Overview of Wildland Fire Occurrence and Trends in the United States

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– Magnitude and trends of wildland fire in U.S.

– Approaches to increasing resilience to wildland fire ecological, community, institutional

– Forest Service Fire Research Portfolio
Acres Burned in the Western U.S.
(Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming)

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<td>Acres (Millions)</td>
<td>0.1</td>
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Sweat Farm Road/Big Turn Around/Bugaboo
Georgia and Florida 2007
November Wildfires California 2008

Wallow Fire, Arizona, 2011
Los Conchas, New Mexico 2011

Texas 2011
Maximum Fire Size

Number of Large Fires/Year

Number of large fires increasing: 7/year  Prob < .03

Karin Riley
Area Burned/Year

Total area burned increasing: 40,716 hectares/year (about 100K acres)

Prob < .02
Karin Riley

Fire Severity

Proportion of Area Burned at High Severity

Karin Riley
Higher temperatures will increase burn areas in the West

Legend:

- Red: at least 6 times more
- Dark red: 5-6 times more
- Orange: 4-5 times more
- Yellow: 3-4 times more
- Light yellow: 2-3 times more
- Light green: up to 2 times more

How much more area will burn each year if temperatures rise 1.8°F:

National Research Council 2011
Adaptation Strategies

- Reduce exposure to the impacts
- Promote resilience
- Facilitate transitions
- Avoid maladaptive response

Vulnerability and Resilience
3 Dimensions

Ecological
Community
Institutional
Ecological Vulnerabilities

• Potential for cascading effects
• Compounded by interactions with other stressors
• Unknown, unfolding impacts of climate change

Strategies for Increasing Ecological Resilience

• Increasing landscape heterogeneity
• Increasing the relative amount of fire that burns under moderate conditions
• Decreasing stand density, understory tree density, and surface fuel loadings in forest types that historically burned in frequent, low-severity fires.
Fire itself is our most important tool for increasing ecological resilience to fire

Community Vulnerabilities

- Unequal risks—weather patterns, fuel configurations, development patterns.
- Communities vary in their capacity to prepare for and recover from extreme events—especially vulnerable: poor communities, rural communities, indigenous people.
Structures burned in Wildland Fires

![Map showing structures lost to wildfire 1999-2011](image)

Structures burned in Wildland Fires

![Bar chart showing number of structures lost to wildfire 1999-2011](image)
How does this compare to home losses from other hazards?

• In 2011, 370,000 home fires, of which around 4500 were burned in wildland fires

• Insured loss Waldo Canyon $352.6 million

• As contrast June 2012 hailstorm in Dallas $1 billion

Strategies for Increasing Community Resilience

Waldo Canyon, Colorado 2012
Research Findings Indicate:
The home characteristics and the area surrounding the home within 100 feet principally determine the potential for home ignitions during extreme wildland fires.
Missionary Ridge Fire
June 2002
Firewise Communities

**FOLLOW THESE GUIDELINES**

1. Thin tree and brush cover
2. Dispose of slash and debris left from thinning
3. Remove dead limbs, leaves and other litter
4. Stack firewood away from home
5. Maintain irrigated greenbelt
6. Mow dry grasses and weeds
7. Prune branches to 10 ft. above the ground
8. Trim branches
9. Clean roof and gutters
10. Reduce density of surrounding forest

Institutional Vulnerability

- Fire suppression as a proportion of total Forest Service budget
  - 13% in 1991; 49% in 2012

- Responding to extreme events may swamp our capacity to prepare for them

  e.g. Wallow fire, Arizona, 2011.
  538,049 acres, over $100 M

- Fire Transfer – can reduce our ability to accomplish our mission
Fatalities

Institutional Resilience

• Understanding where we came from
• Looking to the future (Quadrennial Fire Review)
• Capacity building
• Technology
• Research
Forest Service Research

• Research is itself a powerful tool for increasing resilience -- ecological, community, institutional
• The largest forestry research institution in the world
• Seven research stations and 80 experimental forests and ranges

Strategic Plan for Wildland Fire and Fuels Research and Development Within the U.S. Forest Service
Forest Service Fire Research Portfolios

• Physical Fire Sciences
  – physics of combustion
  – heat transfer
  – computation fluid dynamics models,
  – emissions and atmospheric chemistry

• Ecological Fire Sciences
  – fire history
  – fire effects
  – landscape dynamics

• Social Fire Sciences
  – economics
  – public interactions
  – organizational behavior

• Fuels and Fire Management
  – effects of landscape management strategies at multiple scales
  – effects of treatments and other human impacts on ecosystem components
  – biomass utilization, product development, and forest operations associated with fire and fuel management activities

Thank You