

# Fire Monitoring and Assessment Platform (FireMAP)

*A More Responsive, Affordable and Safe Method  
for Mapping Wildland Fires.*

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# FireMAP Research Objective

Enable the acquisition, analysis and management of hyper-resolution unmanned aircraft systems (UAS) imagery for mapping post-fire burn severity in a more responsive, affordable and safe manner than is possible with current methods.

# Geoanalytics – Spatial Resolution



Reynolds Creek Prescribed burn – 120m AGL – 6.4 cm/px

# Geoanalytics - Spatial Resolution



Previous image resampled to 30 meter (Landsat) resolution



# Training Data Selector

FireMAP

Training Data Selector

[About FireMAP](#) | [Imagery](#) | [Reports](#) | [Training Data Selector](#)



Save Undo Redo

Tool Selector

Point

Pencil

Line

PolyLine

Polygon

Circle

Auto-Cluster

Flood Fill

Label

Enter the label for the pixels you have selected.

Showing:

All Labels

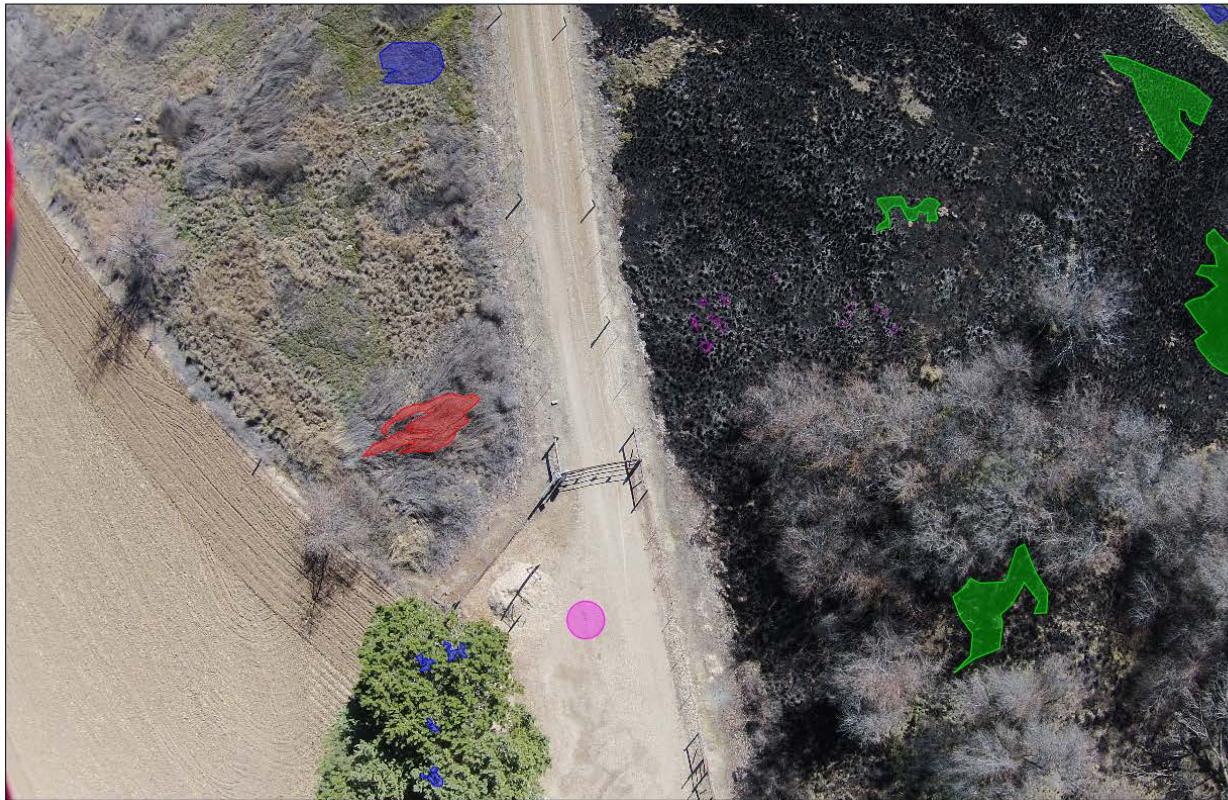
(187,754)

(1400,787)

Coordinates(x,y)

Dimensions(x,y)

Shift-Scroll to resize Image.



Delete

Load

Color Picker



Insert Color Wheel here

Color Picker simply selects the color of the pen tool you will be using to select training data. It does not affect how your data is selected but instead helps aid you in your visualization of your data.

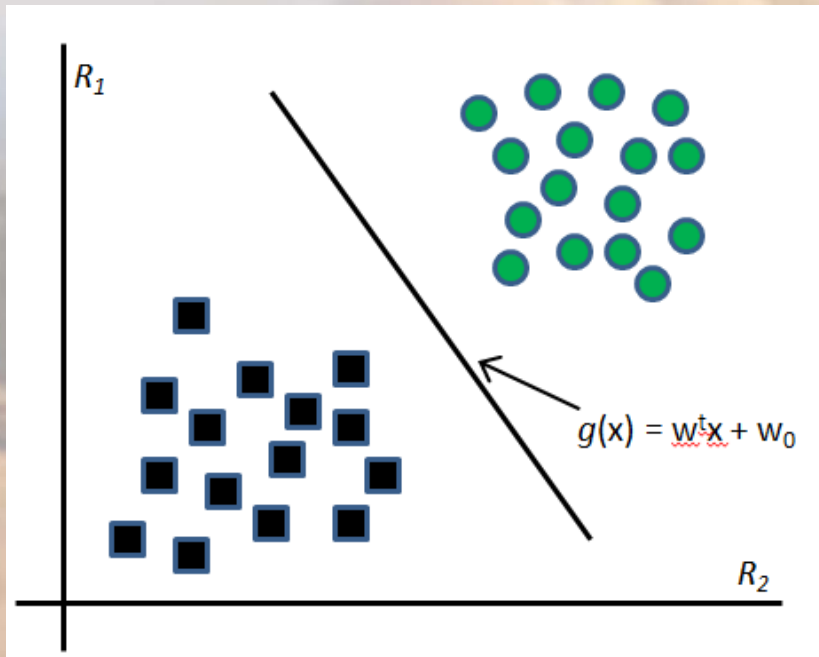
Tutorial

Select Training Image

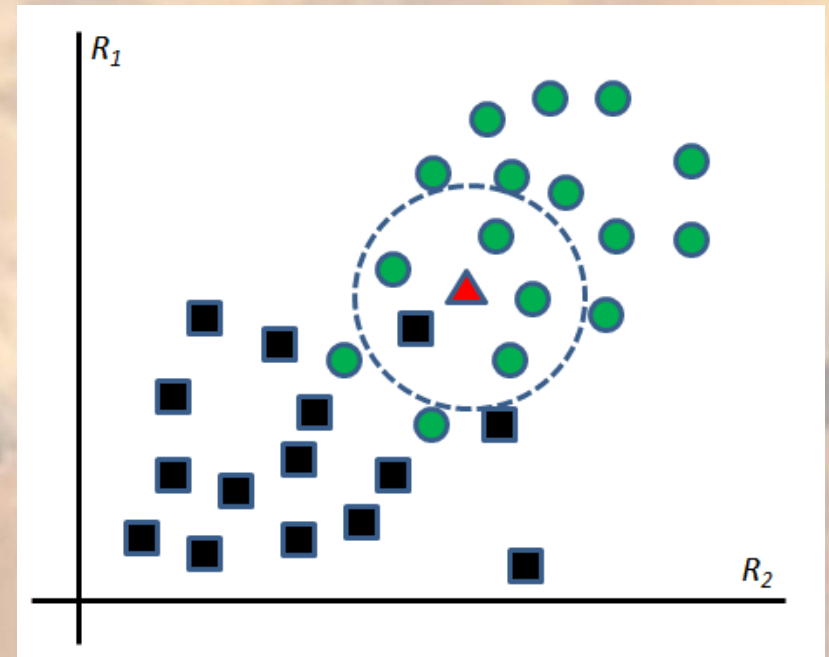
# Geoanalytics - Discovery of Patterns -> Knowledge

Potential tools for measuring burn severity

- Machine Learning – learn by example



Support Vector Machine (SVM)



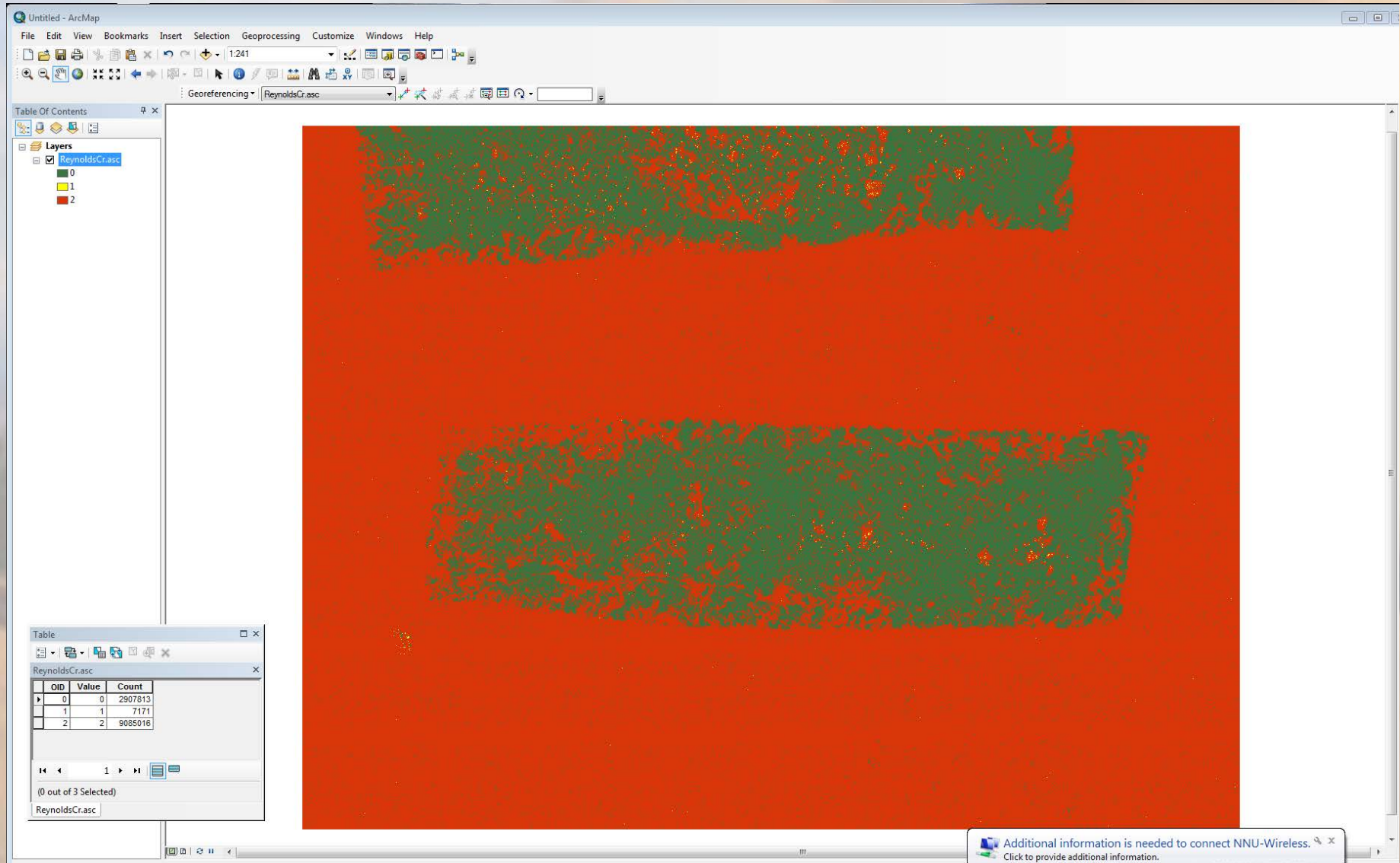
K-Nearest Neighbor (KNN)



# Classifier - Reynolds Creek

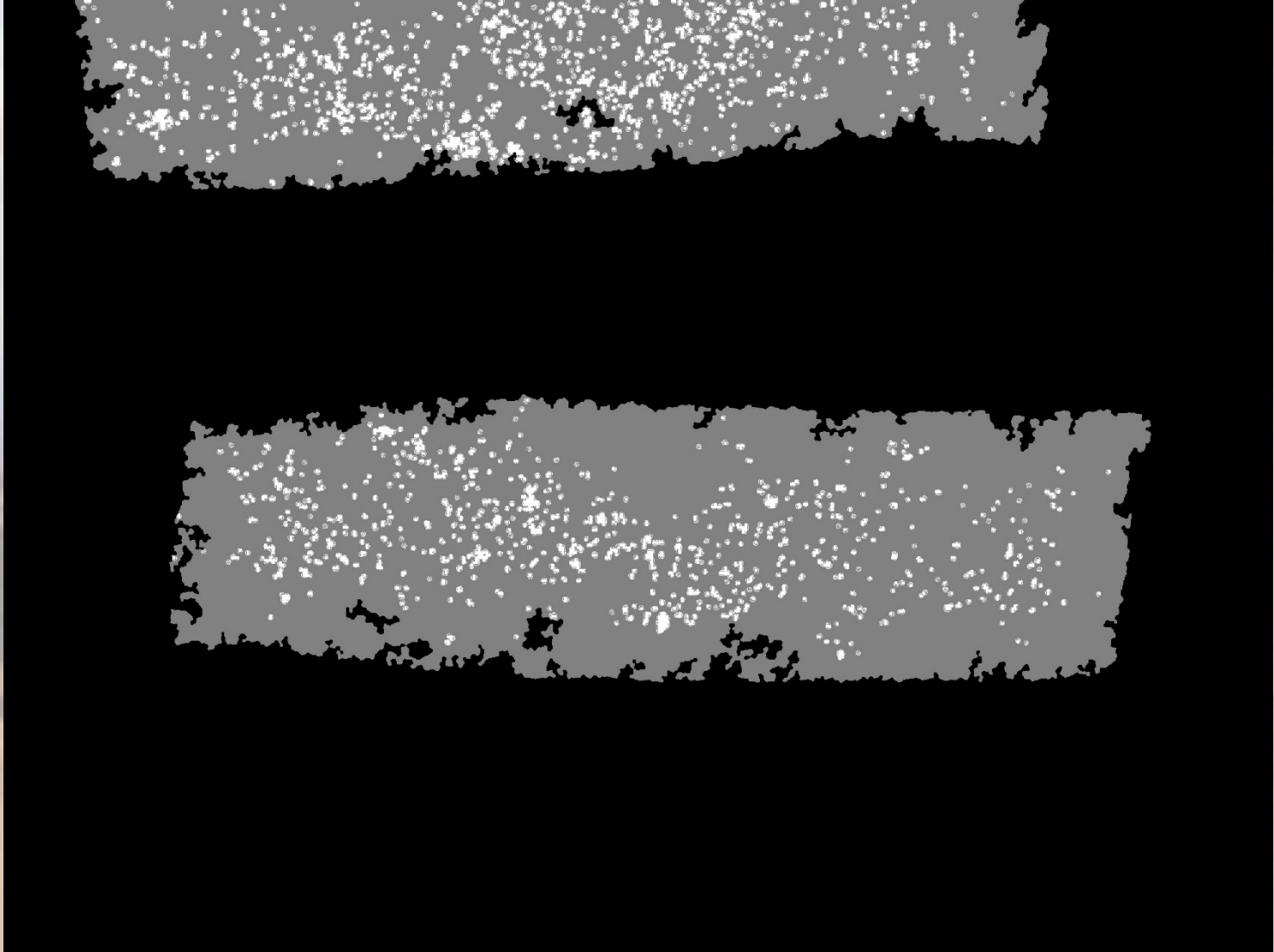


# Classifier - Reynolds Creek





# Post-process Interpreted Image

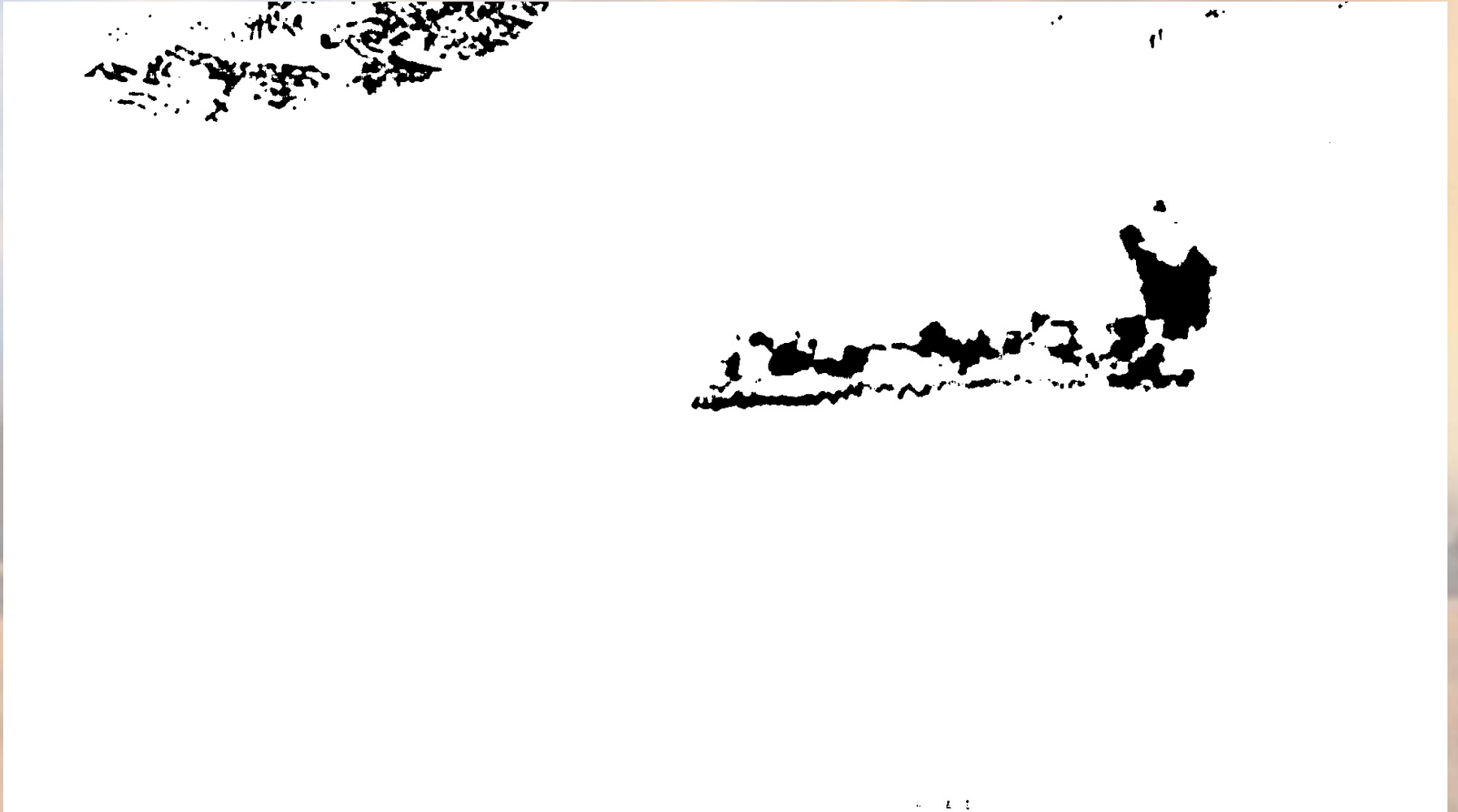


Addition of high severity (consumption) from white ash classification with SVM

# Alternate Applications



# Alternate Applications

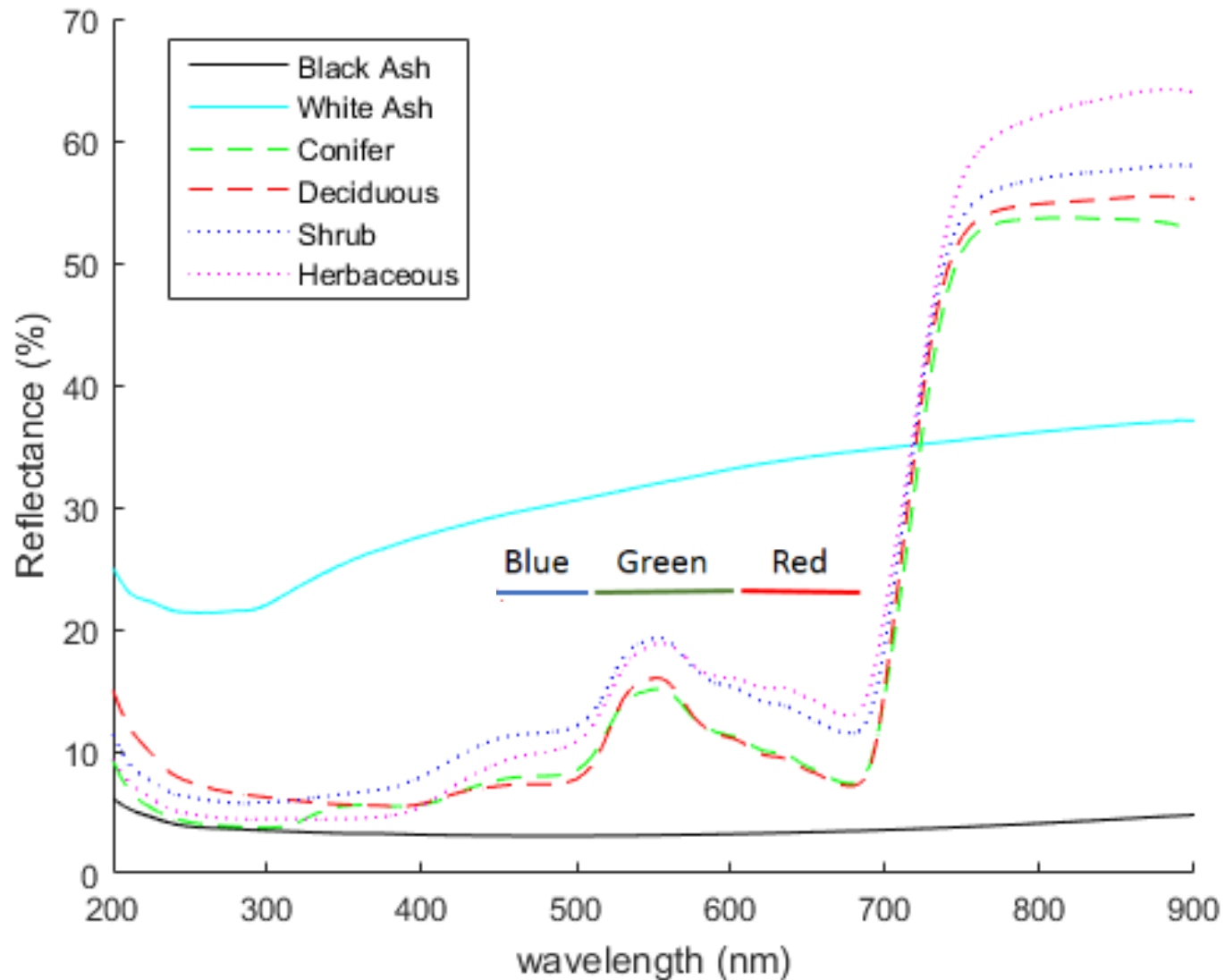




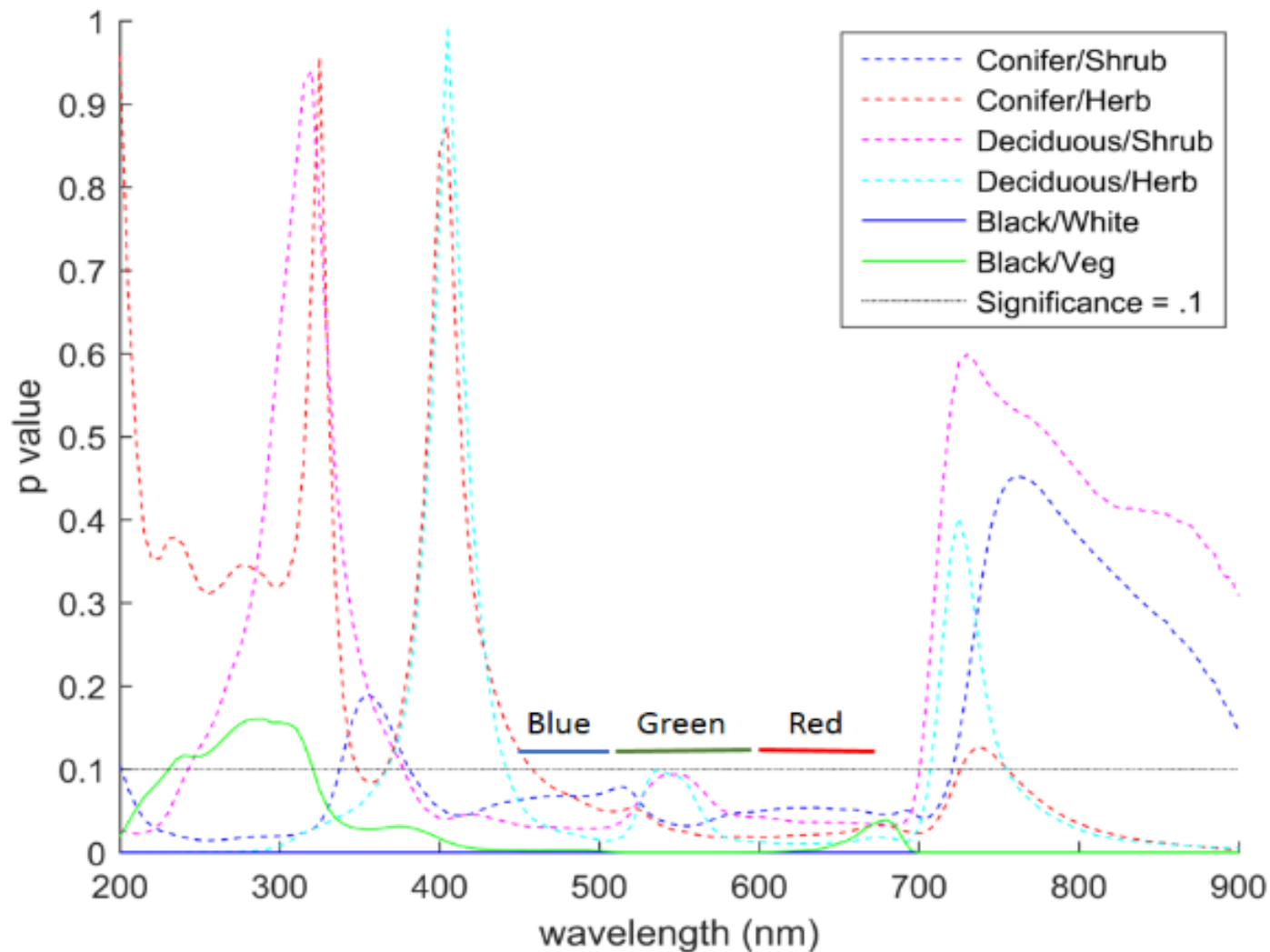
# Spectroscopic Analysis

- Collecting vegetative and ash samples
- Looking for separability in terms of spectral reflectance
- Distinguishing classes of image objects related to fire severity
  - Six classes: black ash, white ash, deciduous and conifer (canopy fuel), herbaceous and shrub (surface fuel)

# Spectral Results



# Calculating Separability Using Two-Tailed T-tests



Using a  
significance  
level of 0.1

P values  
below  
significance  
level indicate  
spectral  
separability of  
classes



# Sensor – Data Acquisition

- Inexpensive color cameras
  - Show Red, Green & Blue bands
  - Raspberry Pi 4-band multi-spectral camera



Blue/Green/Red camera



Blue/Green/Near infrared camera



# Future Work



# Conclusion

- User Interface/ Training Data
- Object Identification
- Image Classification
- Post Processing / Data Output



# Acknowledgements

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- Deer Flat National Wildlife Refuge
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# Any *Burning* Questions?

