

Lab 4h - Hurricanes – Forecasts and Paths (Part 2)

This second half of the lab will look at all the historic hurricanes to determine if there really is a hurricane alley, or some areas that are hit more than others.

Due for this lab

You will write a letter to Uncle Don explaining what you did, make a workflow for the entire lab, and create a map (or two) showing something related to all parts of the exercise by Sunday 14 February 11:59 pm as a *single* PDF file to Blackboard.

Part H.

Close current ArcMap and open a new ArcMap, save relative pathways, and give the *.mxd a reasonable name.

-Add your projected countries, counties, and hurricane tracks (downloaded in part G).

-Kind of intense! Let's start to make sense of all these data...

1. Double check all your projections. Make sure they are all the same. Do this now because it will cause big problems later if they aren't the same.
2. You should see a bunch of hurricane lines now. Use the 'identify' tool (little blue button with an 'i' in it) to click on what looks like a single track. What happened? It seems like individual tracks are divided into segments.

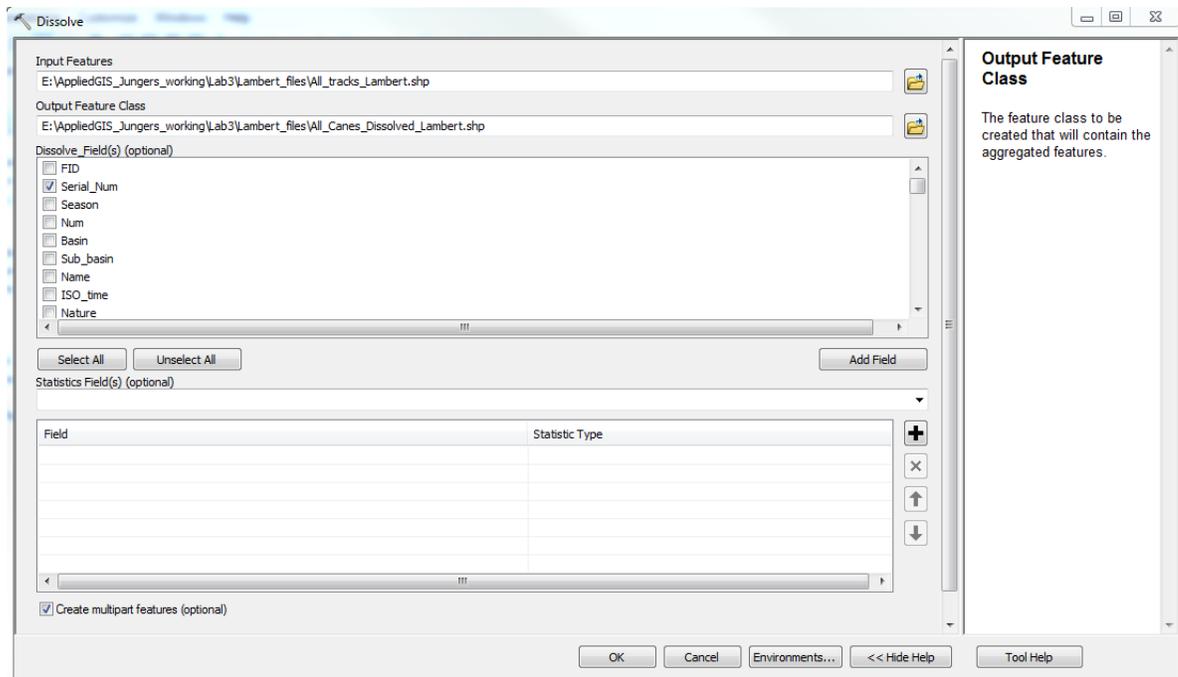
Take a look within the tracks' Attribute Table. Can you figure out what's going on?

It looks like every 6-hour interval of each storm has its own segment. Each storm has a unique serial number, though. Let's use those serial numbers to combine storms' segments into one track for each storm.

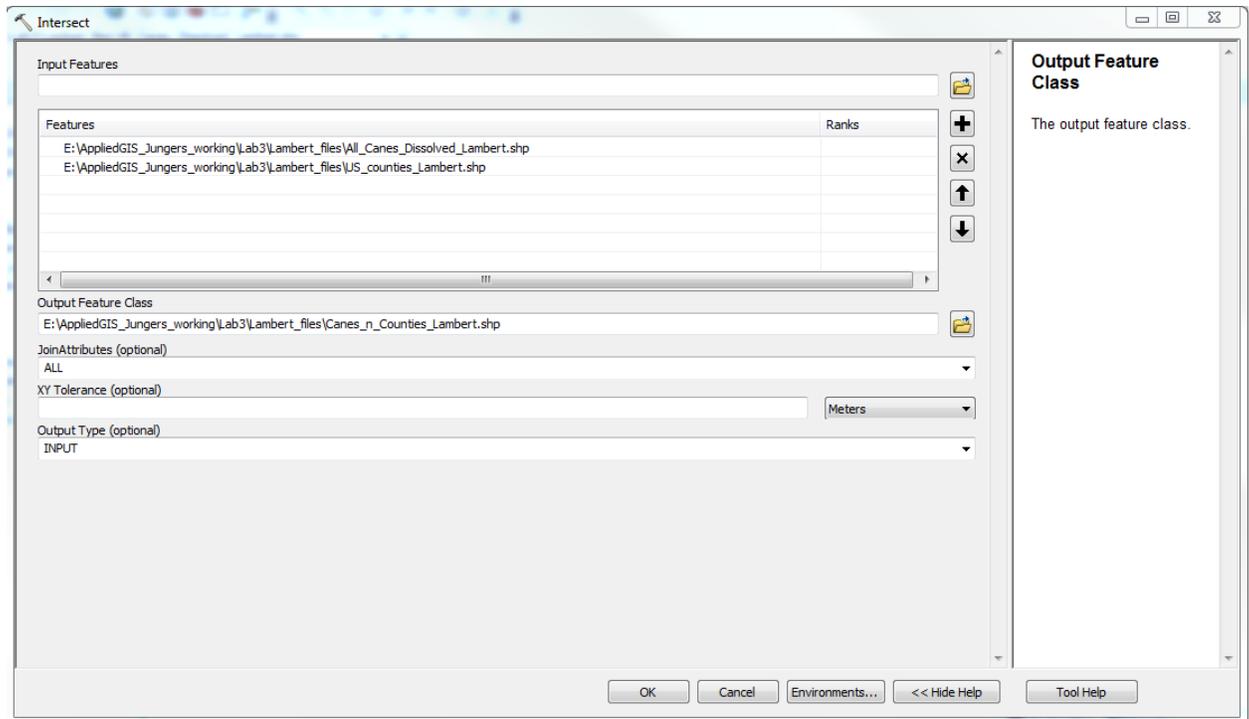
It turns out that Arc has a not-very-intuitively named tool, Dissolve, that does this.

Search for Dissolve.

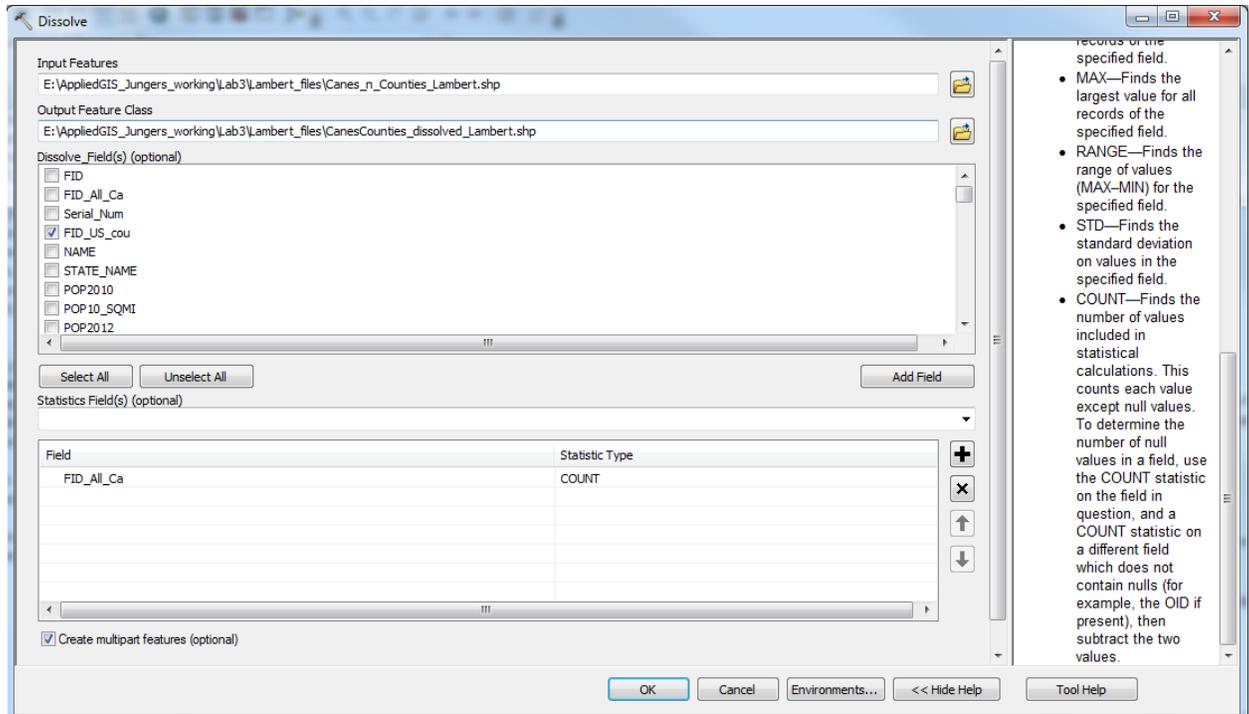
3. What does the description say the tool does? Open the tool and add your hurricanes as input. Name your output feature class. We'll dissolve by Serial_Num. This gives us unique tracks for each storm and doesn't merge two storms into the same one. Check '**Serial_Num**' in the box below (see screenshot below).



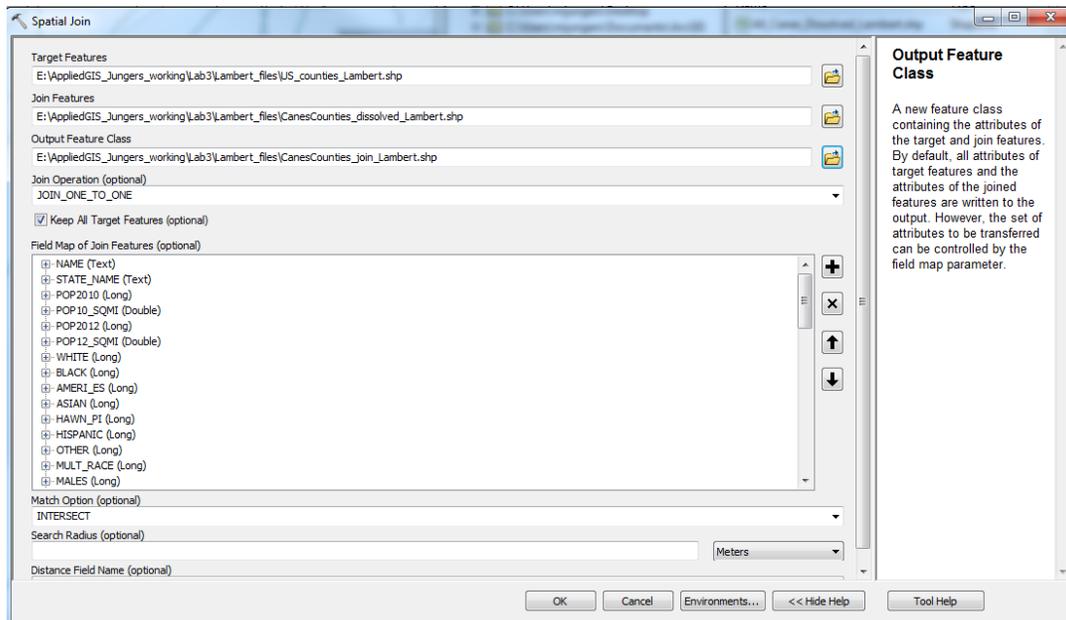
4. When it's done running and you have the new layer added to your map, open the attribute table to make sure that everything looks like they were dissolved properly. You can also use the identify tool to see if you get connected lines that look like they are the same storm. Awesome. Very satisfying.
5. Our next step is to try to figure out how many storms are in each county. That turns out to be non-trivial in this program, so it's going to take a few steps. First we will intersect the storm lines by county to chop them up again (I know, we just put them back together...). So each storm will get a new line every time it crosses a county boundary. Then we'll dissolve the lines again by county, so we'll get a bunch of lines that are all a single line in the attribute table. When we dissolve them this time, we'll have Arc count how many lines it dissolves. Finally, we'll overlap (quantitatively) the counties and the lines so that each county knows how many lines it has in it.
6. Find the **intersect** tool with search and open it. Input your counties and dissolved hurricanes files as the input. Name your output file and keep all the default settings. Click ok.



7. What do you see when you get the output from the operation added to your map? Use **identify** to click on some of the lines and see how they have changed. Don't forget to save your map.
8. Go to Selection -> Clear selection. This is REALLY important. (if you don't have anything selected, then the option will be greyed out – that's okay)
9. Now we need to dissolve the chopped up lines by county (last time we dissolved them by serial number, remember?). Open **Dissolve** again. The input should be your intersect file.
10. This time you will dissolve by **FID_counti**. This is a unique census identifier for your counties. If for some reason (e.g., you have a different county file), you don't have a column for **FID_counti**, choose something else that is unique for each county. Don't click ok yet. Go down to **Statistics Field(s) (optional)** and choose **FID_counti**. It will give you an error message. You'll see the box below now has **FID_counti** in the **Field** column. Under **Statistic Type** use the dropdown menu to choose **COUNT**. This counts how many different hurricanes got dissolved together. Very useful. Your tool should look something like the picture below. Click **OK**.



11. What do you have now when you use **identify** to see what your lines look like? Why? What did the tool do this time?
12. Now we're on the final step. This is another database thing, only because it's in ArcMap, we get to use a spatial way to do it rather than a column matching way. Our ultimate goal is to be able to color the counties by number of hurricanes that have hit the county since the 1850s. So we need to get our column with the number of hurricanes in each county to be associated with the counties shapefile. We could do that by matching the FID columns in both files. We also can do it spatially. Here is the spatial way to do it. Next week we'll use the column matching way.
13. Search for the tool **Spatial Join**. Open it and add your dissolved, intersected, dissolved, selected, merged hurricanes (the one you just made with the count column) into the box called **Join features**. Add your counties into the **Target Features** box. Choose an output file. Leave the rest of the settings as default and click **ok**.



14. When that is done running and added, your counties should now have a column that is the number of hurricanes to hit the county over the last 160 years. So we can make a pretty map showing what counties are most hazardous. Play around with the symbology of your joined counties layer in the layer properties. You can change the map to colorize your counties by categorical data (so that is how the different hurricane strengths were colored differently in the original data) or quantitative data. We have numbers of hurricanes, so that sounds good for us. Choose the count field (COUNT_FID). Now you can play around with where to divide up the colors and how to display the map. Be creative. Mess around with stuff. You can change color bars the same way you do for raster data.
15. Once you have all that done, you may want to check your work against NOAA maps made similarly. What errors do you see in your work? Where could they come from?
16. Your assignment now is to make a hazard map visualizing these data. You may want to use your maps of class hurricanes or your maps from Monday as extra data frames. You may want to turn in a series of maps. Just think about creative ways that you can show what locations in the US have the highest hurricane hazards.

Something cool to look at: <http://csc.noaa.gov/hurricanes/#>