THE EFFECTS OF A WILDFIRE

Tyler Roller

Geog484: Applications of Remote Sensing

Research Question

- Has wildfire areas affected the prevalence of New Mexican Locust?

Introduction

New Mexican Locust:

- A thicket-forming shrub
- 1-10 ft. tall
- Reddish-purple branches and pale, rose-pink flowers
- Thick, rough-hairy beans.

http://www.wildflower.org/plants/result.php?id_plant=rone

Introduction

New Mexican Locust:

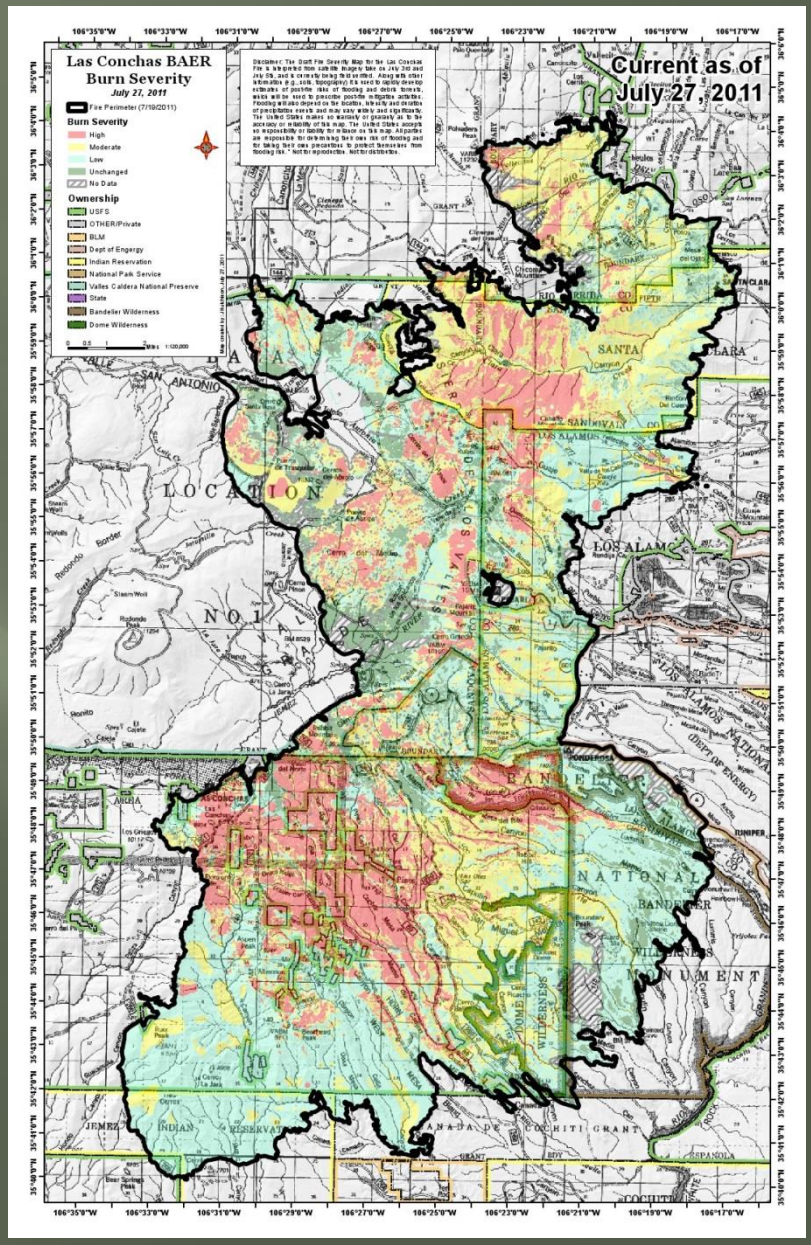
- It grows along with Gambel oak (Quercus gambelii)
- A prominent understory tree in spruce-fir, fir, and mixed conifer forests.
- Often found in forest clearings
- Can dominate shortly after a fire because of its vigorous root sprouting.

https://www.fs.fed.us/wildflowers/plant-of-the-week/robinia_neomexicana.shtml

Introduction

The Las Conchas Wildfire:

- Began around 1pm on June 26, 2011
- Caused when a gust of wind blew a 75 foot tall aspen into a power line.
- Currently 2nd largest wildfire in New Mexico history
- Caused major damage to State and Tribal infrastructures in the area



https://inciweb.nwcg.gov/incident/2406/

Objective

- Using Remote Sensing procedures like vegetation classifications, determine if New Mexico Locust is more abundant in burned areas versus areas not affected by the fire.
- I believe areas affected by the fire will have an abundance of New Mexico Locust

Objective

- My study area:

  The area Northwest of the Valles Caldera including the Santa Clara Pueblo Indian Reservation

Preparation/Pre-processing

- GIS applications used include: ERDAS IMAGINE 2016, TerrSet version 18.08, ArcGIS 10.4, and a Garmin eTrex 20
- Data used: 2011 NAIP, 2014 NAIP, GPS coordinates, Fire Perimeter shapefile, NLCD land cover image
- Pre-classification: Created mosaics of each timeframe, collected GPS data, viewed NLCD

Analysis

Supervised Classification:

- Created a vegetation classification

Consisted of 4 classes:

- Barren land – areas of no vegetation
- Grassland – open areas of grass
- Coniferous areas – large pine forests
- Deciduous areas – shrub thickets

Analysis

Training Areas:

- 7 training areas per class
- Determined that 7 per class was sufficient after the total count was over 250
- GPS data helped validate

Feature classes from buffers:

- After the classification, ArcGIS was used to create 100yd. buffers inside/outside the fire perimeter
- The buffers were used to create feature classes of these areas
- The new shapefiles were then used to summarize the number of raster cells of each class in the buffer areas.

Post-Classification

Accuracy Assessment

- Using the GPS data and the 2011 NAIP data, visual accuracy was determined along with an accuracy report

Post-Classification

Accuracy Assessment

CLASSIFICATION ACCURACY ASSESSMENT REPORT

Image File : e:/classes/applications of remote sensing - geog4841/finalproject/classify2_regionsworking.img
User Name : roller12
Date : Thu Apr 27 18:06:47 2017

ACCURACY TOTALS

Class Name	Reference Totals	Classified Totals	Number Correct	Producers Accuracy	Users Accuracy
Unclassified	0	0	0	---	---
Coniferous	18	18	15	83.33%	83.33%
Shrub	9	12	8	88.89%	66.67%
Grassland	20	19	16	80.00%	84.21%
Barren	18	16	15	83.33%	93.75%
Totals	65	65	54		

Overall Classification Accuracy = 83.08%

----- End of Accuracy Totals -----

Post-Classification

Accuracy Assessment

KAPPA (K^) STATISTICS

Overall Kappa Statistics = 0.7712

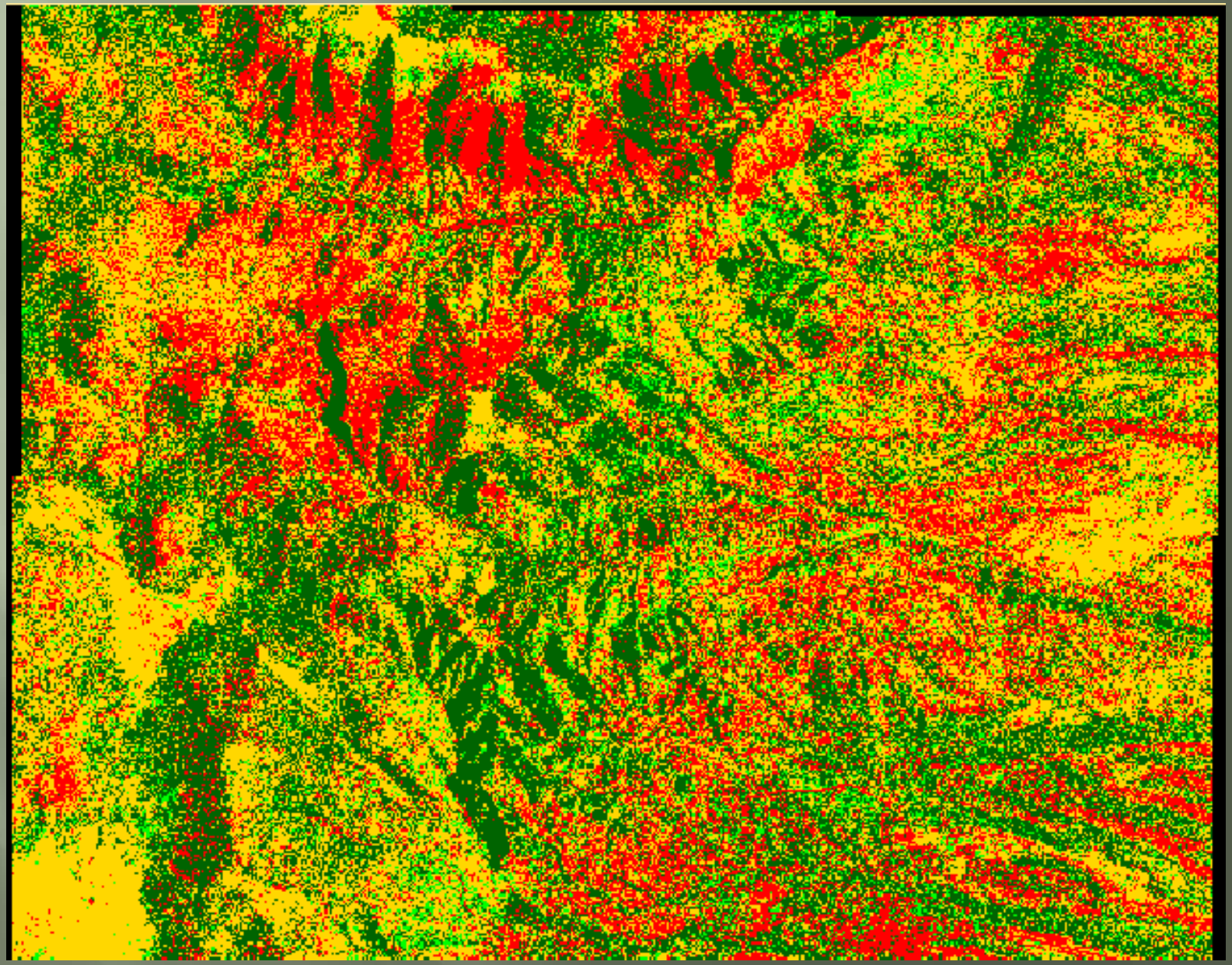
Conditional Kappa for each Category.

Class Name	Kappa
Unclassified	0.0000
Coniferous	0.7695
Shrub/Deciduous	0.6131
Grassland	0.7719
Barren	0.9136

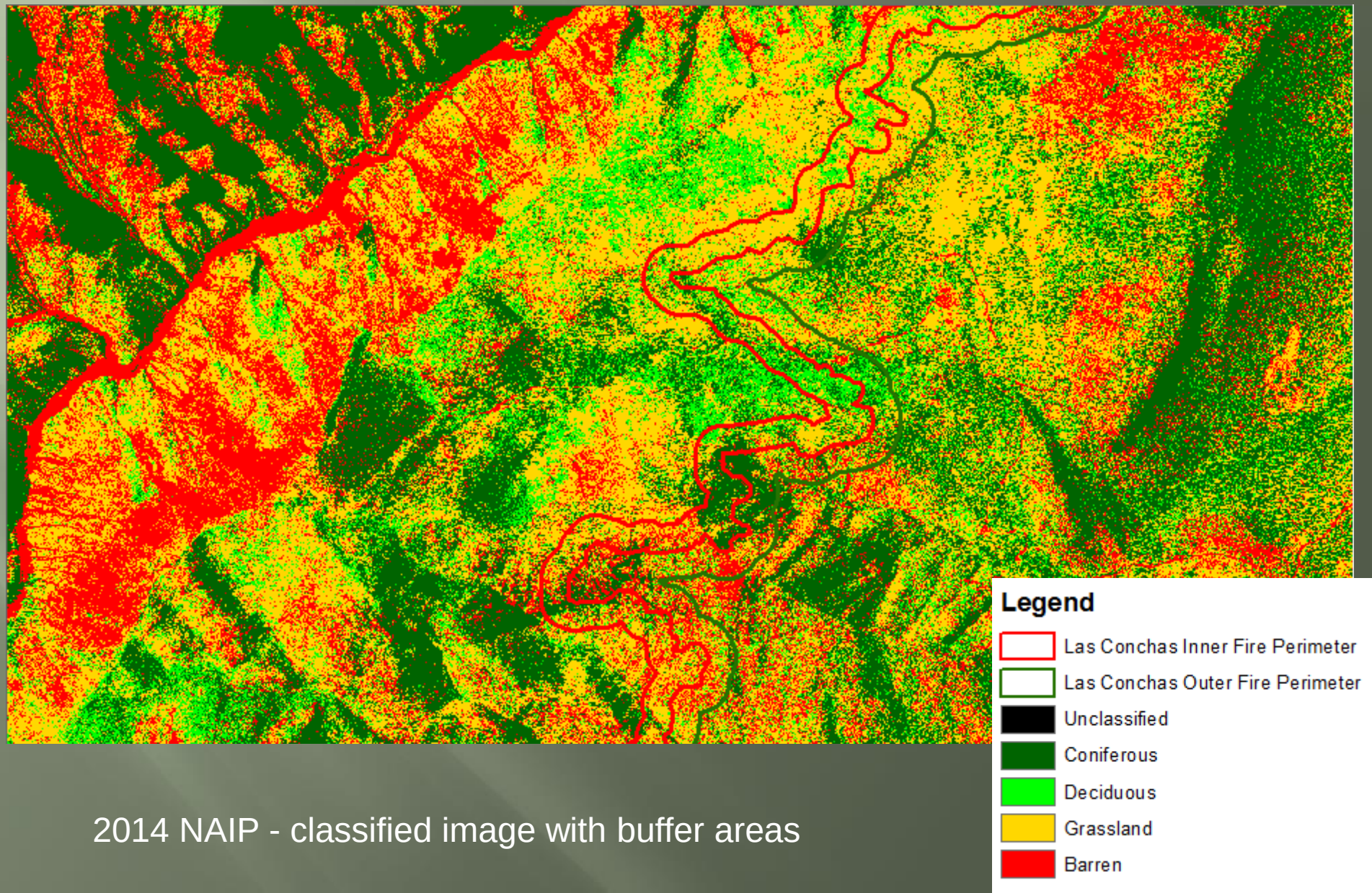
----- End of Kappa Statistics -----

2011 NAIP Image

2014 NAIP Image



2014 NAIP - classified image



2014 NAIP - classified image with buffer areas

Table Comparisons

InnerFirePerimeter

	OBJECTID *	PERIMETERD_1	VALUE_0	VALUE_1	VALUE_2	VALUE_3	VALUE_5
▶	1		153548	2763374	580006	2847297	1032924

OuterFirePerimeter

	OBJECTID *	PERIMETERD_1	VALUE_0	VALUE_1	VALUE_2	VALUE_3	VALUE_5
▶	1		94300	2965501	602529	2303489	951903

Value_1: Coniferous Value_2: Deciduous

Conclusion

- After comparing the tables, there is actually more deciduous growth outside of the fire perimeter

What could be improved/changed:

- Compare the amount of Deciduous cells inside the perimeter to the amount of Deciduous cells outside the perimeter
- Have more specific classes (New Mexico Locust differentiated from Gambel Oak)

References

- https://inciweb.nwcg.gov/incident/2406/
- http://explorer.natureserve.org/servlet/NatureServe?sourceTemplate=tabular_report.wmt&loadTemplate=species_RptComprehensive.wmt&selectedReport=RptComprehensive.wmt&summaryView=tabular_report.wmt&elKey=155582&paging=home&save=true&startIndex=1&nextStartIndex=1&reset=false&offPageSelectedElKey=155582&offPageSelectedElType=species&offPageYesNo=true&post_processes=&radiobutton=radiobutton&selectedIndexes=155582&selectedIndexes=139960&selectedIndexes=134684
- https://www.fs.fed.us/wildflowers/plant-of-the-week/robinia_neomexicana.shtml
- http://rgis-data.unm.edu/rgis/ApolloPro.aspx
- https://www.fs.usda.gov/rds/archive/Product/RDS-2017-0005/
- https://www.mrlc.gov/nlcd06_leg.php