



2017 FIRE CONGRESS  
Research Highlight



# Forest Development Following Wildfire in an Old-Growth *Pinus ponderosa* Forest, Southern Cascades, CA

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## MAIN QUESTIONS OR ISSUES THAT YOU ADDRESSED

- How does forest structure change after 20 years of fire suppression in a structurally restored forest?
- How do these structural changes influence potential fire behavior?

## LOCATION AND ECOSYSTEM INVESTIGATED

- Beaver Creek Pinery, Ishi Wilderness, Lassen National Forest, California
- Old growth stand, dominated by *Pinus ponderosa*, mixed with *Quercus kelloggii*.

## KEY FINDINGS OF YOUR RESEARCH

- Forest structure is converging (becoming more homogeneous) over time
- Tree density increased over time (most pronounced for trees <15cm dbh)
- Ratio of pine:oak was lowest immediately following the last fire
- Infilling of canopy gaps (increase in canopy cover)
- Under different weather conditions and fuel loads, the majority of plots are still highly resilient to wildfire

## HOW DID YOU ANSWER THE MAIN QUESTIONS OR INFORM THE ISSUES?

- Field re-measurement study involving two different sampling designs: 1) Nested inventory plots on a grid spanning the entire study area (100m apart) 2) Six, 1-hectare stem map plots.
- Nested plots were first measured in 1998 (4 years post-fire) and remeasured in 2016 (22 years post-fire)
- Stem map plots were first measured in 2000 (6 years post-fire) and remeasured in 2016 (22 years post-fire) - Moran's I auto-correlation conducted on 2000 and 2016 stand data to examine spatial patterns
- Hierarchical cluster analyses was conducted on 1998 and 2016 stand inventories to categorize forest structure
- Fire modelling was conducted using Fuels Management Analyst (FMA Plus); simulations were run at the 80th, 90th, 95th, 98th weather percentiles using two fuel models which represent moderate and heavy fuel loads.

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This research was presented at the 7th International Fire Ecology and Management Congress, which was held in Orlando, Florida, November 28-December 2, 2017 and was hosted by the Association for Fire Ecology, in cooperation with the Southern Fire Exchange.

## HOW MIGHT/WILL IT INFLUENCE FIRE MANAGEMENT DECISIONS OR PRACTICES?

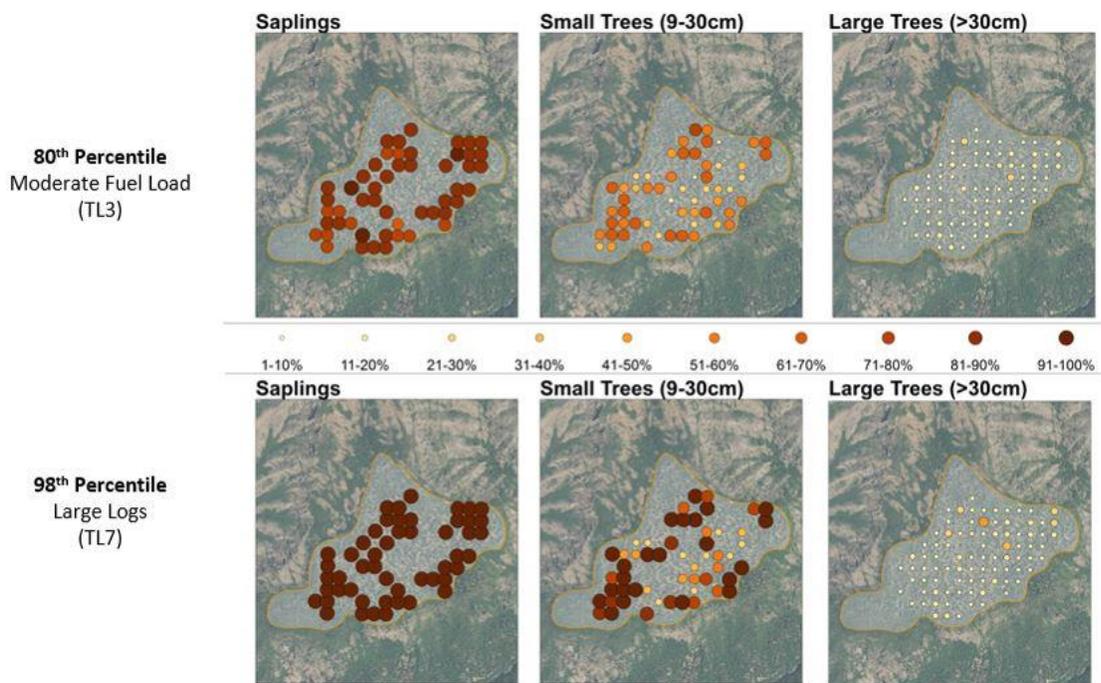
- Managing wildfires, burning appropriate conditions and in sites adapted to frequent wildfire, can help restore structural heterogeneity to fire-suppressed forests
- A structurally heterogeneous forest shows latent resilience to wildfire despite longer than historically experienced fire return intervals.

## WHO IS THE MAIN END-USER OF YOUR RESEARCH?

- Forest and Fire Managers looking to restore and maintain structural heterogeneity in western pine forests.

## CONGRESS SESSION

### Fire Ecology & Effects



**Figure.** Average probability of mortality for saplings, small trees (9-30cm dbh), and large trees (>30 cm dbh) for two wildfire-simulations in a structurally restored Ponderosa pine forest which last burnt in 1994. Top row – mild conditions (80<sup>th</sup> percentile weather and moderate fuel model); bottom row – extreme conditions (98<sup>th</sup> percentile weather, heavy fuel model). All simulations were run using Fuel Management Analyst Plus (FMA plus).