

DEVELOPMENT OF A REMOTE SENSING DERIVED FIRE HISTORY AND ITS APPLICATION IN SPATIAL AND TEMPORAL ANALYSES OF BURN PATTERNS IN THE MOJAVE ECOREGION

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ABSTRACT:

There was concern that the number of fires and area burned in the Mojave ecoregion had increased over the last 4-5 decades, but sparse historic records and lack of more recent data limited the extent this could be evaluated. Therefore, our goals were to: (1) use Landsat-based imagery to develop a database of fire perimeters, burn severity and burn frequency from 1972 – 2010; (2) analyze the spatial pattern of the area burned in subregions of the Mojave; and, (3) use time series models to analyze temporal patterns and develop short term forecasts (1 year ahead) of the number of fires and area burned across the ecoregion.

Multispectral Scanner (MSS) data were used to derive fire perimeters and estimate burn severity from 1972 – 1983 while Thematic Mapper (TM) data were used to derive fire perimeters and estimate burn severity from 1984 - 2010. A total of 254 fires ≥ 405 ha encompassing 7,517 km² (5% of the ecoregion) were mapped from 1972 - 2010. Approximately 76% of the mapped areas had burned just once, while 20% had burned twice. The spatial pattern was highly clumped, with 85% of the burned area occurring in the eastern subregion. Time series analysis indicated that the number of fires and area burned had increased between 1972 and 2010 but the trend was not linear. Rather, the pattern for the number of fires showed two periods of irruptive burning (1994-1995 and 2005 - 2006) while the pattern for the area burned showed a single irruptive period (2005 - 2006). The best supported time series model successfully forecast the number of fires and area burned in 2011. Development of the remote sensing fire database has provided the fundamental information needed for analyzing and forecasting spatial and temporal patterns of burning in the Mojave ecoregion.