

Analysis of Vegetation Reflectance and Burn Severity Using Remote Sensing Data

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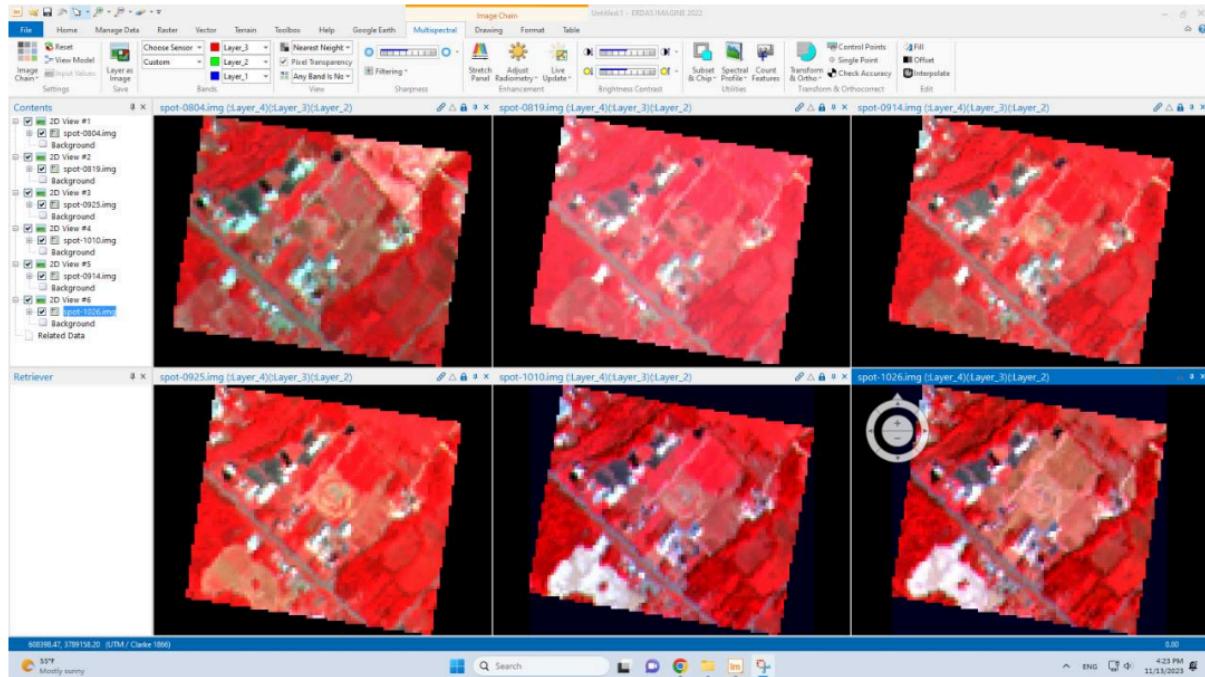
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Abstract

This report presents a comprehensive analysis of vegetation reflectance, phenological changes, and burn severity using SPOT images and NDVI data. The study includes an in-depth examination of spectral profiles, pre- and post-fire images, and the spectral response of various land cover type

Introduction

This report aims to analyze vegetation health and burn severity using remote sensing data. By utilizing SPOT images and NDVI calculations, we can assess the phenological changes in vegetation and the impact of fires on different land cover types. The report is divided into several sections, each addressing a specific aspect of the analysis.



Chapter 2

Data Collection and Analysis

2.1 SPOT Images and Spectral Profiles

Six SPOT images were analyzed, each showing a different date of acquisition. The spectral

profiles of these images were plotted, with the y-axis standardized across all graphs. The images were acquired on the following dates:

- August 4, 1998
- August 19, 1998
- September 14, 1998
- September 25, 1998
- October 10, 1998
- October 26, 1998

Figure 1: View 1

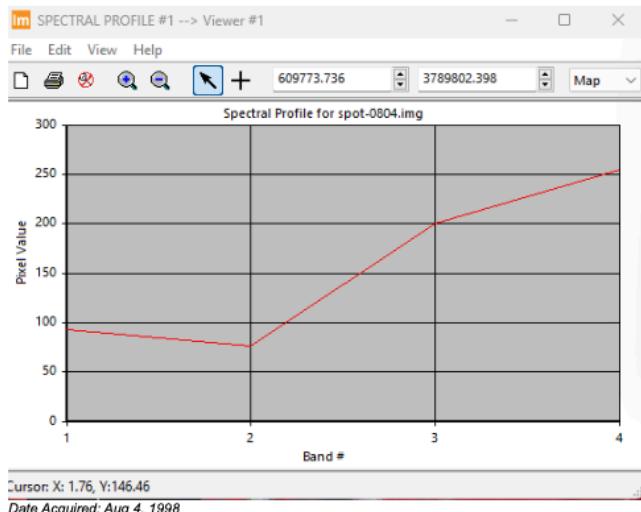
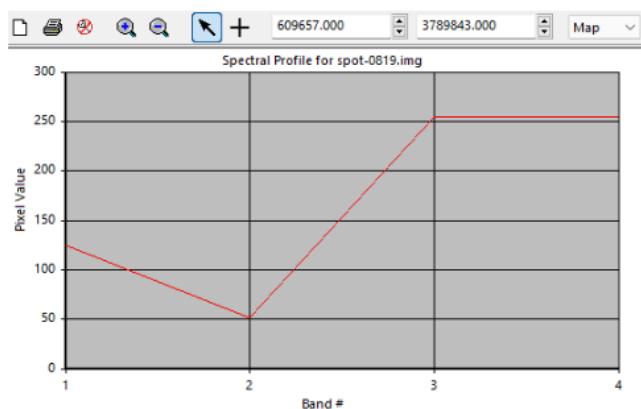
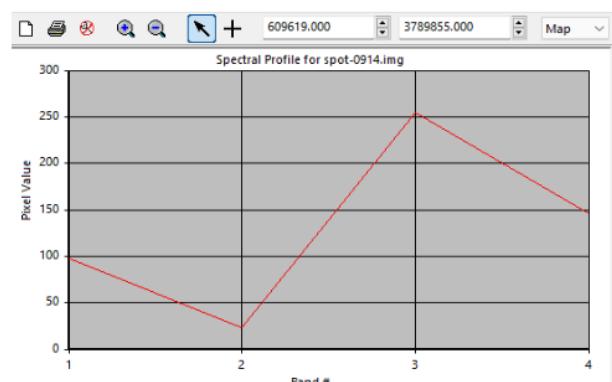


Figure 2: View 2



Date Acquired: Aug 19, 1998

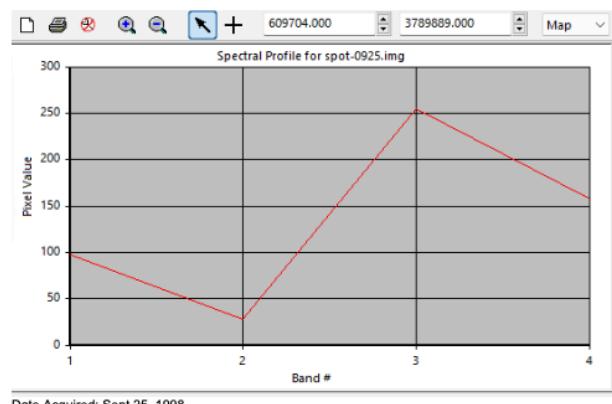
Figure 3: View 3



Cursor: X: 2.29, Y:197.24

Date Acquired: Sept 14, 1998

Figure 4: View 4



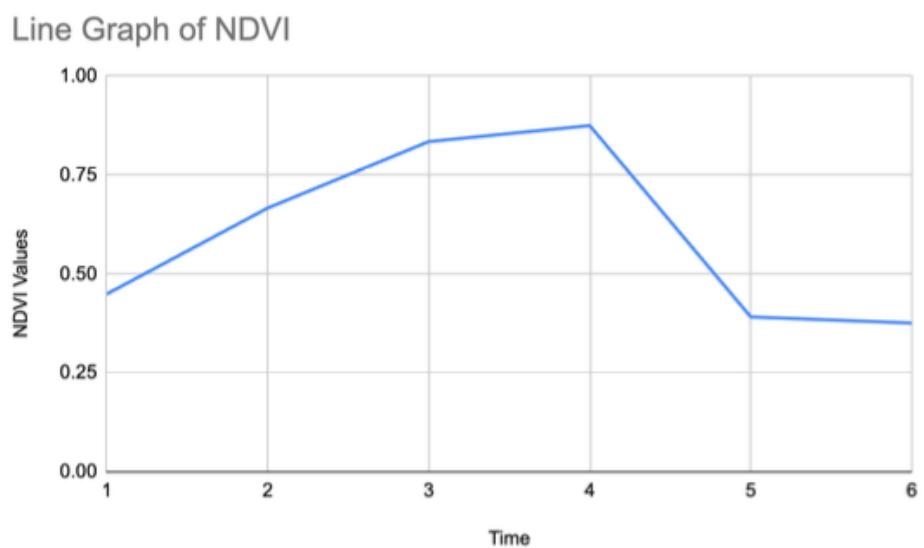
Date Acquired: Sept 25, 1998

2.2 NDVI Analysis

The NDVI values were calculated for specific UTM coordinates, and a line graph was generated to show the changes in NDVI over time. The NDVI values indicate the density and health of vegetation, with higher values corresponding to healthier vegetation.

The range of NDVI values was 0.4675, suggesting significant variation in vegetation health across the study period.

View 1 (52,24)	
Band 3	200
Band 2	76
NDVI	0.4492753623
View 2 (52,24)	
Band 3	255
Band 2	51
NDVI	0.666666666667
View 3 (52,24)	
Band 3	255
Band 2	23
NDVI	0.8345323741
View 4 (52,24)	
Band 3	255
Band 2	17
NDVI	0.875
View 5 (52,24)	
Band 3	215
Band 2	94
NDVI	0.3915857605
View 6 (52,24)	
Band 3	203
Band 2	94
NDVI	0.367003367



2.3 Phenology and Vegetation Reflectance

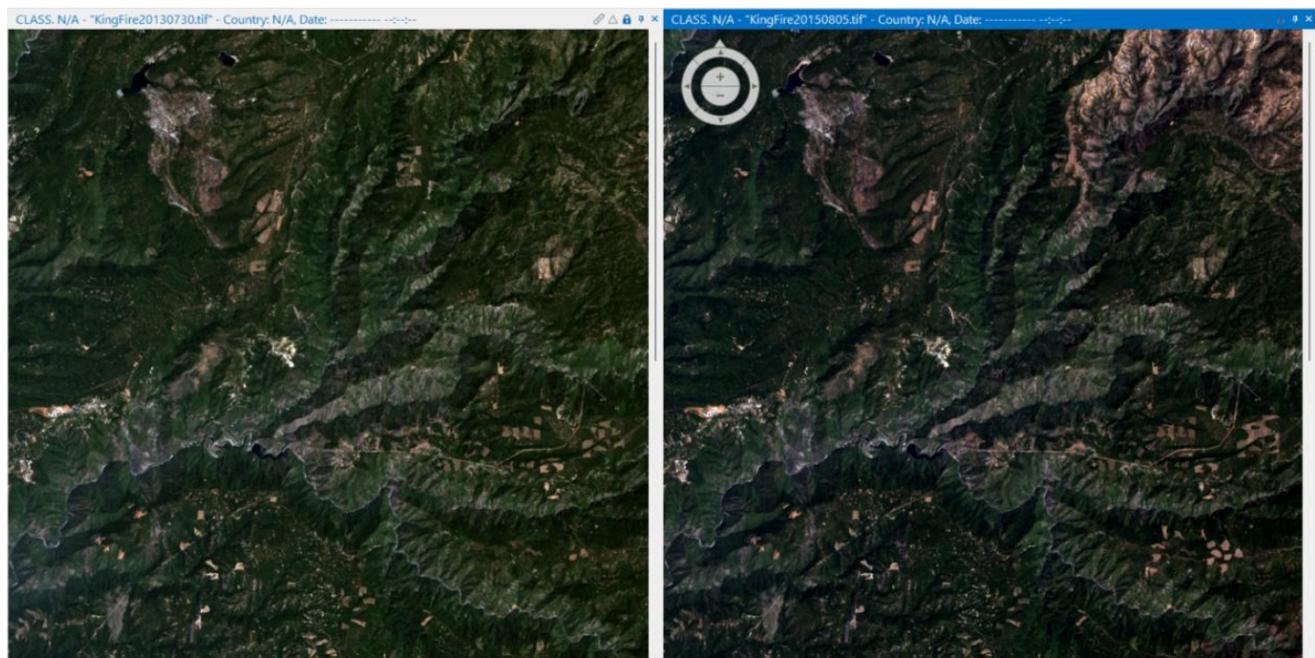
The NDVI values showed an increase from points 1 to 3, indicating the growth phase of vegetation, likely due to spring or early summer. The decrease in NDVI from points 4 to 6 suggests the deterioration phase, possibly due to colder weather leading to shedding of leaves.

Chapter 3

Burn Severity Analysis

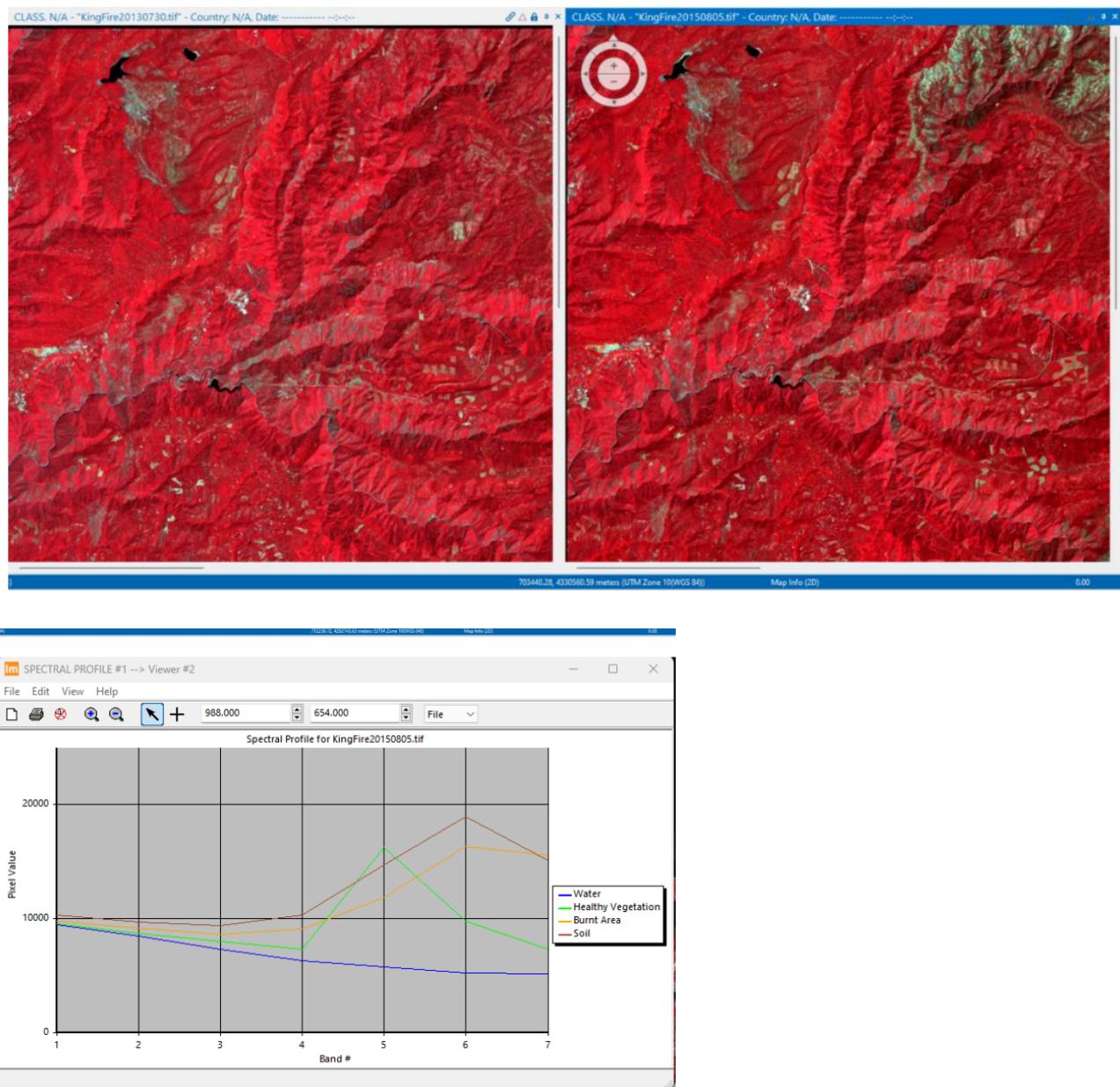
3.1 Pre-Fire and Post-Fire Analysis

Pre-fire and post-fire images were analyzed using both True Color Composite (TCC) and False Color Composite (FCC) views. The burnt areas were identified by their distinctive colors in both TCC and FCC.



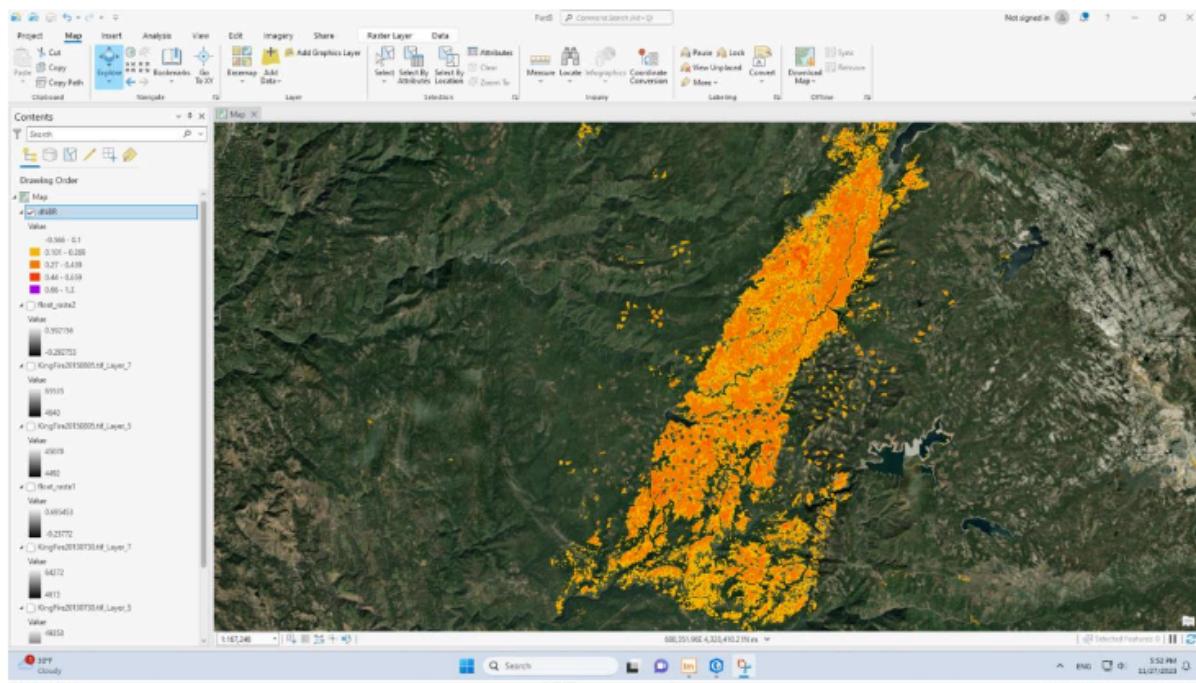
3.2 Spectral Profile Comparisons

Spectral profiles for healthy vegetation, water, soil, and burnt areas were plotted. These profiles highlight the differences in reflectance across various wavelengths.



3.3 Burn Severity Classification

The burn severity was classified based on the NBR values calculated before and after the fire. A comparison of the NBR PreFire and NBRPostFire images revealed significant changes in vegetation reflectance due to the fire.



Chapter 4

Land Cover Spectral Response

4.1 Digital Number (DN) Values for Different Land Covers

DN values for Bands 1-6 were recorded for eight different land cover types. These values were then used to plot spectral response curves, providing insights into the reflectance characteristics of each land cover type.

Land Cover Type	Band 1	Band 2	Band 3	Band 4	Band 5	Band 6
Bare Soil	14104	14478	15921	19133	22745	20150
Pond	9599	8849	7347	6571	6193	6007
Salton Sea	9107	7771	6883	5897	5266	5201
Cropland 1	9911	10504	8465	32639	15008	9037
Cropland 2	9895	9673	8568	23778	12785	8977
Fallow	13361	13940	15526	19143	21474	17901
Trees	11511	11475	10704	25954	19648	12734
Road	13174	13340	13952	18112	17838	15817
Residential	19766	19490	20840	24767	23497	17531

Table 4.1: Digital Number Values for Different Land Covers

Reflectance Values Across Different Land Cover Types for Spectral Bands

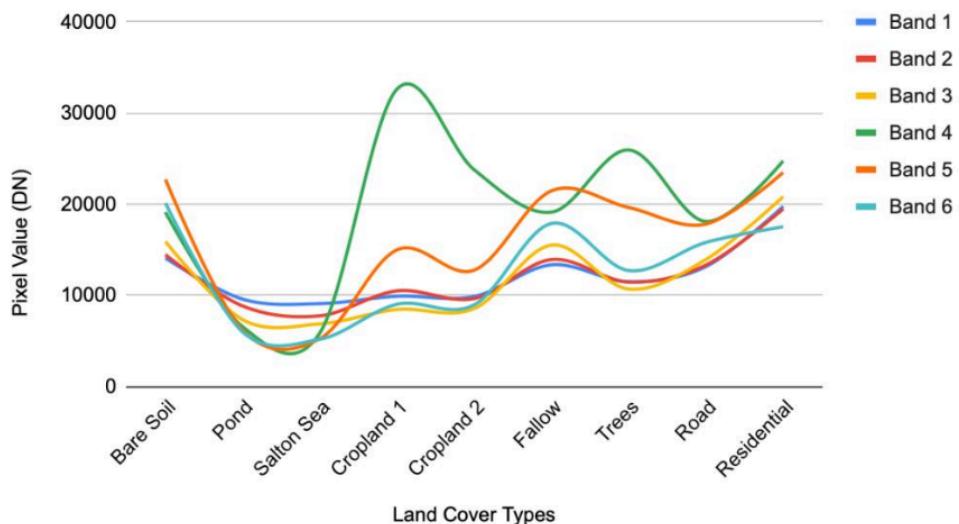


Figure 9: NBR _PreFire

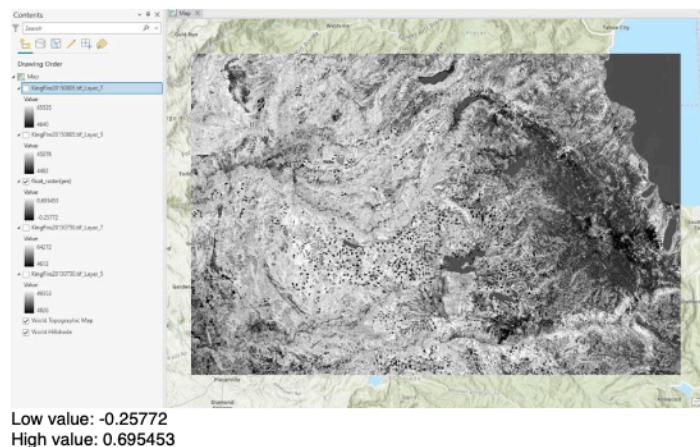
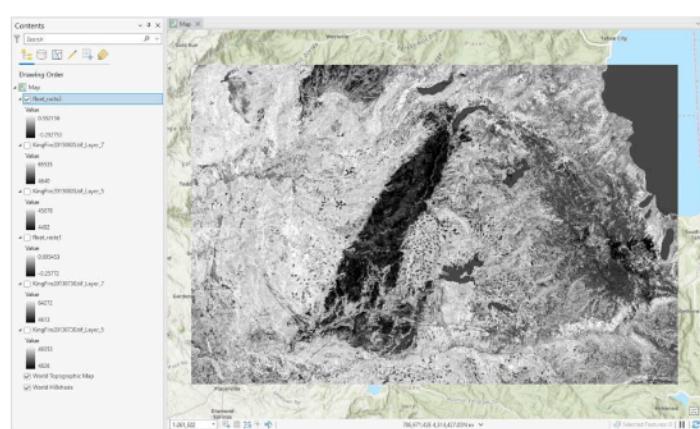


Figure 10: NBR _PostFire



4.2 Spectral Curves and Interpretation

The spectral curves highlight the varying reflectance across different land covers. For instance, vegetation shows high reflectance in the NIR band, while water bodies show low reflectance across most bands.

Conclusion

This report demonstrates the effectiveness of remote sensing techniques in analyzing vegetation health and burn severity. By examining NDVI values, spectral profiles, and burn severity classifications, we gain a deeper understanding of the impacts of seasonal changes and fires on vegetation.