



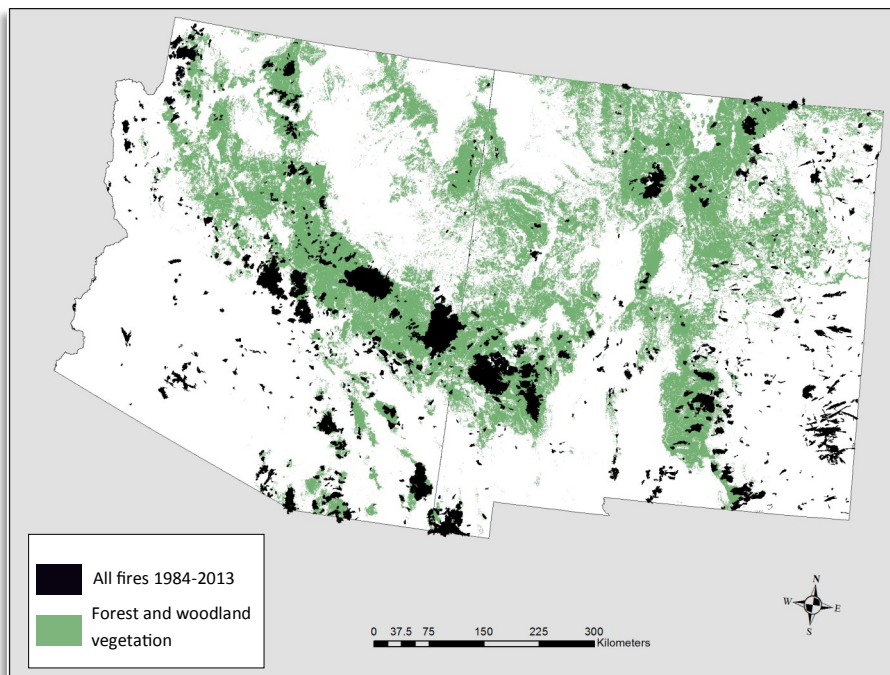
# Increasing High Severity Fire in the Southwest

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## INTRODUCTION

Fire activity in western U.S. forests has increased due to human land use practices and climate conditions. Increasing trends in fire frequency and area burned in the West has called attention to the need for regional high severity trend analyses in the Southwest.

Increasing trends in high severity fire has profound ecological impacts in ecosystems that are not naturally characterized by it. In the face of altered fire regimes, managers are charged with mitigating the effects of high severity fire and promoting forest resiliency



**Figure 1.** Map of Arizona and New Mexico, 1,601 fires analyzed from 1984-2013 (black polygons), and all forested and woodland areas in study region (green).

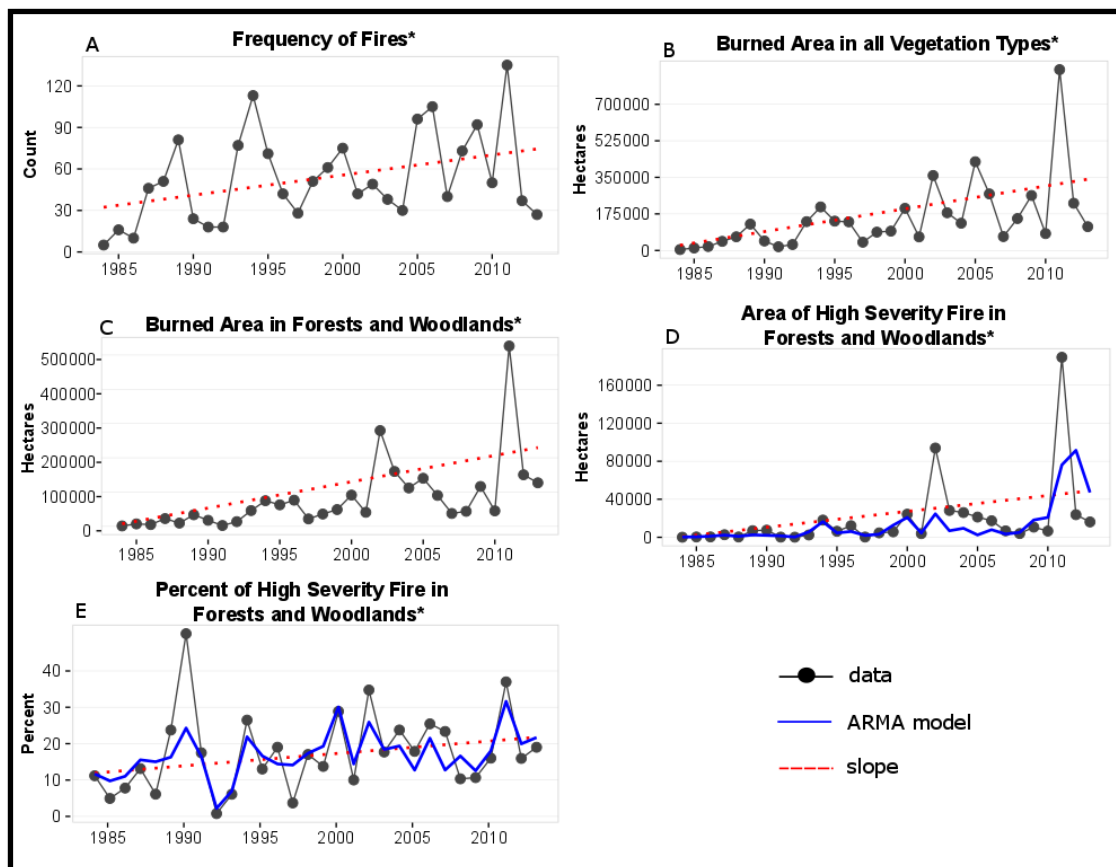
## IN BRIEF

- Fires are getting larger and more severe across all vegetation types across the Southwest
- Fires are getting larger and more severe in all forest and woodland ecosystems
- Percent of high severity is increasing in Madrean, PJ Grass/Juniper Grass, xeric and mesic mixed conifer

## METHODS

Using Monitoring Trends in Burn Severity (MTBS) data from 1984-2013:

- Analyzed 1,601 fires in all vegetation types
- Analyzed 1,150 fires in forests and woodlands
- Assessed area, area burned severely, and percent of high severity fire
- Used relative differenced normalized burn ratio (RdNBR) images with regionally validated high severity threshold of 643
- Assessed trends in 7 forest and woodland vegetation groupings (Ecological Response Units [ERU] Fire Regime Types)
- Used OLS (ordinary least squares) or ARMA (autoregressive moving average) regression techniques to test for trends



## RESULTS: TRENDS IN ALL FIRES FROM 1984-2013

**Table 1.** Results in temporal trend analyses in all fires from 1984-2013. \* indicates significant trend at  $\alpha = 0.05$ . Linear models were used in analyses for A,B, and C and ARMA models were used in analyses for D and E.

## RESULTS: TRENDS IN ALL FIRES STRATIFIED BY FOREST AND WOODLAND VEGETATION GROUPS

ERU Fire Regime Type	Area Severe (ha)	Area Burned (ha)	Percent High Severity (%)
Madrean	98,283*	279,577*	35*
PJ Grass/PJ Juniper Grass	98,601*	327,942*	30*
PJ Evergreen Shrub	36,409*	143,916*	25
PJ Sagebrush/PJ Woodland	40,690*	123,860*	33
Ponderosa Pine	121,153*	742,145*	16
Mixed Conifer Frequent Fire	86,417*	398,083*	22*
Mixed Conifer with Aspen/Spruce Fir	58,477*	178,319*	33*

**Table 2.** The 12 forest and woodland vegetation types used in this study grouped by fire regime type (ERU Fire Regime Type) showing area of high severity fire, area burned, and percent of high severity burned from 1984-2013. This table includes pixels that reburned from year to year. \*indicates significant increasing trend at  $\alpha = 0.05$  from 1984-2013.