Encounter rates between fire and fuel treatments in the United States

Kevin Barnett[1], Helen T. Naughton[1], Sean A. Parks[2], Carol Miller[2]
[1]The University of Montana, [2]Aldo Leopold Wilderness Research Institute
kevin.barnett@umontana.edu

OBJECTIVE

We are characterizing recent interactions between wildland fires and fuel treatments across the conterminous United States (CONUS). Using standardized, spatially-explicit fire and fuel treatment datasets, we asked how often do fires burn into previously treated areas, and how does this vary across major ecosystem types within the CONUS? These findings are relevant to broader discussions over the efficacy of fuel treatments.

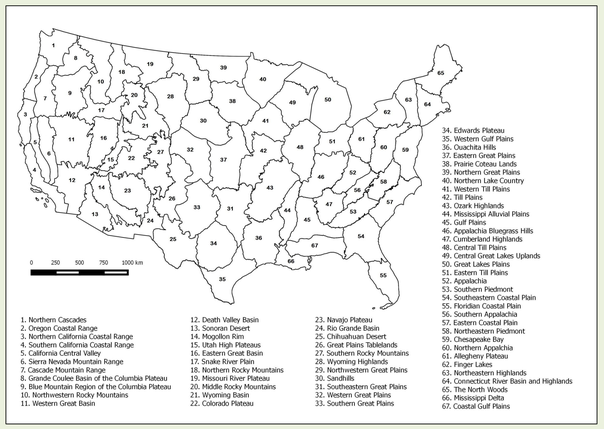
FIRE AND FUEL TREATMENTS

Leveraging treated areas to support incident management

Economic and operational constraints to fuel treatment implementation make it unlikely that treatments alone can achieve forest restoration goals at landscape scales (North et al. 2015). Recognizing this limitation, several calls have been made to expand the use of unplanned fire to accelerate the pace and scale of forest restoration (North et al. 2012, Hessburg et al. 2015).

Using treated areas as "anchor points" (Agee et al. 2000) during unplanned fire events may help to further forest restoration efforts by encouraging the use of fire to achieve land management goals (Reinhardt et al. 2008). Low-risk opportunities to manage unplanned fires may be expanded when tied into existing fuel treatment networks, previously burned areas, or other landscape features (e.g., water bodies, barren outcroppings). **Our goal is to quantify contemporary patterns of fire and fuel treatment interactions in terms of frequency, extent, and geographic variation.** This information may provide forest managers with additional descriptive information to evaluate the success of both fire and fuel treatment strategies.

STUDY AREA



Fire and fuel treatment interactions were characterized at the ecoregion level across the CONUS. To minimize the potential bias introduced by missing data on private or state managed lands, only **fire and fuel treatments that intersected federal lands were evaluated**.

METHODS

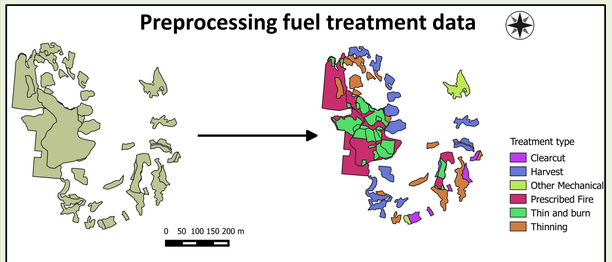
Fuel treatment dataset (n=281,304)

- LANDFIRE public events geodatabase, 1999-2012
- Spatial polygons representing treatment boundaries
- Includes treatment type, year
- Used in conjunction with other ancillary data to update national fuel, vegetation, and disturbance datasets

Wildland fire perimeters (n=3,903)

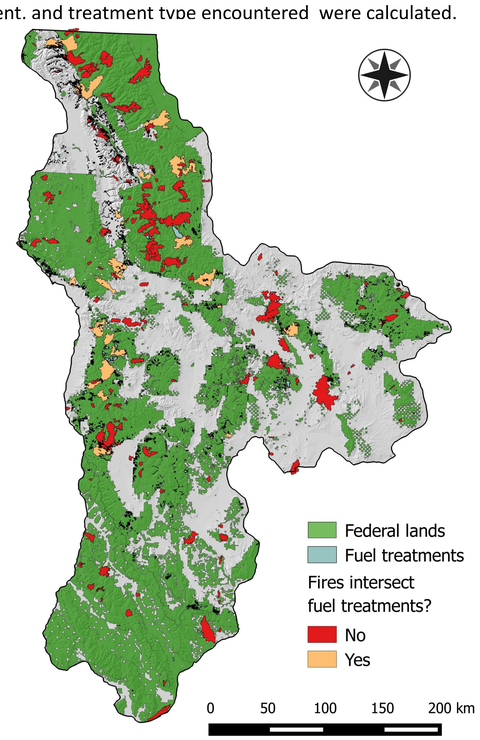
- Monitoring Trends in Burn Severity (MTBS) fire polygons
- Fires greater than 500 acres in the eastern US and 1000 ac in the western US between 2000 and 2013

Preprocessing fuel treatment data



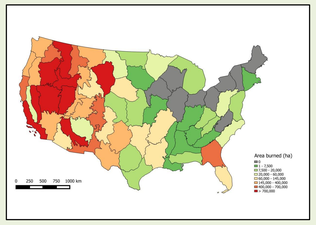
Characterizing fire and fuel treatment interactions

All fire perimeters that intersected extant fuel treatments were identified. Treatments must have occurred no later than the year prior to the year of the fire. Treated area burned, time since treatment, and treatment type encountered were calculated.



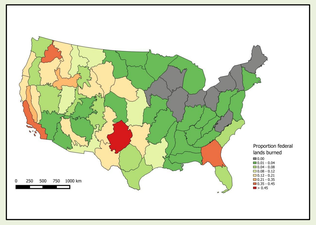
RESULTS

Spatial distribution of area burned



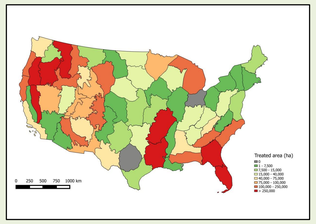
Total area burned: 18,850,074 ha

Total area burned was highest in Northwestern Rocky Mountains, Snake River Plain, and Blue Mountains ecoregions.



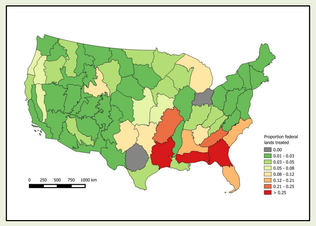
As a proportion of federal lands, these ecoregion level spatial patterns become less apparent.

Spatial distribution of treated area



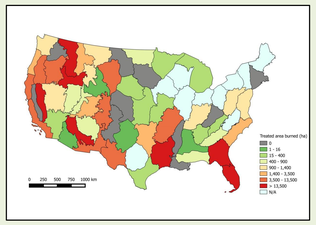
Total treated area: 5,724,138 ha

Total treated area was highest in the Ozark Highlands and Southeastern Coastal Plain ecoregions.



Ecoregions of the southeastern United States had the greatest proportion of federal lands treated.

Spatial distribution of treated area burned

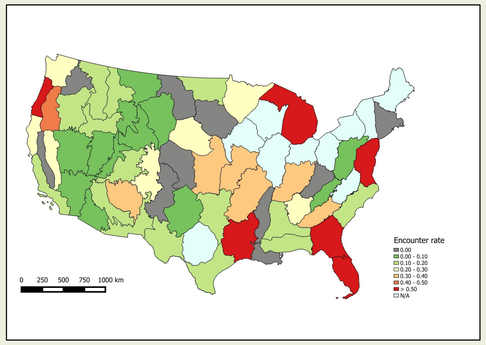


Total treated area burned: 304, 440 ha

Geographic patterns of total treated area burned tend to mimic those of total treated area. Fires failed to encounter previously treated areas in ten ecoregions.

RESULTS (continued)

Encounter rate



The highest encounter rates are found in the southeastern CONUS, including the Ouachita Hills, Southeastern Coastal Plain, and Floridian Coastal Plain ecoregions.

CONCLUSIONS

To our knowledge, this is the first broad scale assessment of the frequency and extent of fire and fuel treatment interactions across the CONUS. Results reveal geographic variation in treated area burned and the rate at which unplanned fires encounter previously treated areas.

Limitations:

- Coarse scale of analysis may not reflect local fire and fuel management objectives
- Strict definition of 'encounter' may mask instances where treatments facilitated successful suppression

Future research needs:

- Contrast the frequency and extent of fire-fuel treatment interactions with fire-fire interactions.
- Exploring the influence of previously treated or burned areas on initial and extended management responses to unplanned ignitions is a priority.

References

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ACKNOWLEDGEMENTS

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