An Assessment of Burn Severity and Land Cover Classification from the Corta Fire

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ABSTRACT

The frequency and intensity of wildfires has increased in the United States for the past decade, presenting environmental concerns in western areas. The Corta Fire of 2019 in Elko County is a notable event, since pre-fire vegetation can impact the severity of a fire and affect existing biodiversity and land cover distribution. The objective of this research is to relate pre-fire land cover and burn severity and assess which pre-fire land cover types are most vulnerable to moderate and high burn severity. A Random Forest (RF) algorithm was applied to Sentinel-2 satellite imagery through Google Earth Engine (GEE), creating a pre-fire land cover classification map of the Corta Fire region based on the National Land Cover Database (2018) map. Burn severity was calculated using the Differenced Normalized Burn Ratio (dNBR). Spatial analysis in ArcGIS was performed to compare burn severity distributions across land cover classes. The land cover classification map achieved 80% accuracy, with land cover patterns observed between burn severity zones. Shrubland covered a majority of the study area and exhibited the highest percentage of moderate burn severity, indicating a presence of fine, dry fuels in the area to allow for sustained moderate-severity burns. Deciduous forests and wetlands had the greatest percentage of high burn severity, likely due to higher fuel loads that promote prolonged combustion and heat retention. Grasslands showed the highest proportion of low burn severity, reflecting their rapid ignition and lower fuel continuity. The results of this study demonstrate how pre-fire land cover influences burn severity distribution, providing insights towards the relationship between pre-fire vegetation distribution and burn severity. Understanding how burn severity is influenced by pre-fire vegetation from different land cover types is essential for wildfire strategies related to wildfire risk assessment and post-fire management.