Supervised Classification of Wildfire Burn Scar

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5/4/21
GEOG 342 - Remote Sensing Final Project

This project aims to use supervised classification of Landsat 8 imagery showing the extent of the October 2017 Tubbs fire, in Sonoma County, CA.

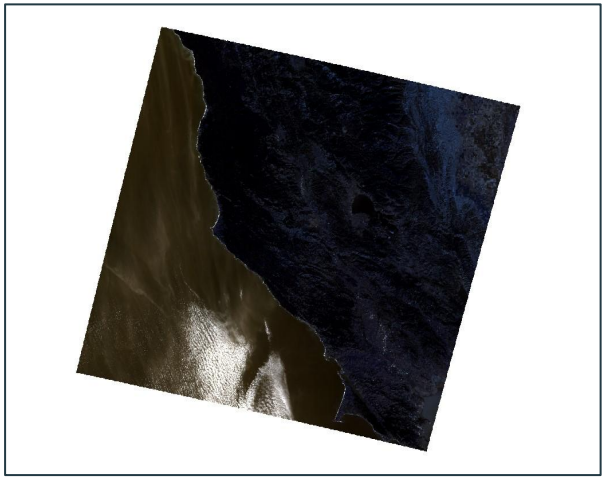
According to California Department of Forestry and Fire Protection, the Tubbs fire burned almost 37,000 acres and destroyed around 5,600 buildings.

The goal of the project is to analyze the extent of the area actually burned, compared to the extent of the fire perimeter.

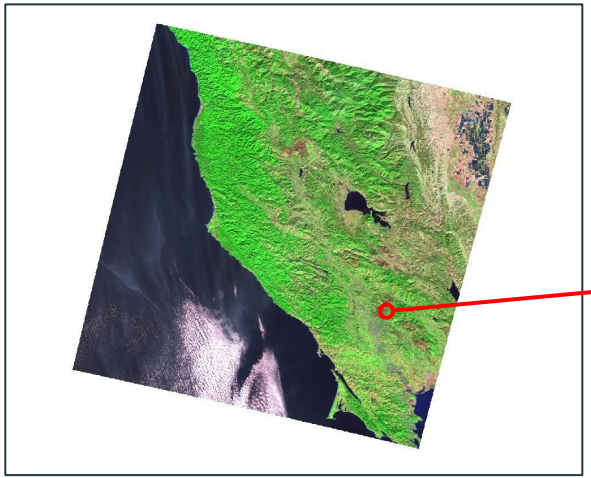
The area of the fire perimeter is where the often cited 37,000 acre number comes from, but I expect the actual amount of burn area to be less than that.

Supervised Classification Data

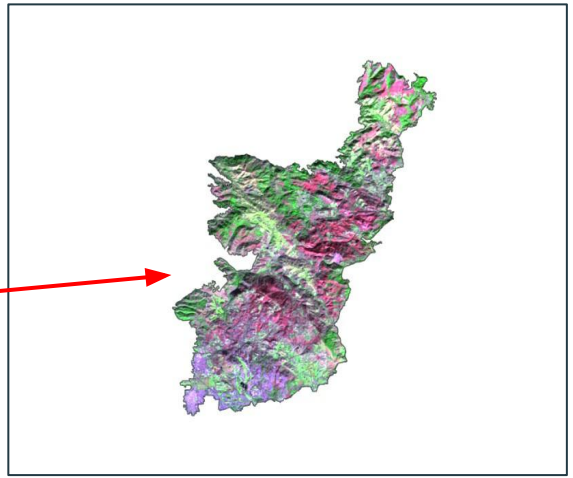
Input File → Enhanced → Clipped



Landsat 8 image from world explorer



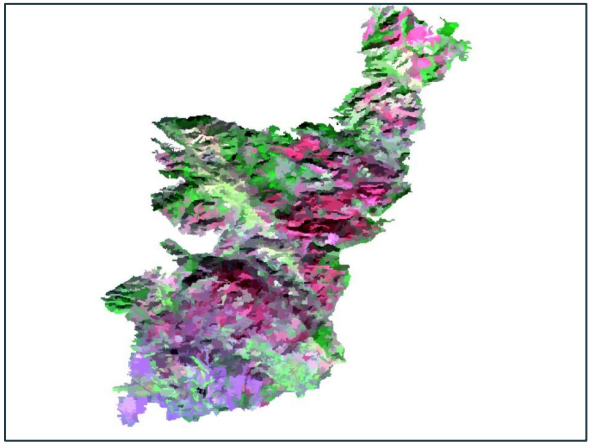
Changed brightness, gamma and contrast and applied new bandwidth combination to show burnscar (7,5,4 shortwave infrared)



Clipped using Tubbs fire perimeter from California Department of Forestry and Fire Protection

Supervised Classification Process

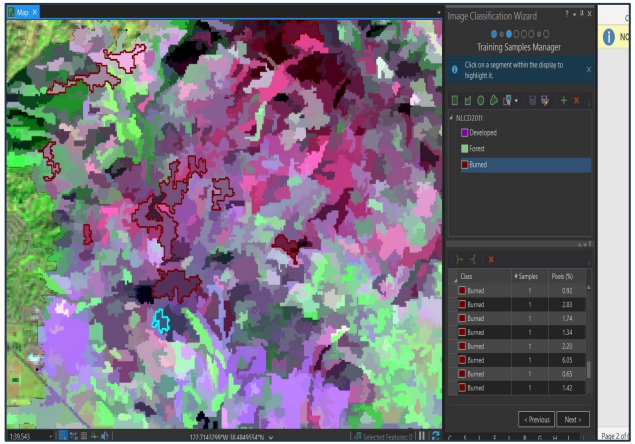
Image Segmentation



Classification Scheme

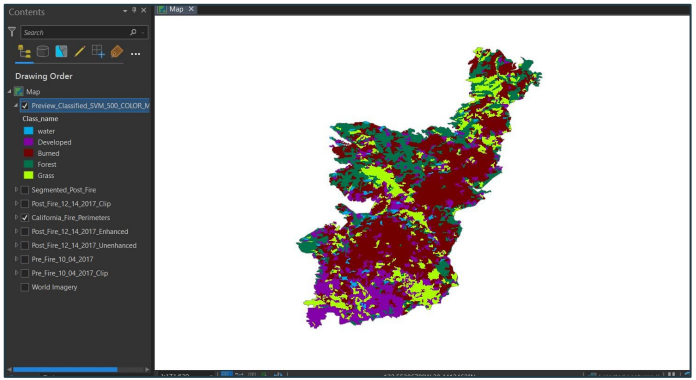
1. Developed (40)
2. Vegetation (60)
   a. Grass (30)
   b. Forest (30)
3. Burned (60)
4. Water (3)

Training Samples



Preview Results

First Preview Result



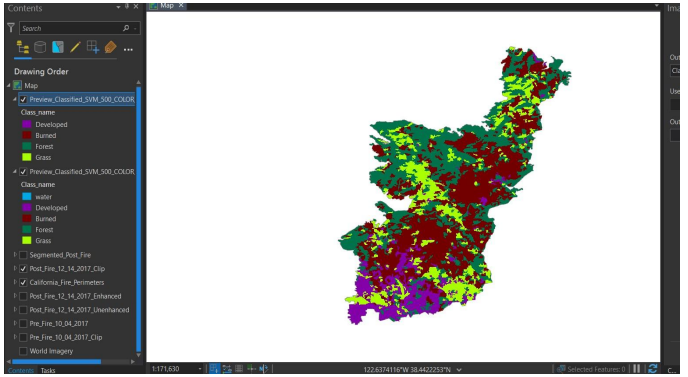
Issues with Urban and Water

Final Sample Totals

1. Developed (60)
2. Vegetation (130)
   a. Grass (50)
   b. Forest (80)
3. Burned (105)

Removed water as a class, clarified developed vs burn

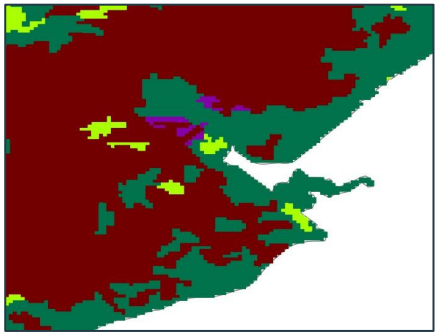
Final Preview Result

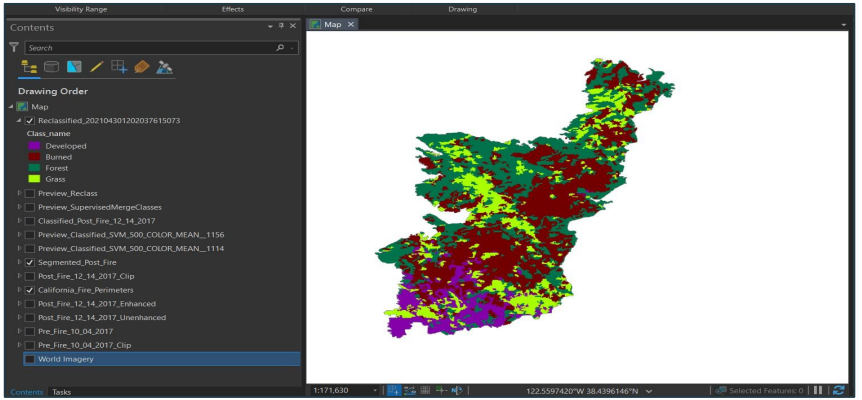


Better with burn and developed

Classifying, and Reclassifying

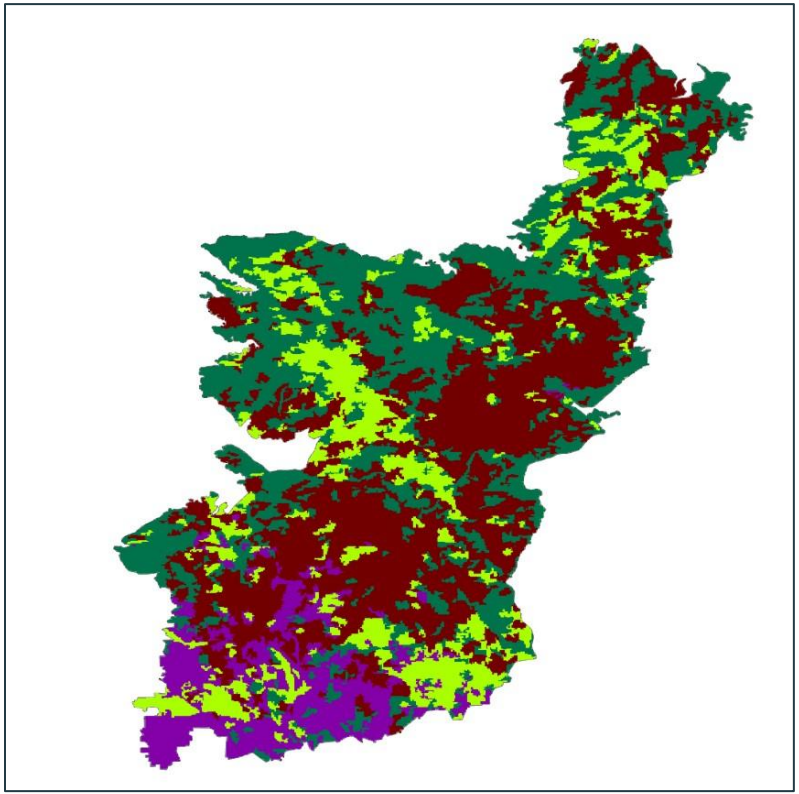
Started reclassifying pixels I knew were incorrect, mostly development that should be burned



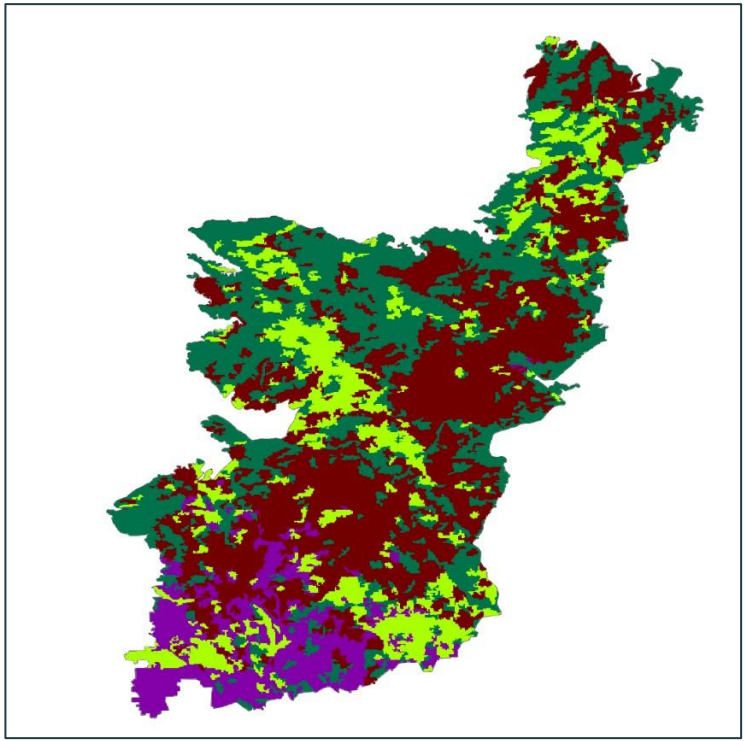


Some issues with reclassifying all the pixels, but the Final result was much better

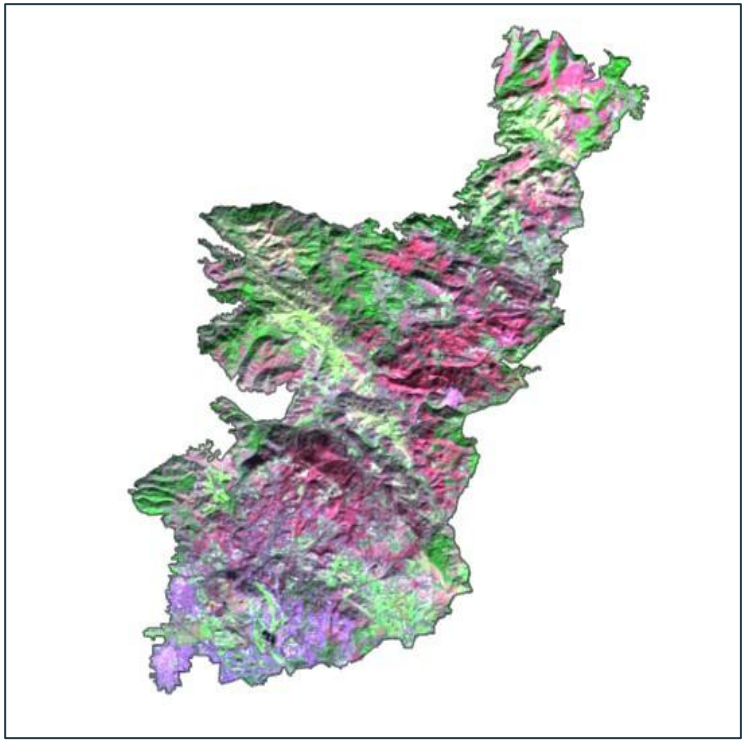
Final Output



Comparison

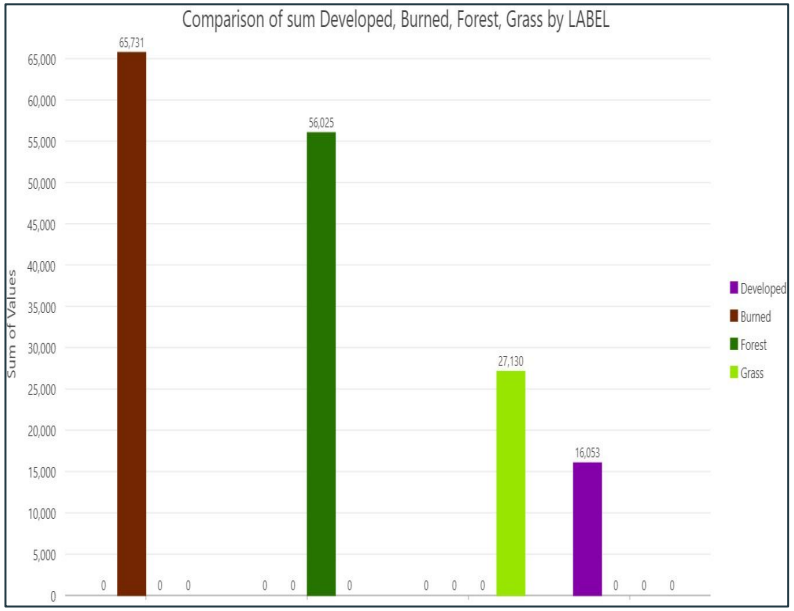


Supervised Classification Final Output



Landsat 8 image with burnscar bandwidth combination (7,5,4)

Area Burned



Using zonal histogram tool I created a histogram showing the sums of each class. Burned represents 48.71%

The Original fire perimeter polygon included the area in acres: 36,701

36,701 acres x 48.71% burned = 17,877.05 acres burned.

Meaning the burn scar area is 17,877.05 acres.

The total area burned is 18,824 acres less than the acreage of the fire perimeter.

Issues

- Classification had issues with differentiating between urban and forest in some area, mistaking it for burnt area
- There are known burned areas in the urban environments which did not show up well on the burnscar bandwidth combination
- Issues with reclassifying, which were consistent with the demo from class
- The shadows were hard to differentiate between forest and burnt area at some points
- Had to remove water as a class because it was being mistaken for shadows in the mountains
- I had issues with zonal statistics tool
- A before the fire would have been useful for comparing burn scars.