WILDFIRES: Risk Assessment on Crop Commodities in the US

With analysis on two hot spots in Kansas and Washington

Introduction:
Climate change has been an increasingly concerning issue that more countries worldwide have felt its adverse effects, effects such as rising sea level, increasing global temperature, and more climate extremes (IPCC, 2018). The United States has also been suffering from climate change, such as the Hurricane Maria sweeping across Puerto Rico in 2017 which led to so many deaths, and enormous wildfires in California in 2019 that made countless people homeless. In this poster, I will focus on one major impact of climate change, wildfires, since the rising temperature enables wildfires to ignite more easily. As it can be seen in Figure 1, in recent years, wildfires have been covering more acres (Congressional Research Service, 2020). This increase in acres impacted can have a significant influence on agriculture in the US, because wildfires can be extremely destructive of crop commodities. And given the increasing amount of carbon dioxide released into the atmosphere, climate change may be worsening and more wildfires of larger magnitudes are expected to take place in the near future.

Given that the US has a large agriculture base, I want to examine which kind of crops is more vulnerable to wildfires. This kind of information will be useful to crop owners and local governments for them to better prepare for future wildfire incidents by taking more proactive actions to lower wildfire risks.

Methodology:
The essential data on wildfire was obtained from the Fire Information for Resource Management System. This website only provides data on the most recent wildfires, and I chose to focus on April 24th within the last 48 hours, since the data on wildfire location is broken down by continents, the initial wildfire layer encompassed North America as a whole. Since my area of focus is only the mainland United States, I first did select by attribute to select out part of the wildfire layer that is within the source layer (the outermost political boundary) of the US (Map 1).

The essential data on crops was obtained from USDA as well as the Cropland Data layer, February 2019, which is used to assess the kind of crop commodities that are likely to be impacted by wildfires. That is, I first did select by attribute to select the specific crops layer I am interested in (Map 2). I then used the select by attribute tool to assign a higher risk factor to crops that are heavily impacted. For example, in Map 6.1, it may be impossible to distinguish different crops with naked eyes by looking at the US as a whole. Therefore, I select by attribute to find the kinds of crops that are most adversely impacted. For example, in Map 6.1, it may be extremely hard to distinguish the mélange of different crops even though I have changed the legend symbology to let each crop have as distinctive color as possible. Another limitation is when I used the kernel density tool to indicate the relative intensity or magnitude of wildfires to reclassify wildfire risk, I used the variable, brightness, as a proxy to show the severity of wildfires. That’s the best proxy I can find given the limited amount of variables I could choose from in the wildfire dataset.

Results and Discussion:
Based on Map 5, it can be clearly seen that the areas of high wildfires risks are mostly concentrated in the Central United States, such as the State of Kansas, or are concentrated along the southern border of US, along with some other sporadic concentrations such as in the State of Washington. For the hot spot in Kansas, the kind of crop commodities that’s most adversely impacted is grassland or pasture, which is followed by soybeans in the second place and corn in the third place. For the hot spot in Washington, the crop commodity that’s most impacted is fallow or idle cropland, which is followed by barley and spring wheat. Even though my analysis only focused on these two hot spots, I believe the kinds of crops impacted by wildfires in Kansas can be quite representative of the broader central part of the US whose agriculture is mainly composed of these cash crops. Furthermore, given that the map has shown that high wildfire risks are concentrated in the central, I conclude the kinds of crops that are most impacted by wildfires are pasture, soybeans and corn.

One major limitation of my analysis is the inaccuracies which stem from simply relying on visual comparison to find the kinds of crops that are heavily impacted. For example, in Map 6.1, it may be extremely hard to distinguish the mélange of different crops even though I have changed the legend symbology to let each crop have as distinctive color as possible. Another limitation is when I utilized the kernel density tool to indicate the relative intensity or magnitude of wildfires to reclassify wildfire risk, I used the variable, brightness, as a proxy to show the severity of wildfires. That’s the best proxy I can find given the limited amount of variables I could choose from in the wildfire dataset.