Lab 5 Part 1 Validation of LANDFIRE Outputs

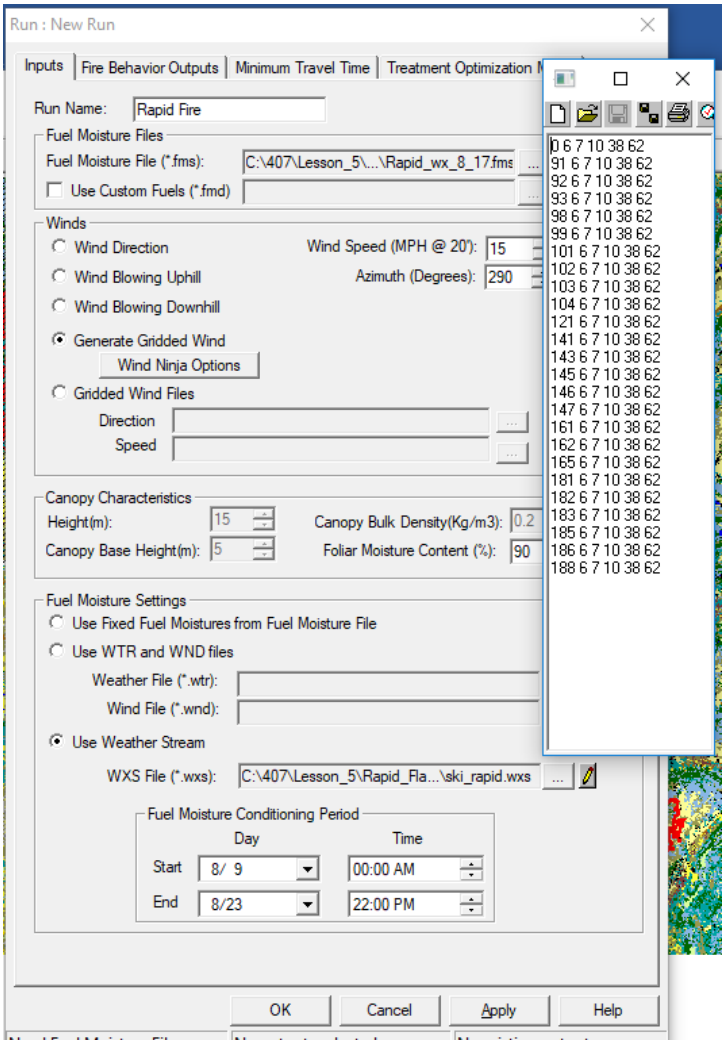
Objectives

- Compare modeled fire behavior to measured and expected fire behavior, effects, and progression to better interpret future results.

Process – Weather and fuel moisture data for the time of the Rapid fire was interpreted using Fire Family Plus. Each output used in this lab is the product of several runs using reasonable inputs to create output that matched as close as possible to expected conditions.

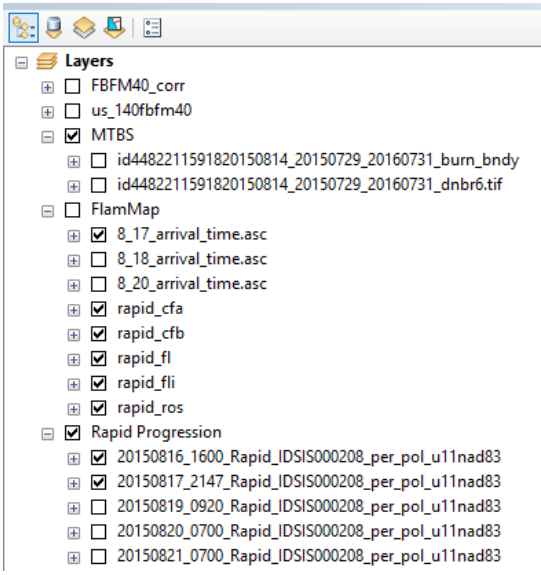
Step 9 – Compare fire behavior output

a. Download the Lab_5_1_data from Bblearn. Later in the lab, we will be producing similar outputs using FlamMap, but for the sake of time, you will just be analyzing it here. A potential final project will be to complete additional fire behavior runs in FlamMap with different fuel or weather conditions or even different fuel conditions and see if you can improve the outputs results. The figure below shows the inputs used to produce the fire behavior outputs. The fuel moisture (.fms), Weather stream (.wxs), and Weather file for Fire Family Plus (.fw13) are included in the Lab_5_1_data but are not required for this lab.

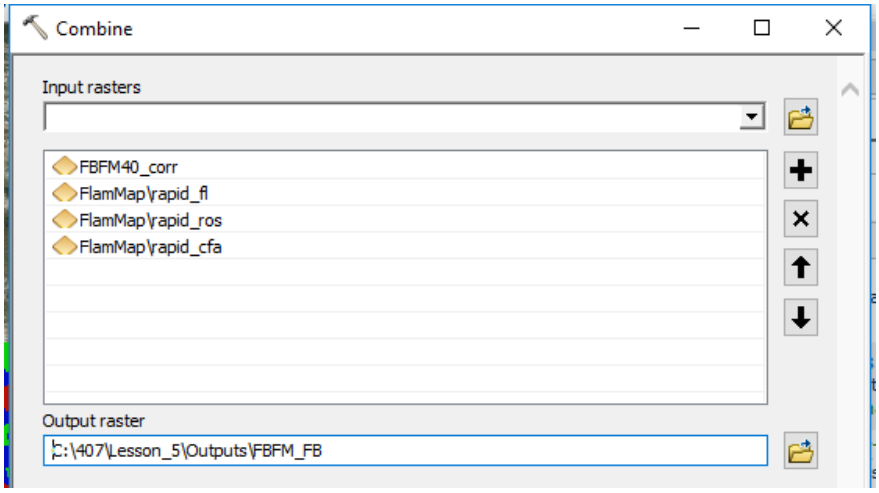


b. Open a new ArcMap project and add the following data (the exact path names might be slightly different for you)
    a. Lab_5_1_data

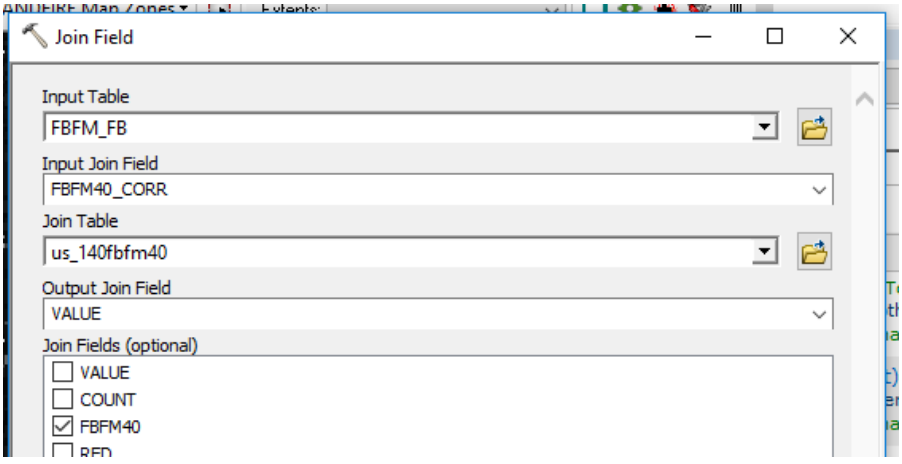
b. Lesson_3 >>Rapid>>Add the 5 days of fire progression– change the layer for "…0818.." to "…0819.." to correct the erroneous date.
c. MTBS>> add **"…_dnbr6**", **"…burn_bndy**", and **."…_rep**"
d. Lesson_3>>LANDFIRE>> add the original FBFM40 layer **us_140FBFM40**
e. Lesson_4>>LANDFIRE_corrected.gbd>>**FBFM40_corr**



c. Organize your data by making *New Group Layers* for **FlamMap, MTBS,** and **Rapid Progression** (note the image to the right does not include the '…rep' layer since it only shows in the 'List by Source' display)
d. Set up your *Geoprocessing>>Environments* to the Lesson_5>>outputs folder (create one if you need to)
e. Use the *Combine* tool to combine *FBFM40_corr*, *rapid_fl, rapid_ros, rapid_cfa*. Name it **FBFM_FB** (for fire behavior).



f. Use the *Join Field* tool to join in the names of the FBFM40 names to the combined table.



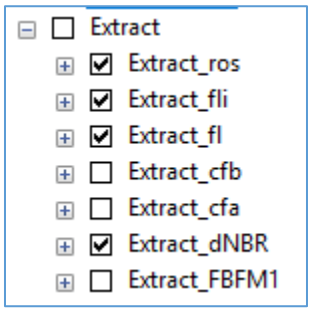
g. Open the attributes table and sort the *FBFM40_corr* column Ascending. Taking into account the number of pixels that are in each row, look through the data to see if there are any values that seem to be out of the range of normal. Consider opening the CompareModelsFour.xlxs spreadsheet from lesson 3 part 2 to compare expected fire behavior with fuel model alone.

NOTE: this is not a comparison to *measured* data, this is *modeled* data. FBFM40 was used as an input to generate the fire behavior information. This comparison will demonstrate the variability that exists even within fuel models.

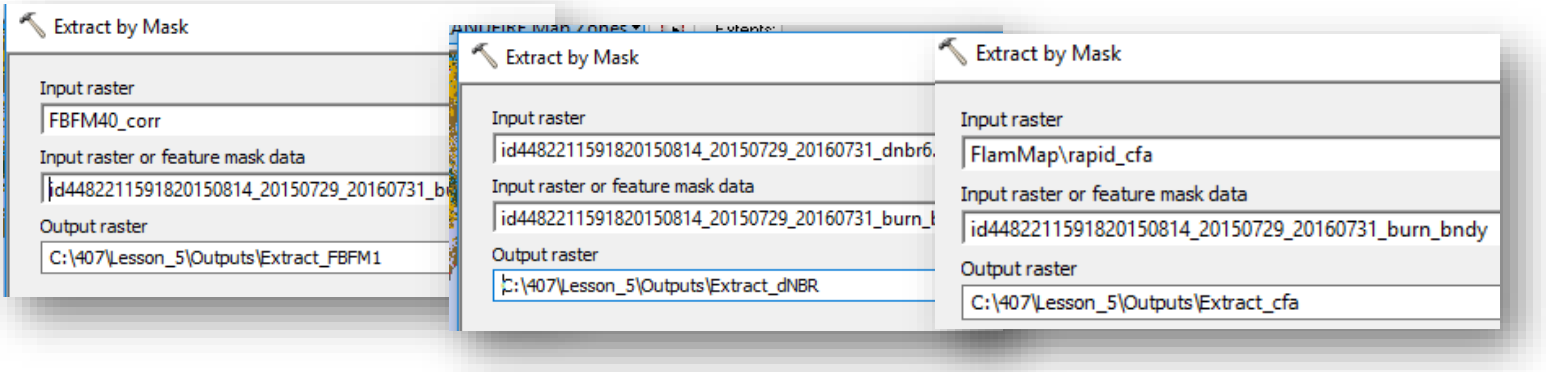
Question 1: Discuss any values you found questionable in your exploration of FBFM_FB.

Question 2: Discuss some sources of error that could account for the differences between the variables (think big picture, for example are the fuel models correct for the area? Are fuel models accurate to begin with? How would different weather inputs affect the outputs? Etc.).

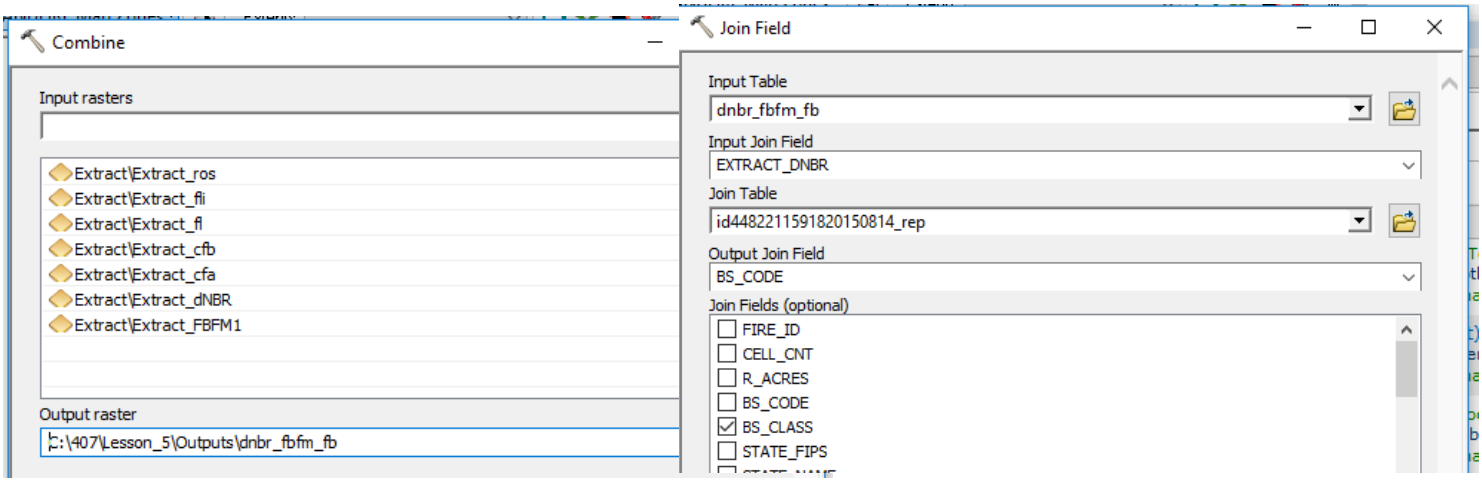
Step 10 – Compare fire effects – Similarly to the previous step, you will combine FBFM40, dNBR, and Crown Fire Activity to see how the values compare. First, however, each layer needs to be trimmed to the shape of the Rapid fire perimeter to make the combine possible.



a. Trim the data around the Rapid fire – Use the *Extract by Mask* tool to trim *FBFM40_corr*, *dNBR,* and the FlamMap outputs to the **…burn_bnry** polygon. Make a *New Group Layer* for the extracted layers



b. Use the *Combine* tool to combine *FBFM40_corr,* the *dNBR* layer, and all the FLAMMAP fire behavior. Name it **dnbr_fbfm_fb**.



c. Use the *Join field* tool to add the labels of FBFM and dnbr to the attributes tables of the combined table. For dNBR use id4482211591820150814_rep as the *Join Table* as shown above.

d. Explore the attributes table using various organizations such as comparing crown fire activity to fire severity. Does it seem like values of *predicted* high fire activity correspond with *observed* high fire activity? Pay special attention to the rows with the most pixels and to the pixels that are non-burnable that are classified as having burned.

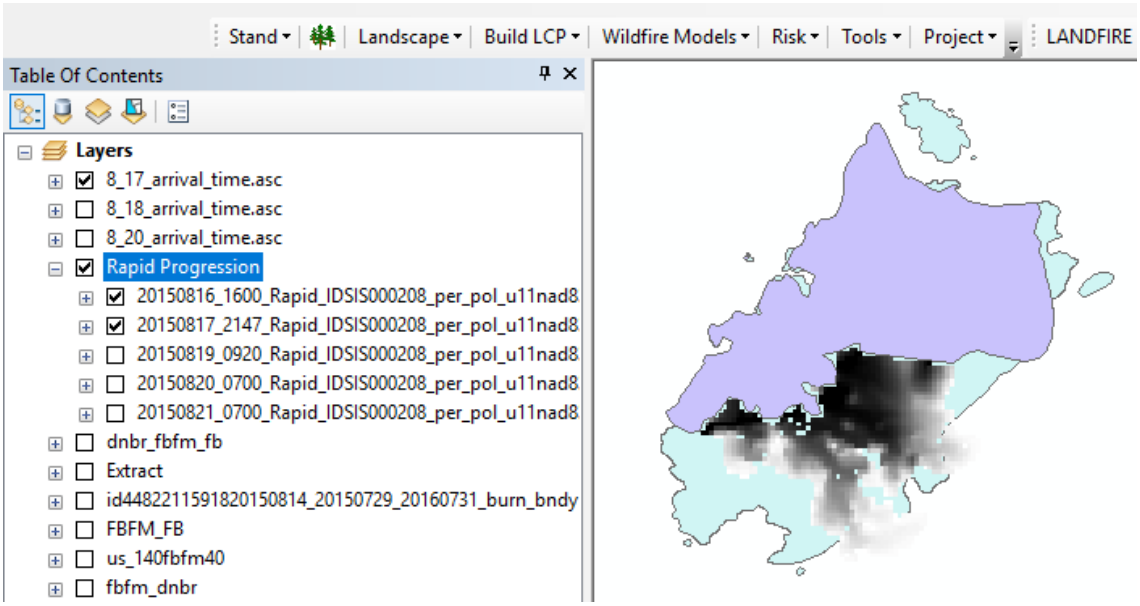
Question 3: Discuss any values you found questionable in your exploration of dnbr_fbfm_fb.

Question 4: Discuss some sources of error that could account for the differences between the variables.

Step 11 – Compare fire growth

A note on the creation of the '…arrival_time.asc' layers. It took roughly 10 FlamMap runs to generate a reasonable arrival time layer for each day. Slight adjustments were needed in the weather, spotting distance and ignition source. This is evidence that fire behavior output should not be taken at face value but instead considered one of many possibilities.

e. Compare the Rapid fire progression with the '…arrival_time.asc' layers. You are simply looking at how the outer edge matches that day's fire growth.



Question 5: Describe how the predicted fire growth compares to the actual progression.

Question 6: Discuss some sources of error that could account for the differences between the variables.

Question 7: How do the results from steps 9, 10 and 11 of the LANDFIRE validation process impact the way you will interpret fire behavior output for this area in the future?

At this point in the "real-world" you would take adjust the input layers and run your fire behavior models again so see if you can improve the correlation between modeled and observed fire behavior. For the purposes of this exercise we are going to move forward with out analysis. Keep your notes from this lab as reference for part 2 when you are interpreting output for a future event. Ex. Did you notice that there were a fair number of non-burnable pixels that had some measure of fire severity? This could mean that for future fire predictions, non-burnable pixels will show as NOT carrying fire when in reality they may.

FlamMap Inputs used to create the fire perimeter outputs.