

Impacts of Drought on Forests and Forest Management

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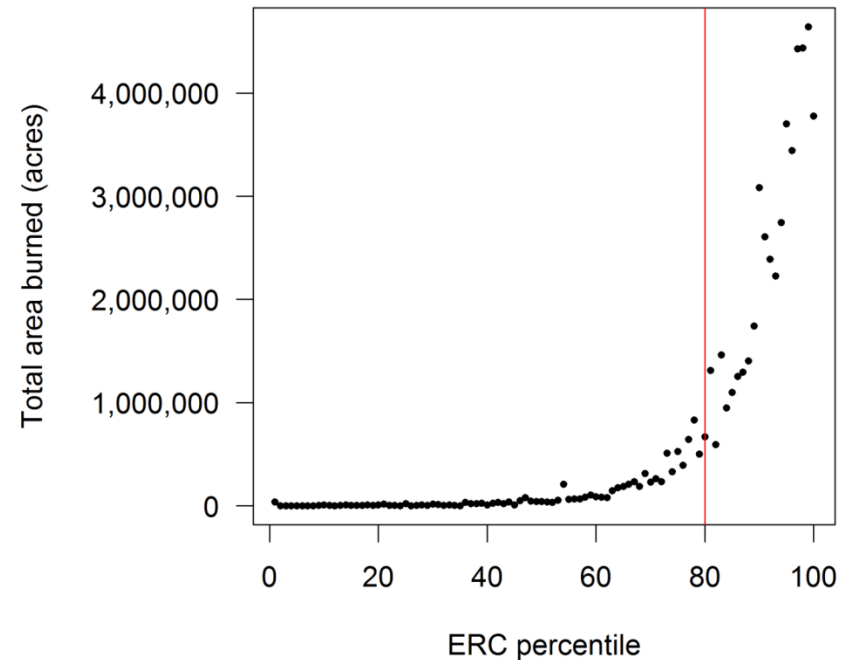
Notable Forest Impacts

- Short Run
 - Increased tree mortality due to diverse factors
 - Increased wildfire activity
 - Lower water production, altered quality
- Long-run
 - Altered ecosystem structure and function
 - Lower overall biomass levels and forest extent
 - Altered water production
 - Altered wildfire activity/regimes
- Both short- and long-run impacts have secondary impacts
 - Timber values
 - Other forest values (wildlife, recreation, livestock forage in forests, etc.)



Wildfire Activity Impacts

- The number of large fires and area burned in the U.S. West is strongly correlated with short-term drought (on the order of a month long).
- Therefore, droughts need not be long in order to result in sharp increases in wildfire occurrence.

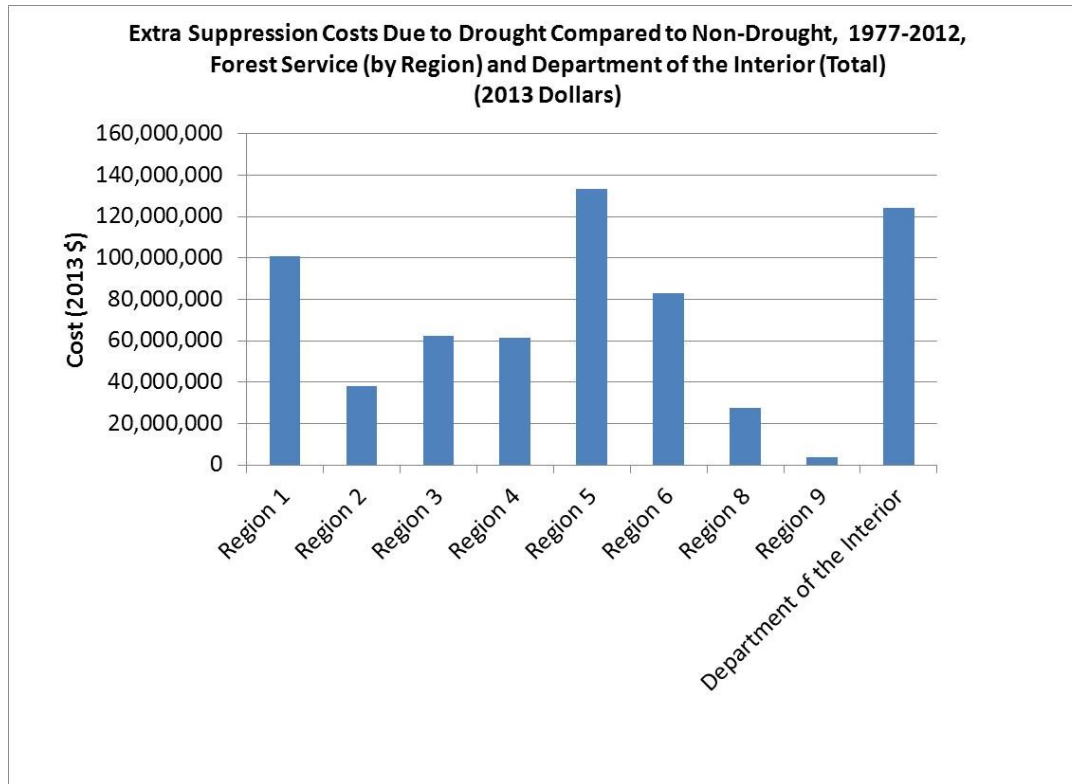


ERC is the National Fire Danger Rating System's Energy Release Component for fuel model G. ERC is a proxy for the amount of fuel available to burn, based on fuel moistures.

From: Riley et al. 2013. The relationship of large fire occurrence with drought and fire danger indices in the western USA, 1984-2008: the role of temporal scale. International Journal of Wildland Fire.
www.publish.csiro.au/paper/WF12149.htm



Wildfire Suppression Cost Effects

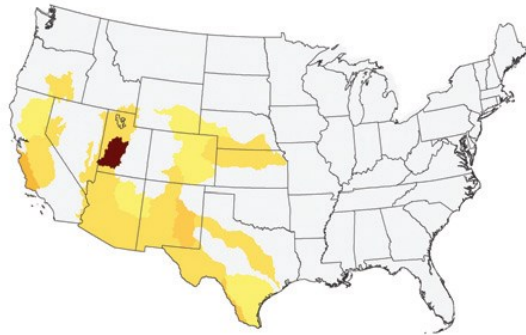


- Note: Based on the August Palmer H-Index < -2 (except Regions 5 and 6—September)
- Average regional impact is \$64m/yr for FS Regions, \$124m/yr for DOI
- All impacts significantly different from zero at 5%



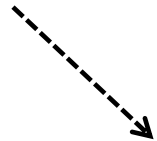
Water Vulnerability

Current and Projected in 2060

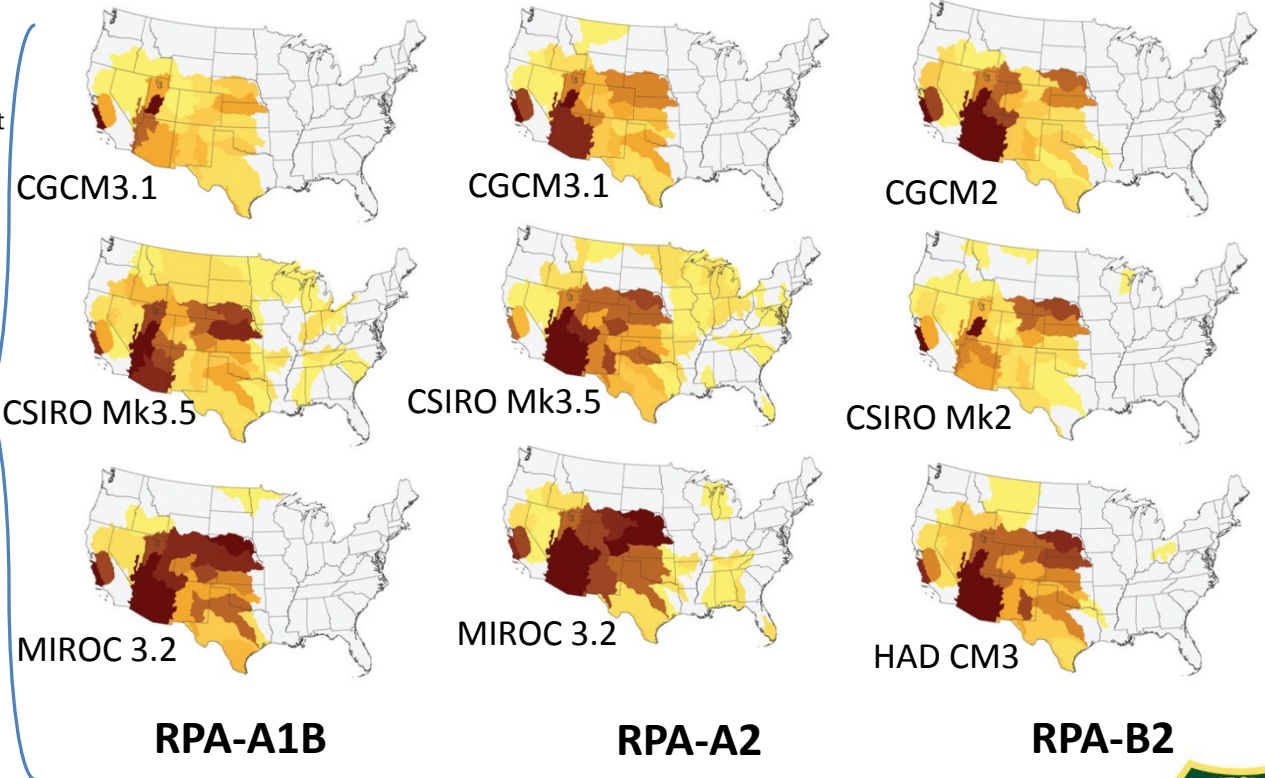


Source: Figure 115, Chapter 12, 2010 RPA Assessment

CURRENT



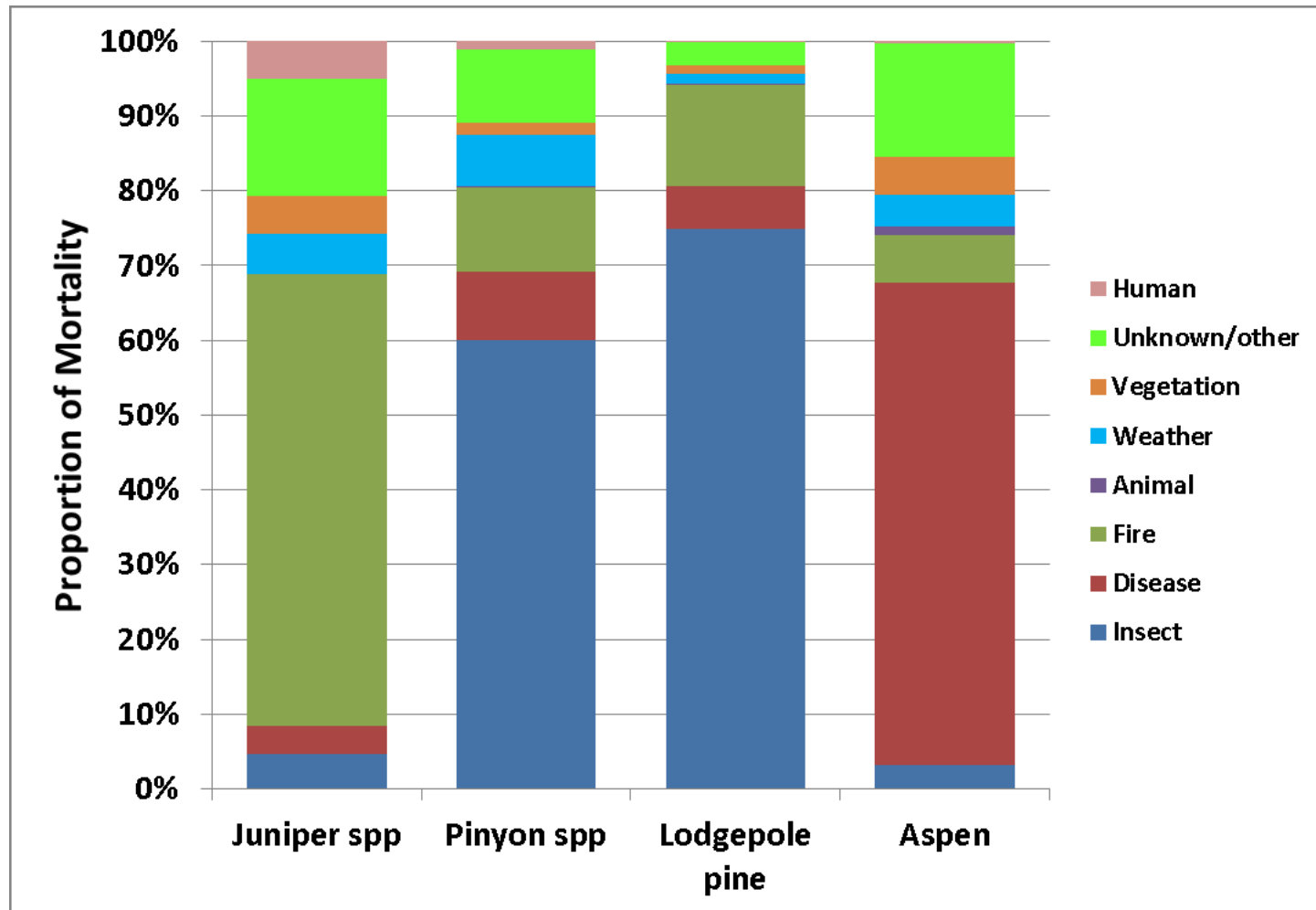
PROJECTED



Source: Figures 117, 118, 119, Chapter 12, 2010 RPA Assessment



Tree Mortality in the West



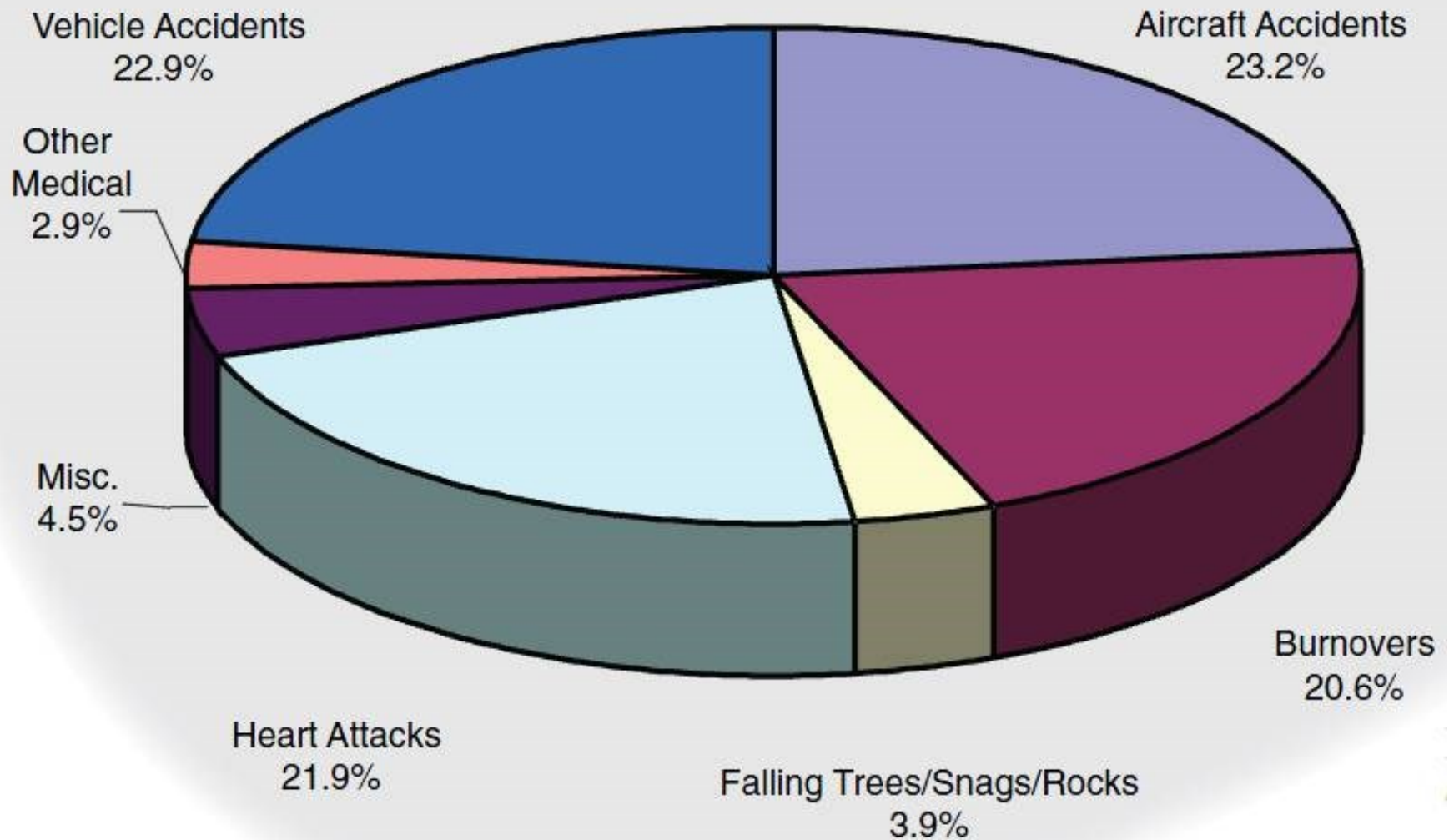
Solutions

- Wildfire
 - Enhanced wildfire prevention of all forms
 - Faster response times to ignitions
 - More efficient fuels management
 - More efficient wildfire suppression
- Water
 - Efficiencies, storage, planning
- Ecosystems (especially in the long-run)
 - Migration corridors?
 - Assisted migrations?
 - Altered management approaches, certainly



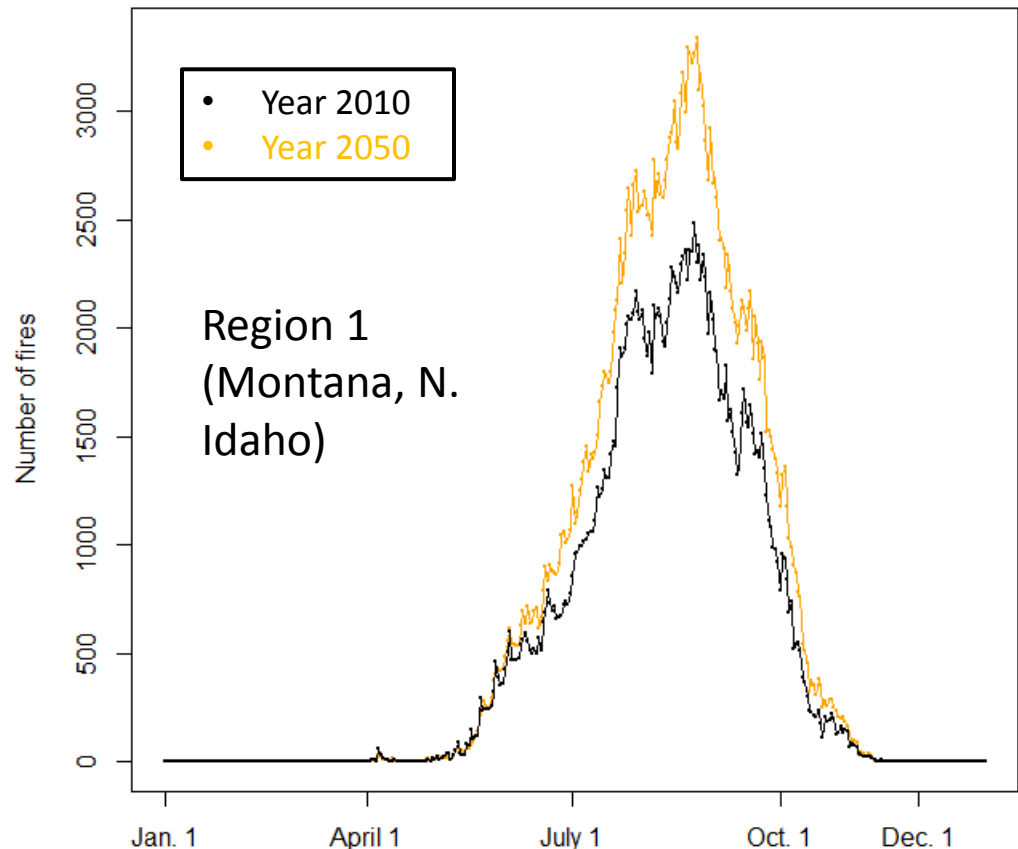
SUPPLEMENTARY SLIDES

Fatalities by Cause of Death From 1990 to 2006



Wildfire Activity Impacts: Climate Change

- Predictions:
 - Temperature increases, which would increase wildfire activity.
 - Uncertainty about changes in precipitation, relative humidity, and winds.
 - Droughts will continue to occur, and may intensify.

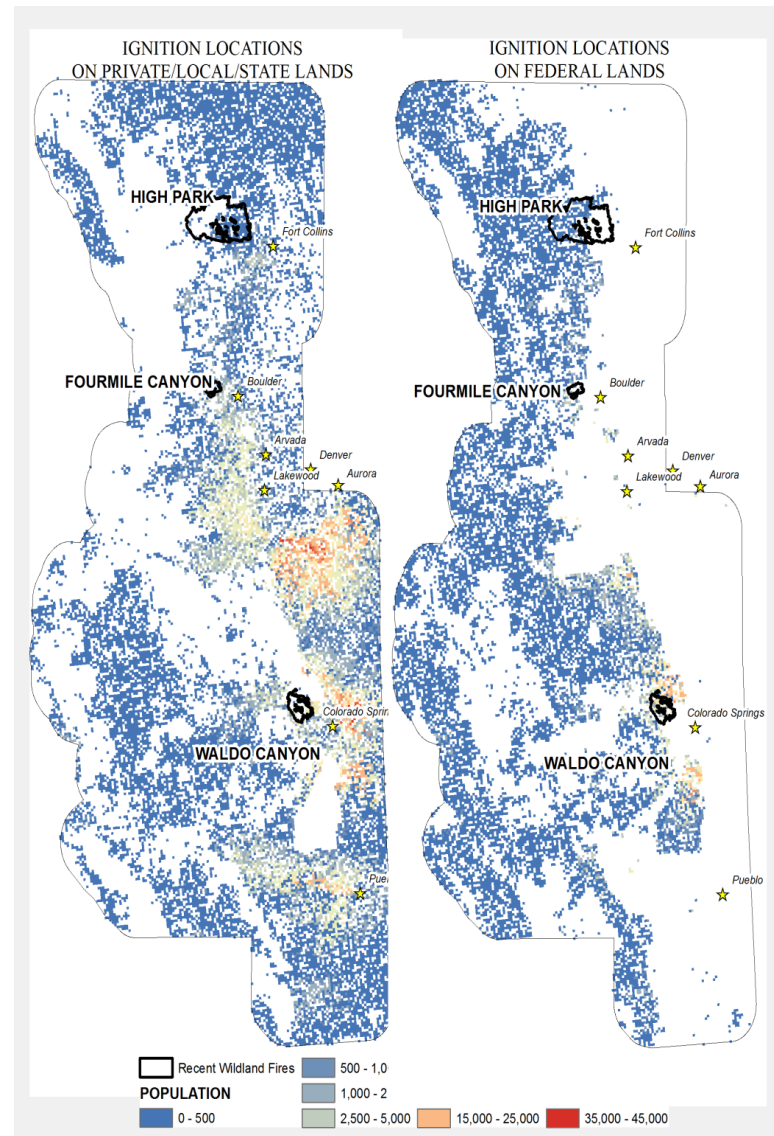
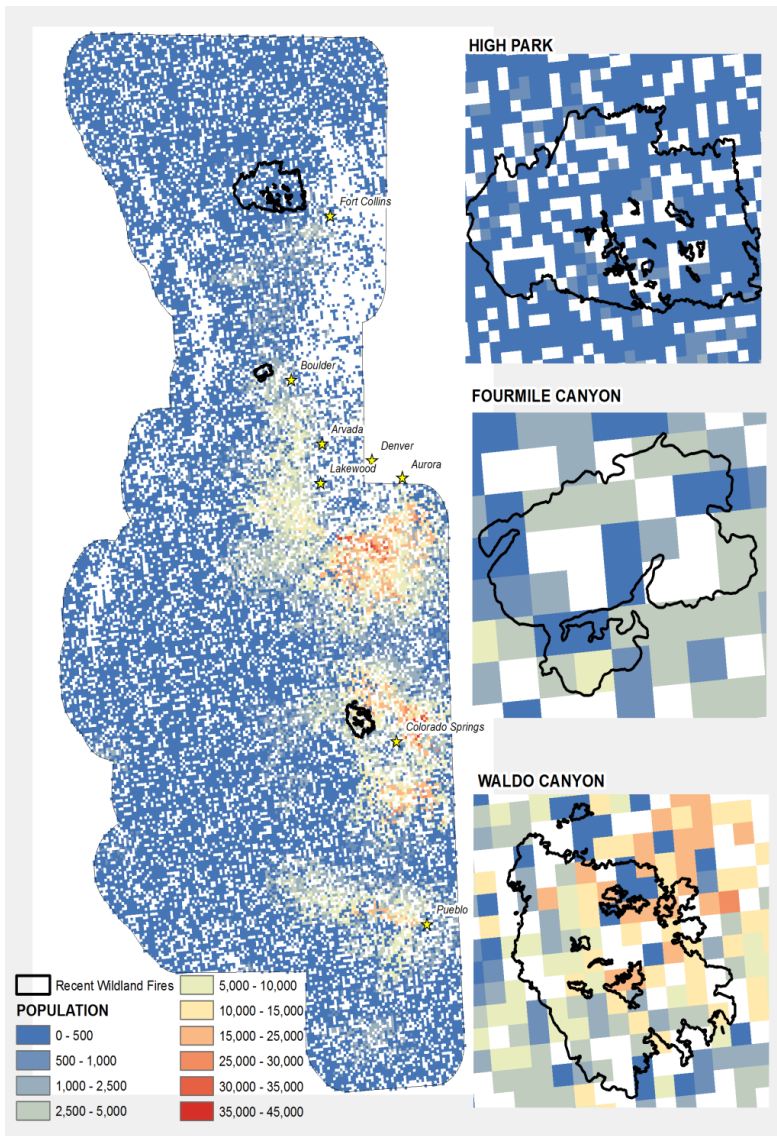


Total number of ignitions per calendar day (summed over the simulation period of 20,000 years).

- More Wildfire

From: Loehman, Riley, et al. USFS Region 1 Climate Change and Fire Synthesis.

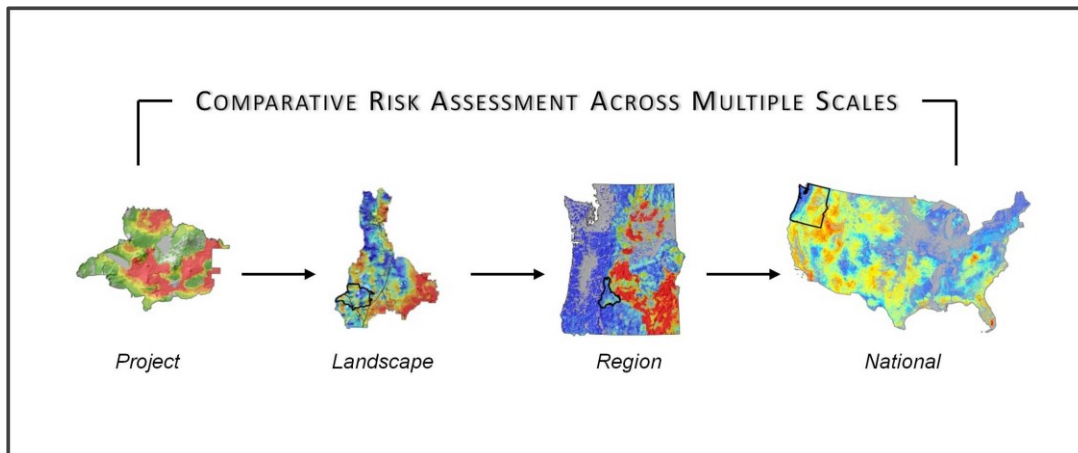
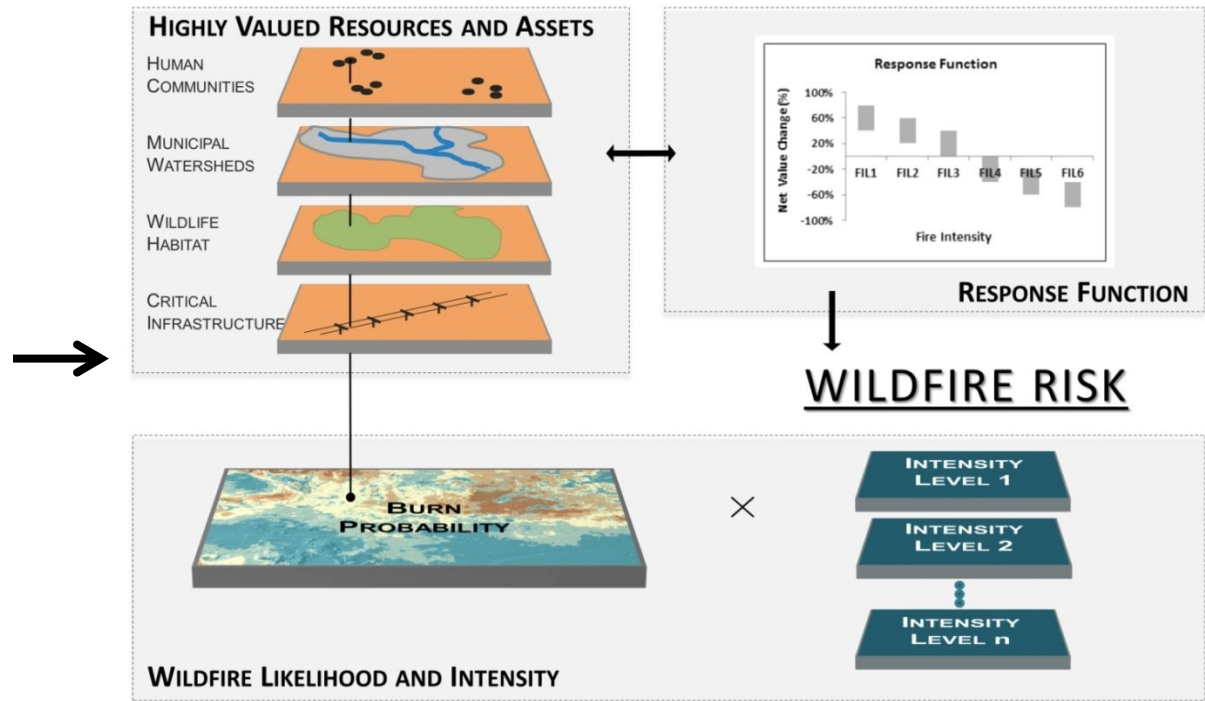




Projecting Future Wildfire Risk

Fire modeling results can be linked with maps of highly valued resources and assets to:

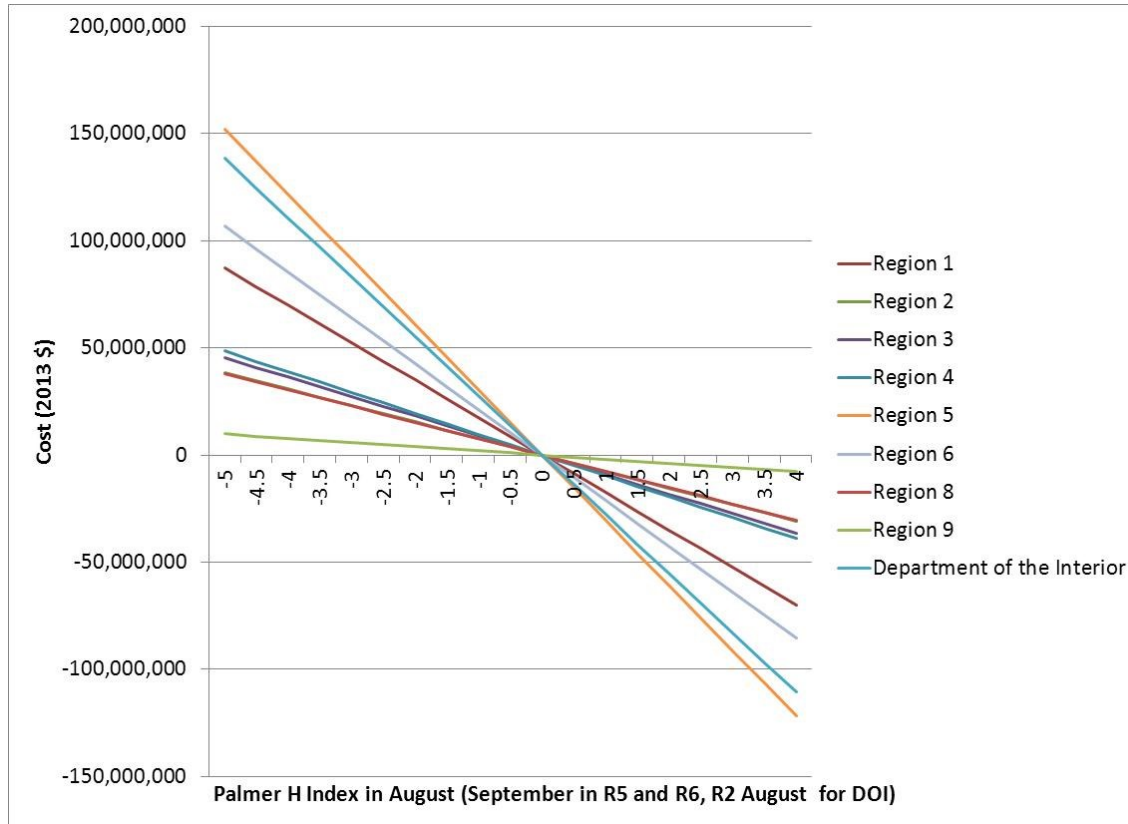
- (1) Determine their likely exposure to wildfire;
- (2) Characterize the potential positive/negative effects of fire; and
- (3) Project differences in exposure and effects under current and future conditions



This basic assessment framework can be used at varying spatial scales



Continuous Drought Impacts on Suppression Costs



- All impacts significantly different from zero at 5%

