Fire & Healthy Forests

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Our general view of forest fires.

Fountain Fire 1992

- 60,000 acres
- 300 homes
Annual Area Burned
Western States

Arno & Allison-Bunnell 2002 (1915 to 2000) &
National Interagency Fire Center http://www.nifc.gov/fire_info/fire_stats.htm
“The most potent factor in shaping the forest of the region has been, and still is, fire. The general character of the forest, ... in fact almost every phase of its condition has been determined by ... fire.”

J. B. Leiberg
1902

Forest health?

Concept is subjective and adaptive.

Usually related to a condition of a forest based on ecological indicators and collective value judgments of stakeholders.

From Online PowerPoint:
Forest Health – Definitions, Concept, Perceptions.
R.W. Hofstetter, NAU.
Fire Climate - Precipitation Patterns

Graphs showing precipitation patterns for:
- **REDDING, CA**
- **FLAGSTAFF, AZ**
- **YELLOWSTONE LAKE, WY**
- **NORTH PLATTE, NE**
Red dots = Lightning Caused Fires
Blue dots = Human Caused Fires
June 2008 Lightning Fires

Modis Image from NASA World Wind overlaid on Google Earth
33 Fire Scars
Historical, Frequent, Low-intensity fires

Created forests of open structure with low fuels.
Stand Structure & Species Composition
Changes over 20th Century

Fire exclusion has helped lead to increasing stand density.

Original Stand Structure
“...the capacity of a system to absorb disturbance ... while undergoing change so as to retain essentially the same function, structure, identity, and feedbacks...”

Resilience

Forested systems characterized by fire regimes of frequent, mostly low-moderate intensity fires, dominated by large, long-lived trees, are considered resilient if the forested landscape exhibits a generally forested condition, including larger trees, shortly following a disturbing event such as fire.
Resilient?

Fountain Fire 1992

Campbell Fire 1990
Barkley Fire 1994
“The virgin forest is uneven-aged, or at best even-aged by small groups, and is patchy and broken; hence it is fairly immune from extensive devastating crown fires.”

“fire creates a patchy scattered distribution of reproduction”
(Show and Kotok 1924)

Stanislaus NF - 1929

Knapp et al. 2013
Topography

Fire Severity Patterns

Greater %
High Severity

Mid Slope
Intermediate

Greater %
Low Severity

Taylor & Skinner 1998
Topography & Fire Regimes

Fires were limited by topographic features (ridgetops, streams, aspect changes, etc.)

Hayfork Study Area
Rusch and Judd Creek Watersheds

Taylor & Skinner 2003
Skinner, Taylor, Agee 2006
Much information about the effectiveness of fuel treatments is anecdotal.

We are often unable to draw statistical inference from these case studies.

However, the preponderance of the information supports effectiveness of managing fuels.
Cone Fire - Sept. 2002
Blacks Mountain Experimental Forest

Unthinned

Unit 46
LoD
Thinned
+
Prescribe Burn

Thinned
Early 1980s
Unthinned No fuels treatment

Back-to-back photos Across treatment boundary

Thinned with no prescribed burn
Unthinned
No fuels treatment

Back-to-back photos
Across treatment boundary

Thinned & Prescribe Burned
Unthinned
No fuels treatment

Back-to-back photos
Across treatment boundary

Thinned &
Prescribe Burned
Priorities for Fuels Assessments
Stand Scale

- Surface Fuels
- Ladder Fuels
- Crown Fuels
- Maintain Large Fire Resistant Trees

Agee & Skinner 2005
Basic principles of forest fuel reduction treatments.
Forest Ecology & Management 211: 83-96
Cone Fire Effects

A. No Treatment
B. Thinned – No RxBurn
C. Thinned with RxBurn

Ritchie et al. 2007
Climate Change... Where are we headed?

- Fire season getting longer.
- Fuels keep growing.
- Greater probability of intense fires.
Options?