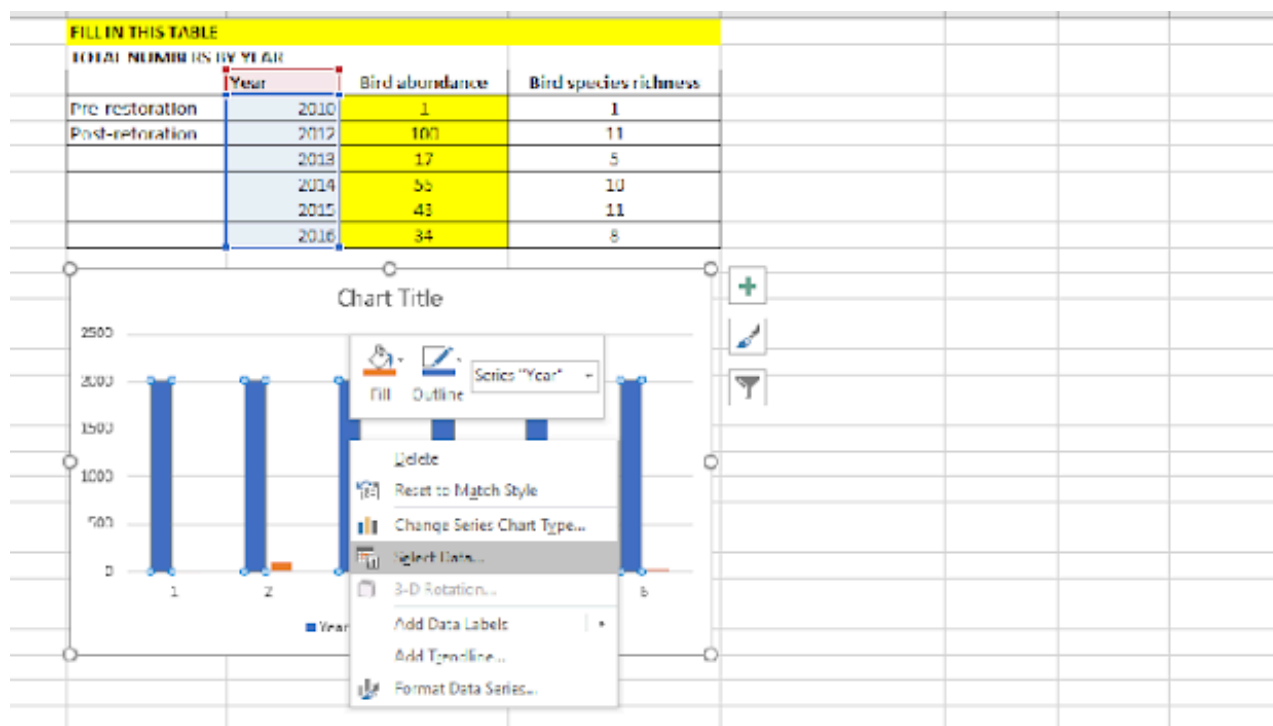
Once you have all of the values filled out in the table, it's time to make some graphs!

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For the first graph, select the entire area from cell H2 to I8. Click on the top panel tab “Insert”. Then, select the 2D column bar chart. See image below:

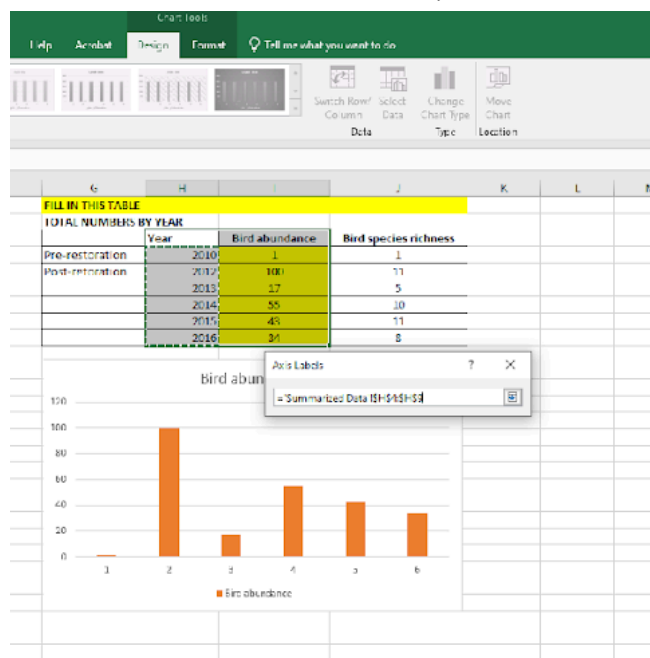


Once the graph appears, right click on it and scroll to “select data”

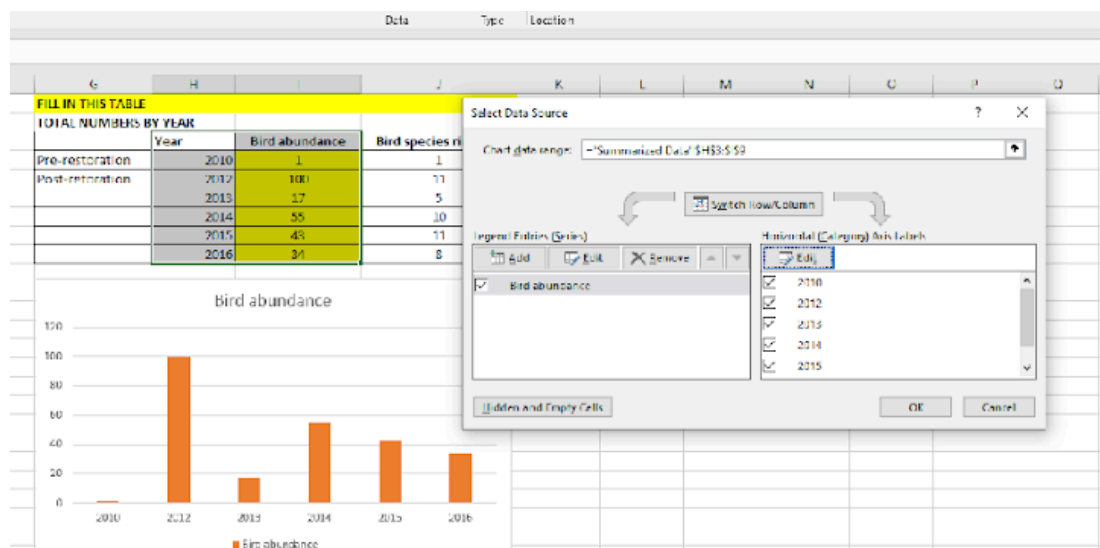


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Remove “Year” as one of the data sets and click on “edit” for the “Bird abundance” dataset. For the x-axis for the Bird Abundance, select the numbers in the year column.



What you want is Bird abundance on the y-axis and year on the x-axis, like this:



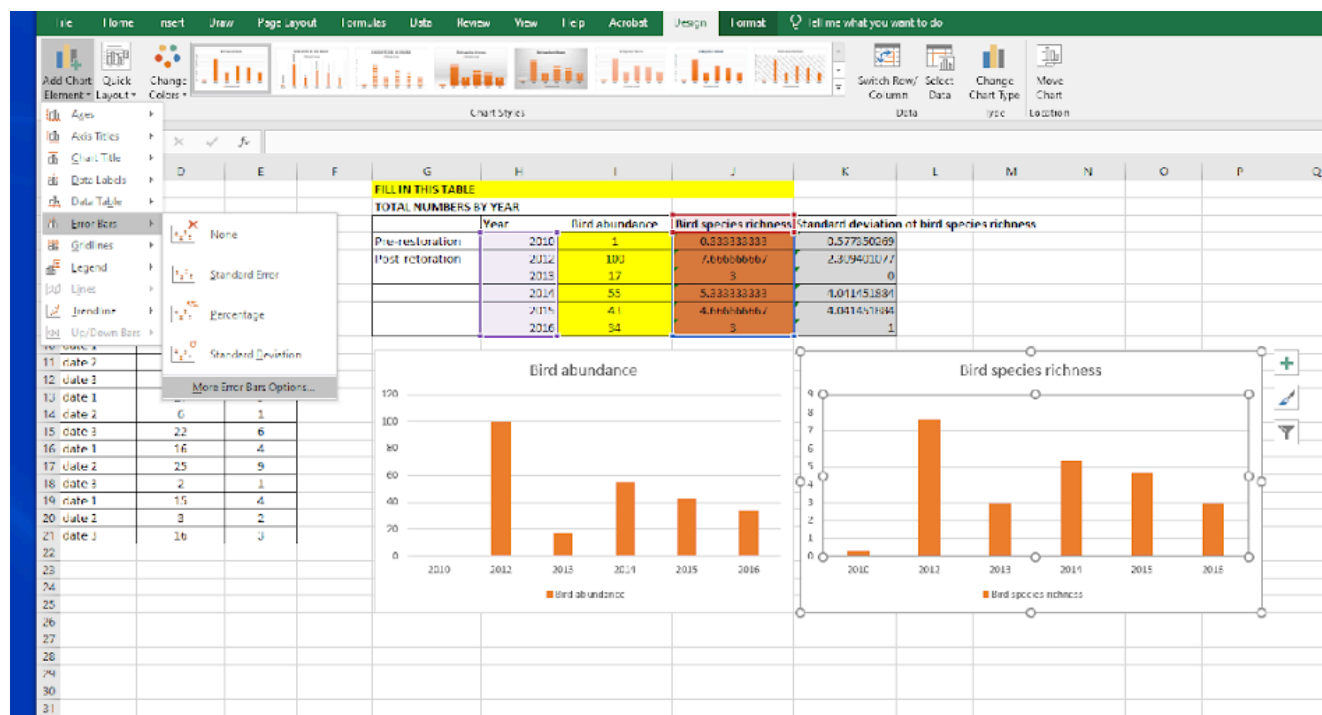
Next, you just need to make your graph look nice by adding x-axis and y-axis titles and tick marks. Your graph is now ready for interpretation! Before you start looking at it, draw your second graph – average bird diversity.

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Now, you are ready to make your second graph.

You can copy and paste your first graph into the same spreadsheet. Then, click on the data and you can just drag and drop the highlighted part of the table from “bird abundance” to “bird species richness”. You can also use the “select data” feature that we used before, but copying and pasting is much faster!

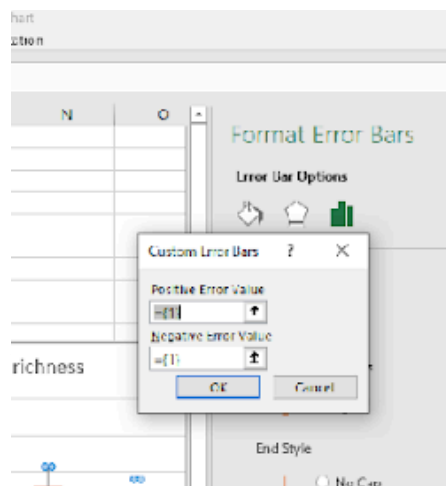
Finally, you need to add error bars to this graph. Click on the graph and go to the Design tab up top, select “add chart element”, then click on “error bars” and scroll down to “more options”. See the image below to make sure you are on the right track:



You will need to manually insert the standard deviation that you calculated.

A panel should have popped up on your screen for error bar options. Scroll down to the bottom and click on “Custom – Specify value”.

You should see this pop-up box:



Click on the arrow next to the “positive error value” and it will allow you to select your standard deviation values. Select K4 through K9 and then hit “Okay”.

Do the same thing for the Negative Error Values.

Julio who participated in the Prairie Project educator cohort program. Learn more prairieproject.org

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Now your error bars should extend above and below each bar according to the standard deviation.

The standard deviation for 2013 was 0 since the same number of birds was seen on all three dates, so there should be no bars on 2013. The other dates should all have error bars associated with them.

For the plant data, you can follow the exact same steps that we used for the bird diversity data to draw two graphs:

1. A bar chart of average plant diversity and standard deviation from 2010 through 2020
2. A bar chart of average invasive species dominance and standard deviation from 2010 through 2020.

Upload your graphs to canvas to get credit for this part of the assignment.

You can either copy and paste them into this word document or submit the excel documents that you were working on. Include all of your team members names who contributed.

Now that you have created your graphs, you can interpret them!

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With your team, you should review the actual data and then answer the following questions:

1. Were your expected results close to what the researchers found? If not, how were they different, and why do you think they were different?
2. After the initial restoration treatments were applied between 2011 and 2012, was there much year-to-year variation in any of the variables? What could cause inter-annual variation? In other words, what factors might be responsible for years with higher or lower bird diversity or invasive plant coverage?