# Radiant Guide

Launching Radiant and opening a data file

You will use a program called Radiant to visualize the data. This program will be run remotely so you don't need to install anything on your own computer.

1. First, go to https://qubeshub.org/groups/dryadlabclass. You'll need to first create a user account by clicking the "Login" button and linking your Google account (see picture below).
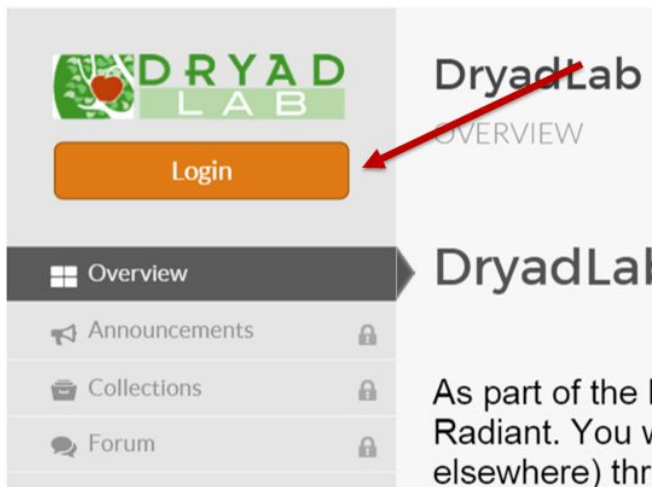
When you have successfully created an account you will be placed in your "Dashboard" (see picture below). Come back to the class website at https://qubeshub.org/groups/dryadlabclass.
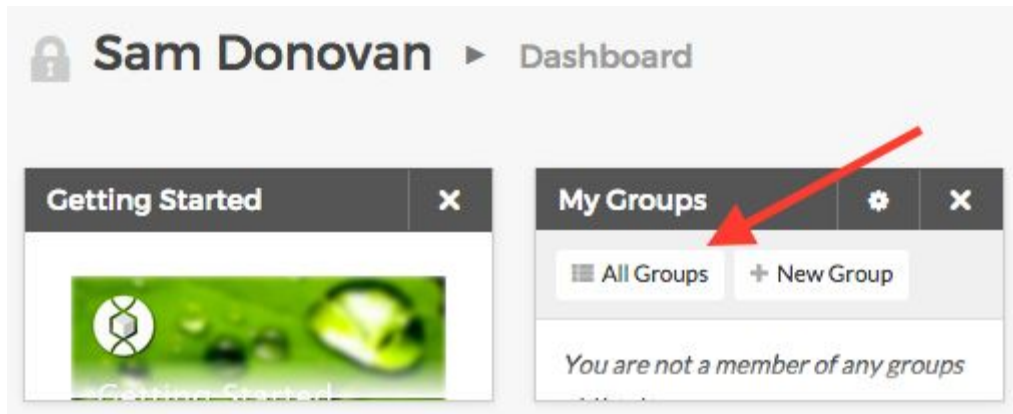
Then click the "Join Group" button (see picture below) and you are ready to get to work.
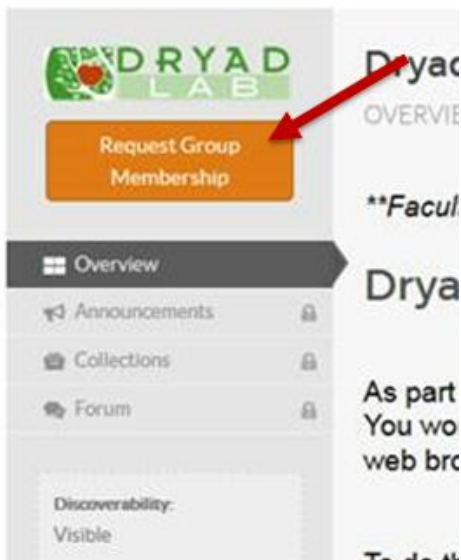
2. Radiant is a tool that runs in a much more powerful statistics program called R. We will launch both R and Radiant together with the following link:
https://qubeshub.org/tools/bioradiant/invoke?params=file:/data/groups/dryadlabnetwork/extinction.csv

3. This should open a browser window called "Iceweasel" inside your terminal window (see picture above). Radiant is now running for you on a computer in Indiana. Congratulations, you are now using a supercomputer!
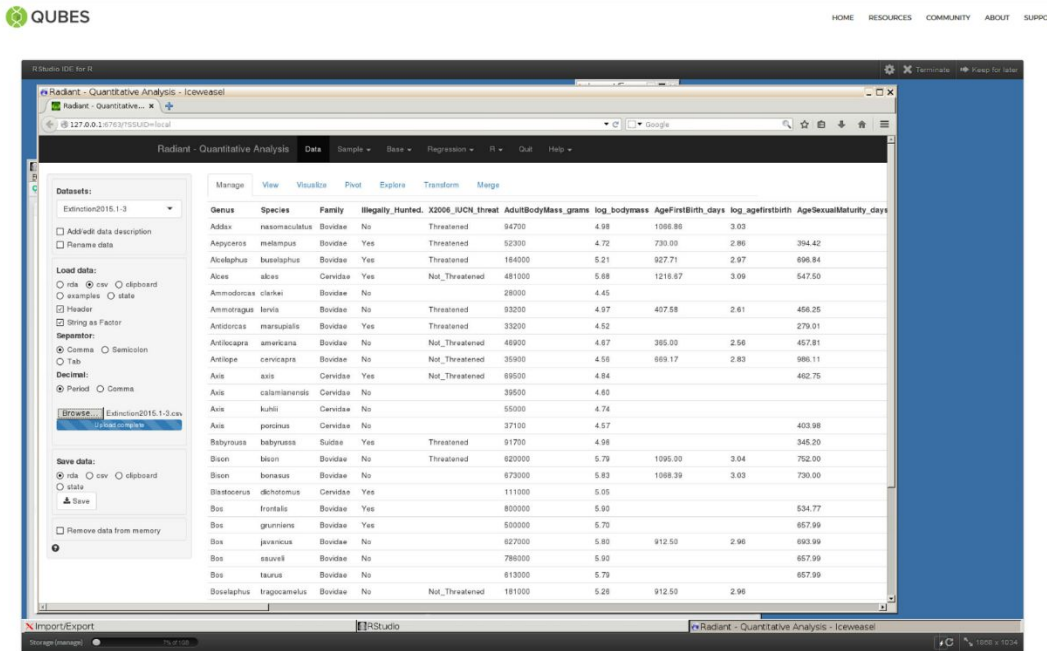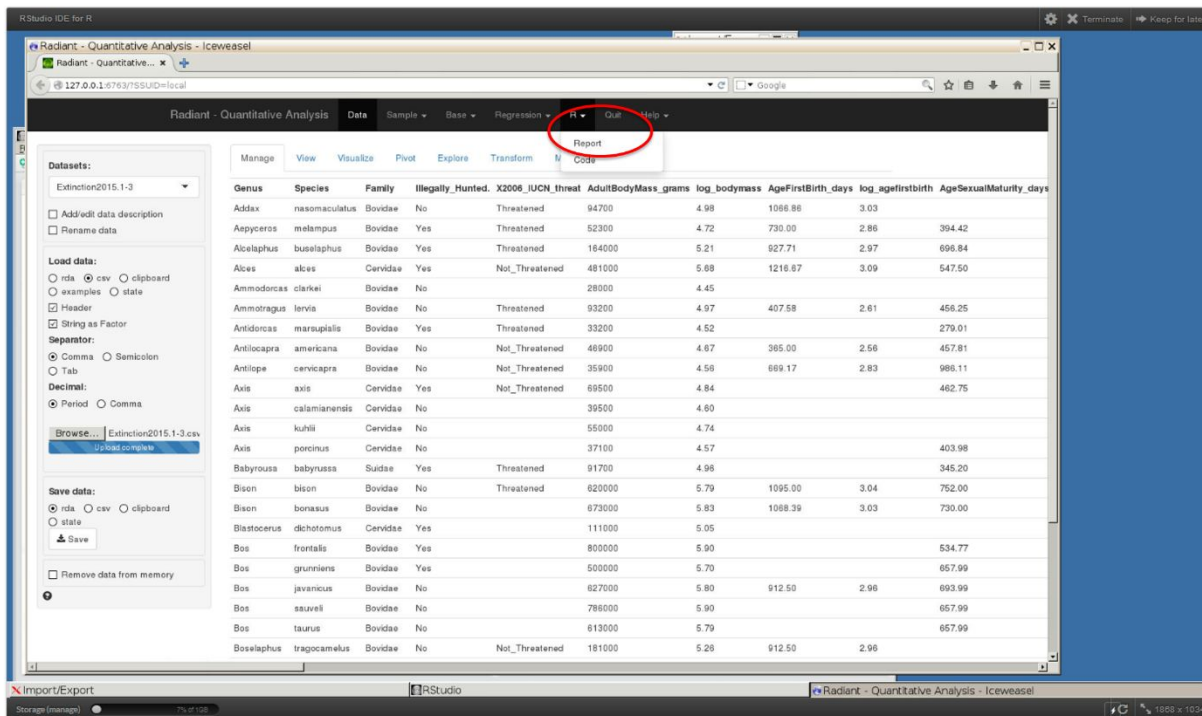
Saving your work in Radiant

Radiant will produce a report with all of your workflow, so that you can have a record of the different ways you looked at the data to ask different questions.

Before doing anything else, set up that document with the following steps:

1. Choose the "Report" option from the pull-down menu labeled "R" (see picture below).
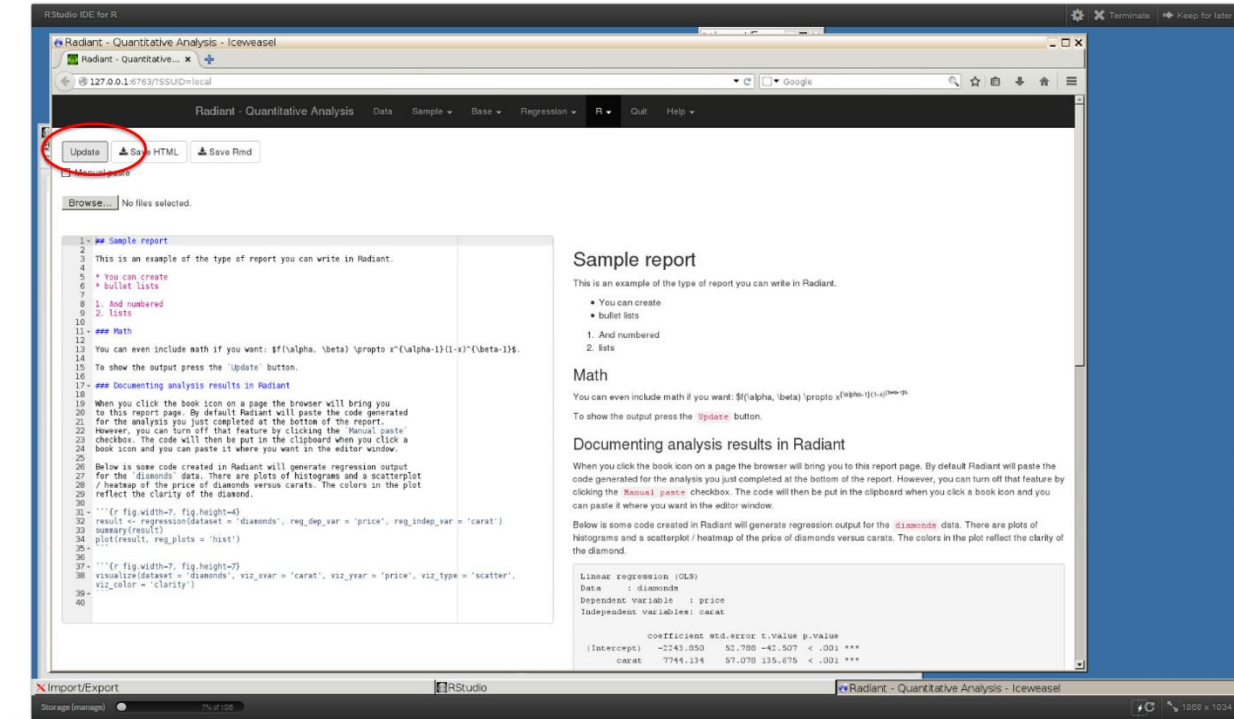

2. This will take you to the workflow screen, with the unformatted text on the left. Radiant includes some sample text to get started. Click the "Update" button just above the text box to the left, to produce a formatted version of the sample text, including some plots. The formatted version should appear on the right (see picture below).

3. Now you can delete the sample text and write your own. Include your names at the top of the document. You can even add headers by typing ## before the line. To start a new line of text, leave an extra empty line in your code. To update your new document, click the "Update" button again as you did before.
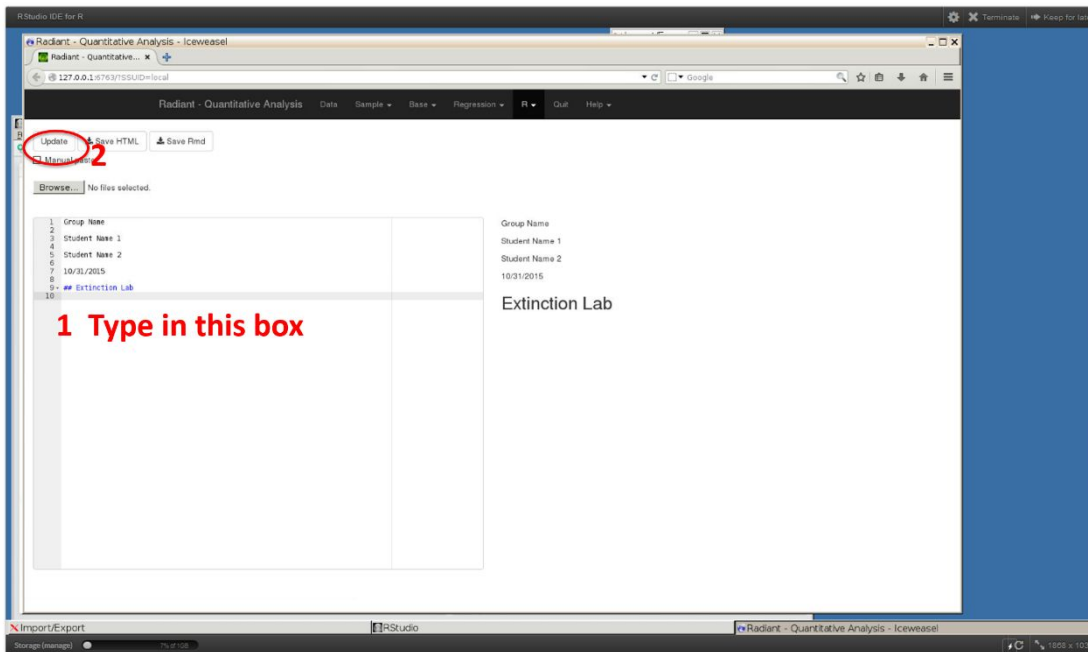
4. To add plots or data summary statistics to your report, go to the Visualize tab. Select "Data" from the upper menus, then the "Visualize" tab.
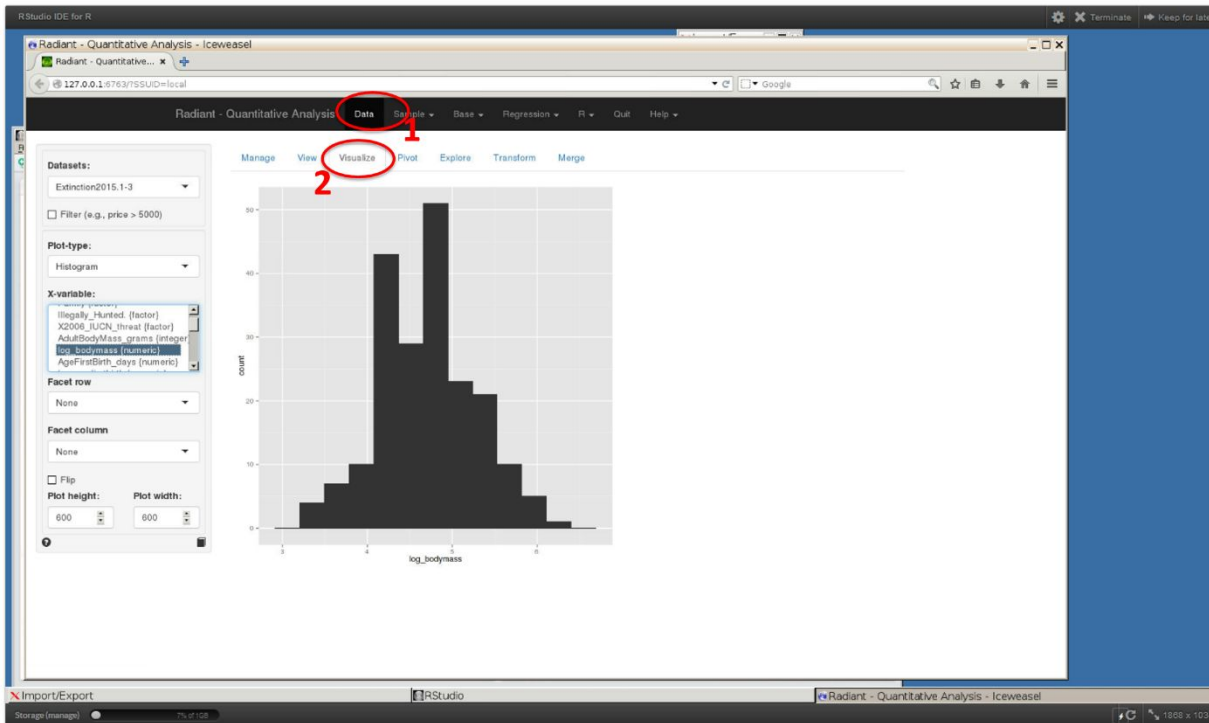
Down in the lower left corner is a book icon. Clicking that icon will add the current plot or summary statistic to your report. Try it with a histogram: Choose "log-bodymass" from the drop-down x-variable menu, and a histogram should appear. To save it, click the book icon.
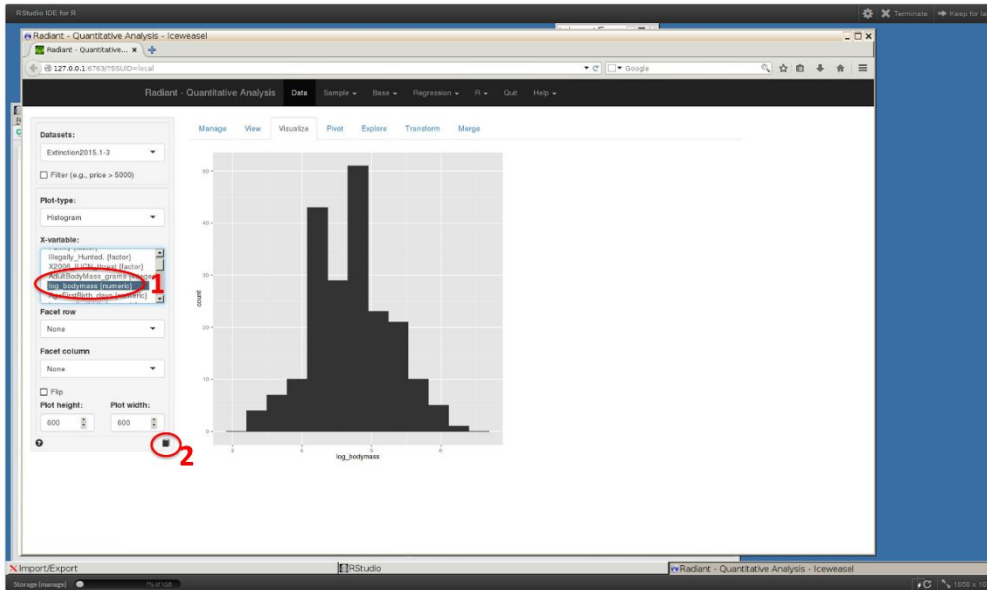
5. When you click the book icon, it should take you back to the "Report" tab. Click the "Update" button again, and your plot of log-bodymass should appear on the right in your report.
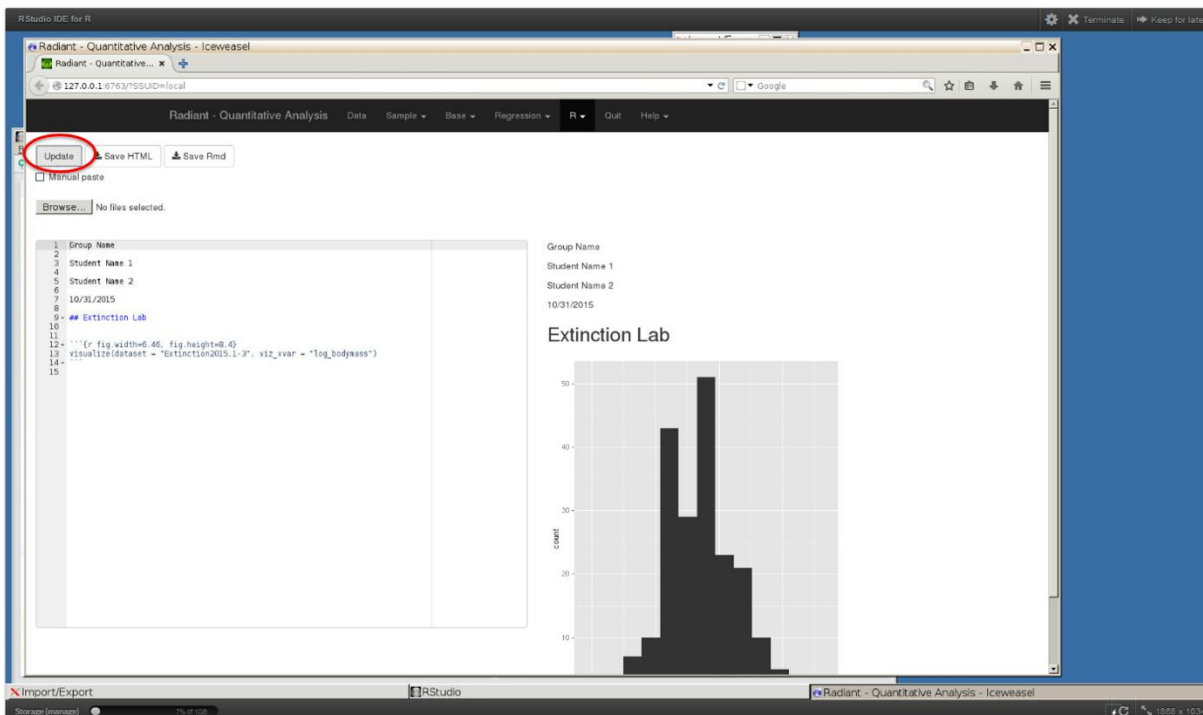
6. You can also add text in the box on the left explaining why you chose to make the different plots. If you make a mistake or decide that your choice of plot was not helpful, don't delete it! It is often just as helpful to have a record of what *didn't* work—just like in a lab notebook, this report should be a complete record of everything you tried. Instead of deleting a plot, you can add a sentence before the 'incorrect' plot explaining what the mistake was or why it turned out not to be helpful.

7. The following tutorials will help you go through the process of visualizing your data in Radiant. Just remember to click the book icon every time you summarize or plot your data. Add as much text as you need to explain why you chose to plot the data in that way, and what information you gained from it. Feel free to also add any notes to yourself that might help you later—for example, about different plot types, or the way to add colored lines, etc.

8. At the end of the exercise, you will need to save your html report. Don't forget this step! Otherwise all your work will be lost. Go to the R->Report page again and click the "Save HTML" button to download the report, and choose "Save as" in the box that pops up (scroll down to see that option). Then follow the prompts to save the file to your computer.
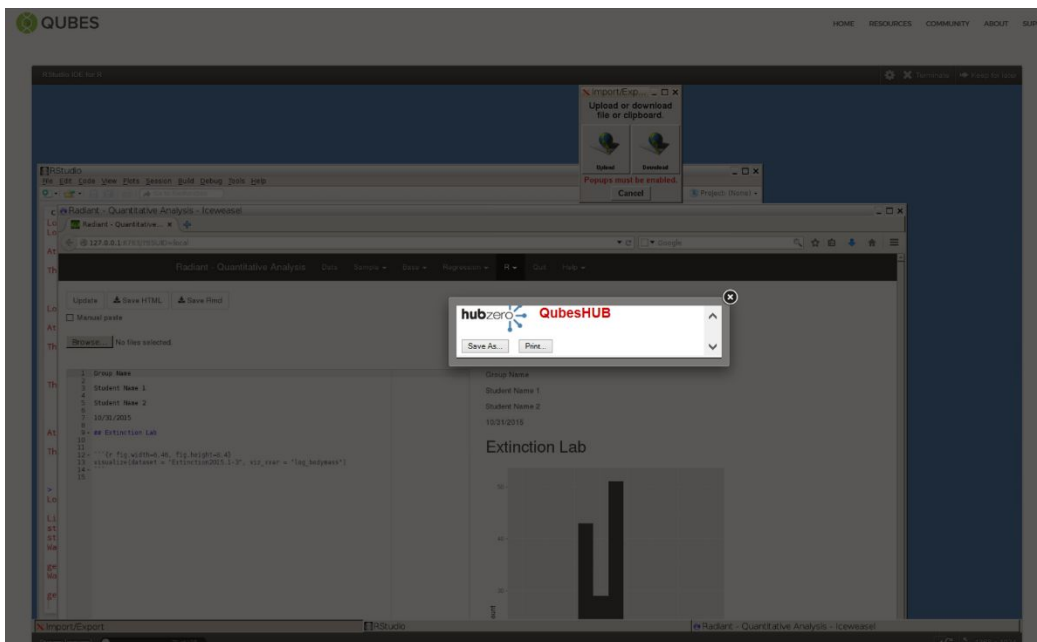

10. You now have a report file to print or submit online as part of your assignment.

How should I look at my data? What type of plot do I need?

If you want to look at the patterns in one variable at a time, you might try:

...a histogram (Data-> Visualize tab-> Histogram in Plot-type menu-> choose a numeric X-variable)

Histograms show you the whole distribution of your data. Your data are divided up into different bins along the x axis. The frequency (number of counts in each bin) is on the y axis. Why would this plot be more helpful for summarizing your data than simply looking at the mean and standard deviation? This is a good way to look at continuous variables (listed as "numeric" in your pull down menu)
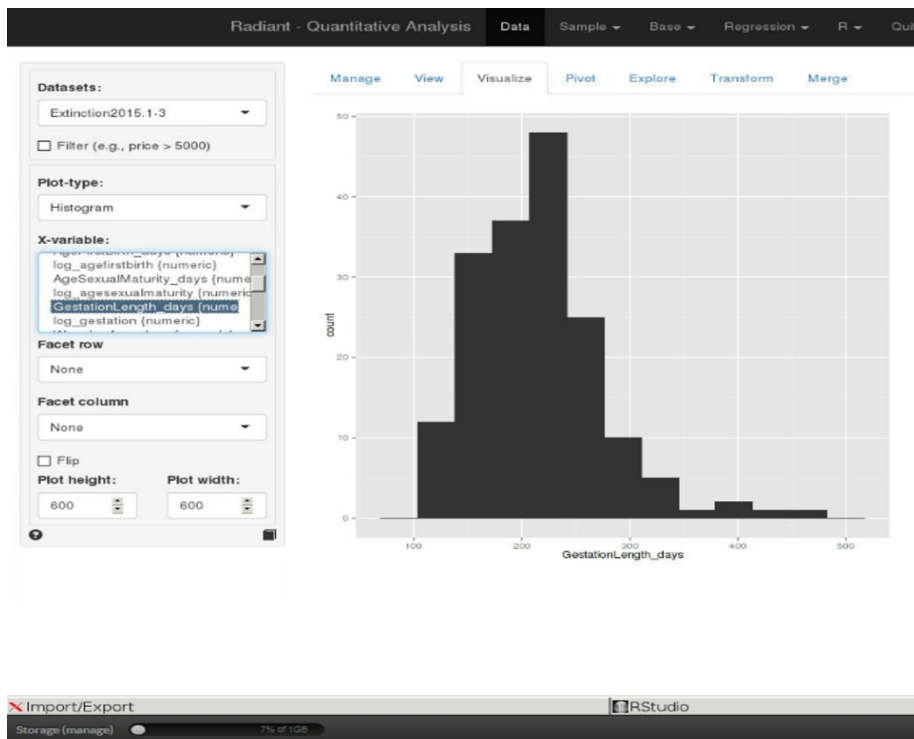
If you want to look at how two variables relate to each other, you might try:

**...a scatterplot** (Data-> Visualize tab-> Scatter in Plot-type menu->choose a numeric Y-variable-> choose a numeric X-variable)

You've probably seen this type of plot before. It is a common way to look for a relationship between two continuous variables, often before fitting a linear regression model. Why is it important to always look at the data before fitting a regression line?
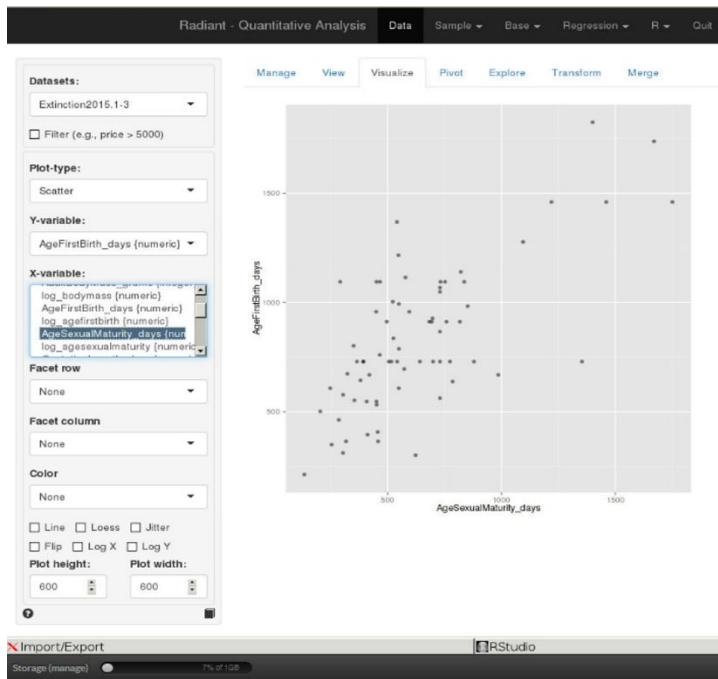
...a barplot (Data-> Visualize tab-> Bar in Plot-type menu->choose a numeric Y-variable-> choose a factor X-variable to group by)

When your data are in discrete categories or types (like conservation status), a barplot can be helpful. The data are divided up into those categories along the x, and their mean value within that category is plotted on the y (your continuous variable), so that you can see differences in y among the different groups. Note that even though they look superficially similar, barplots and histograms are very different. How?
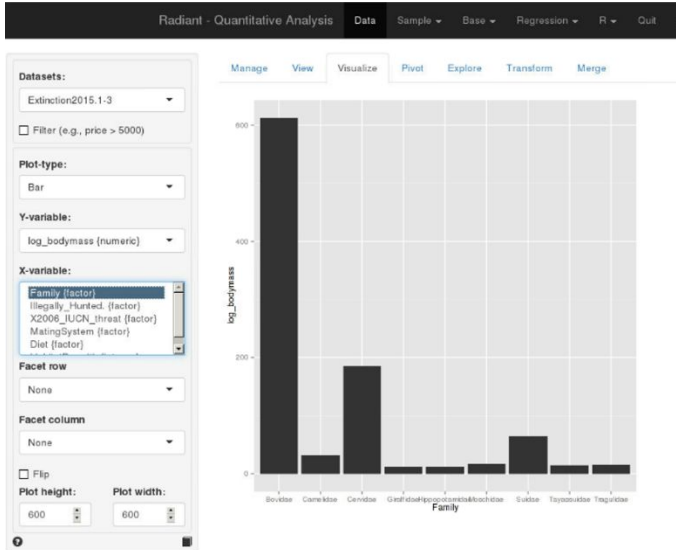
....a boxplot (Data-> Visualize tab-> Box-plot in Plot-type menu->choose a numeric Y-variable-> choose a factor X-variable to group by)

Boxplots are similar to barplots, but instead of just giving you the mean, they show you the whole distribution of data in each groups.   For a given box, the middle line is the median; 50% of your data are above that line, 50% are below. Likewise, the upper and lower edges of the boxes give the 25% and 75% quantiles, and the "whisker" lines give the 5% and 95% quantiles. So 95% of your data are below the upper whisker, but only 5% are below the lower whisker. This is another good way to look at how continuous variables (listed as "numeric" in the pull down menu) differ among categories or groups (your discrete x variable, listed as "factor" in the pull down menu).
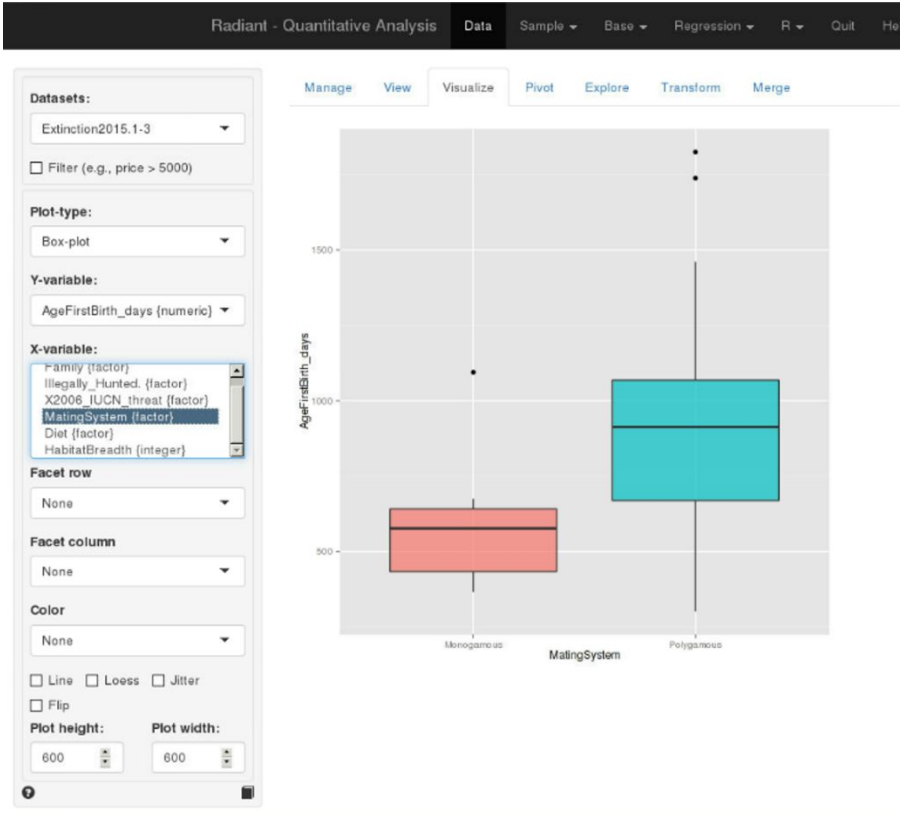
Other tips:

Radiant has many options for formatting, including plotting in different colors. Some of these options can even help you see differences between three or more variables on the same plot. Feel free to play around with these options.

These are just a few plot types that you might want to explore. Again, feel free to try out others if you think they might be more helpful for your data and experimental question.

Remember to save your work to the report by clicking the book icon every time you make a new plot!