Sierra Nevada
Forest Ecosystem Health

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Talk Outline

• What is forest health?
  – Many different definitions
    • We will look at several

• Forests in the Sierra Nevada
  – Past management activities (fire suppression, harvests) have produced some forests with high fire hazards
  – More susceptible to drought, insects, disease-induced mortality outside of a desired range

• What can be done to address these issues?
Definitions of Forest Health

- Utilitarian to ecosystem perspectives
- Some definitions: presence of dead trees or trees of low vigor – unhealthy
- Maintenance of biodiversity – some definitions relate high biodiversity to healthy ecosystems
- Do definitions vary depending on scale?
  - Individual tree, community, landscape?
  - Research question that will be explored
Healthy Forests Definitions

• A condition where biotic and abiotic influences on forests do not threaten management objectives now or in the future

• A healthy forest is one that resists change and has the ability to bounce back (resilient) after stresses or disturbances
Resistance to Change

• Healthy forests can incorporate disturbances (drought, fire, insects, disease) without mortality outside of a desired range

• Example of Jeffrey pine-mixed conifer forests in the Sierra San Pedro Martir, Baja California, Mexico
  – Forests never harvested, limited fire suppression begins in 1970
Wildfire July 4, 2003

• Fire burned approximately 10,000 acres
• Fire was very patchy
  – directly linked to heterogeneity of forest structure and fuels
• Largest fire in 20 years
• Occurred at end of severe drought (1998-2002), same drought as in Southern California Mountains
Wildfire Impacts

- Approximately 3% of dominant and co-dominant trees killed (study in progress)
- SSPM forest are healthy
  - High resistance
    - Multi-year drought, wildfire, native bark beetles all present, still low mortality
Lake Arrowhead Sept, 2003
Mixed conifer forests, Unhealthy
Fire Problems in the Sierra

- Many ponderosa pine, mixed conifer, and Jeffrey pine forests are vulnerable to uncharacteristically severe fire
- Huge area impacted, what can be done?
- Fireshed analysis (Berni Bahro, USFS R5)
  - Large areas (thousands of acres)
  - Delineated based on fire regime, fire history, fire hazard, potential fire behavior
Landscape Level Fuel Treatments

• Millions of acres have high hazards
• Different treatment patterns can be applied
  – Random, strips, strategic
• Are there differences in wildfire performance with similar area treated?
• Which can be applied easier in real landscapes?
  – Those with diverse ownerships, uses
Sagehen Creek Basin – SPLATs in purple (DEMO ONLY)
Different Patterns

No Treatment

Random

~20% treatment, Mark Finney

Strips

Strategic
Strategically Placed Area Treatments

Treated Areas

Flanking Lower ROS & Intensity

Headfire
Forest Health in the Sierra

• Fire performance: modeling approach used
  – Otherwise areas would have to be burned by wildfire (this will happen)
• How can forest health be evaluated?
• Do definitions vary depending on scale?
  – Individual tree, community, Fireshed?
  – Research question that will be explored
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My papers available at
www.cnr.berkeley.edu/stephens-lab/people.htm
Hit the link to my testimonies and pubs by my picture