

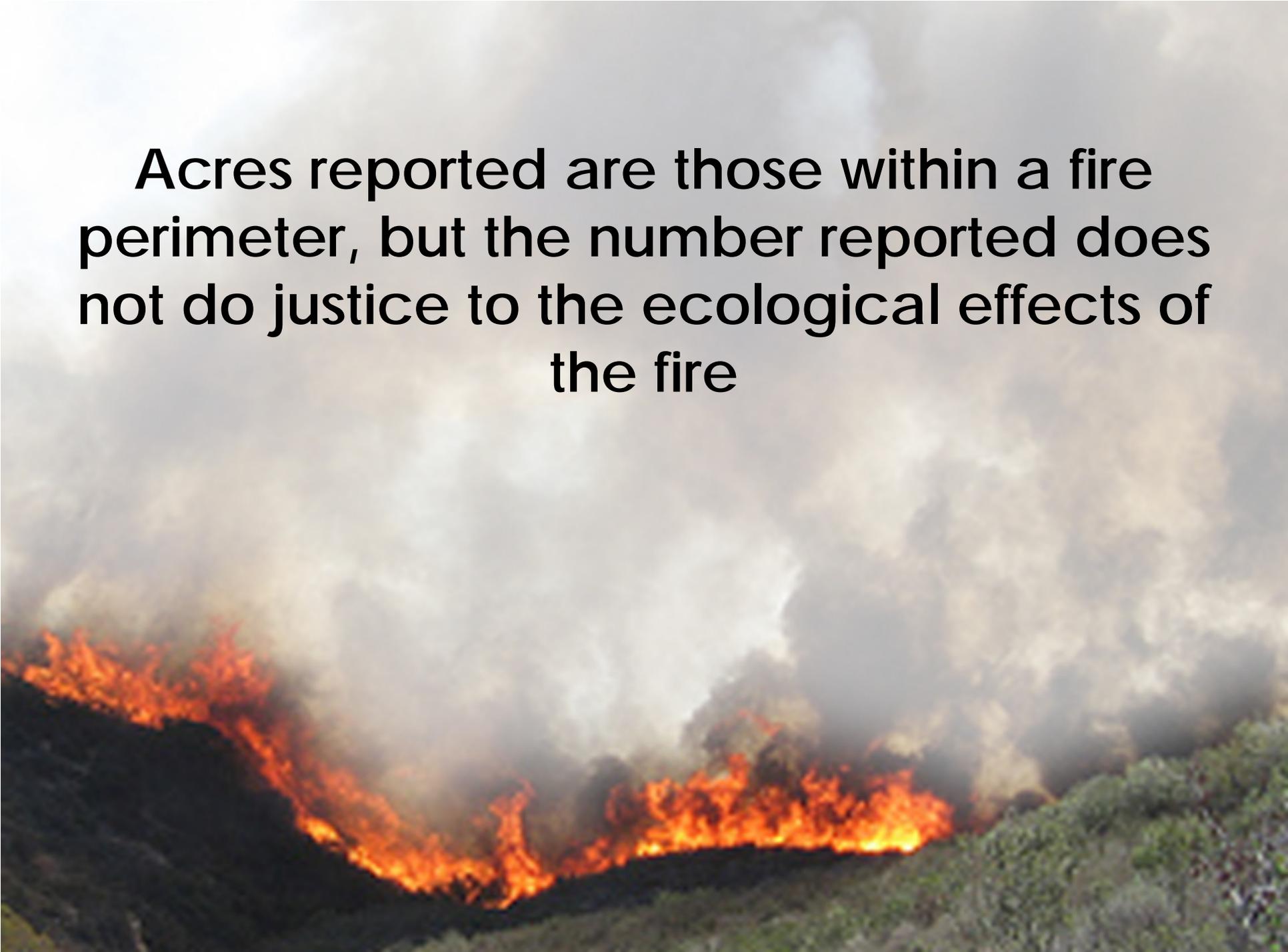
**When numbers don't tell the whole story  
—a closer look  
at fire severities on large fires from the  
Southwest's 2011 fire season**

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# Analysis Objectives

- Question is more than just how many acres experienced fire, also how did they burn?
- Use remotely sensed burn severity maps to take a closer look at burn severities on large fires from the 2011 fire season
- Compare burn severities to historical based on fire regime groups and vegetation types.

**Acres reported are those within a fire perimeter, but the number reported does not do justice to the ecological effects of the fire**



# Fire Season of 2011 was a historic one-- Over 2,000,000 acres in Arizona and New Mexico experienced fire

*“This year will be remembered as the year of the massive blazes, with three among the state's top 10:*

- *◆The Wallow Fire, the state's largest at 538,049 acres.*
- *◆The Horseshoe Two Fire, fourth-largest at 222,954 acres.*
- *◆The Murphy Complex Fire, ninth-largest at 68,078 acres.*

*“The 2011 fire season stands unrivaled in its destruction of wildlands due to an early-summer combination of extremely dry weather and windy conditions that fed several monster fires that tore through hundreds of thousands of acres of forest and grasslands.”*

*-The Arizona Republic, August 8, 2011*

**New Mexico joins Arizona and Texas  
with record breaking wildfire seasons**

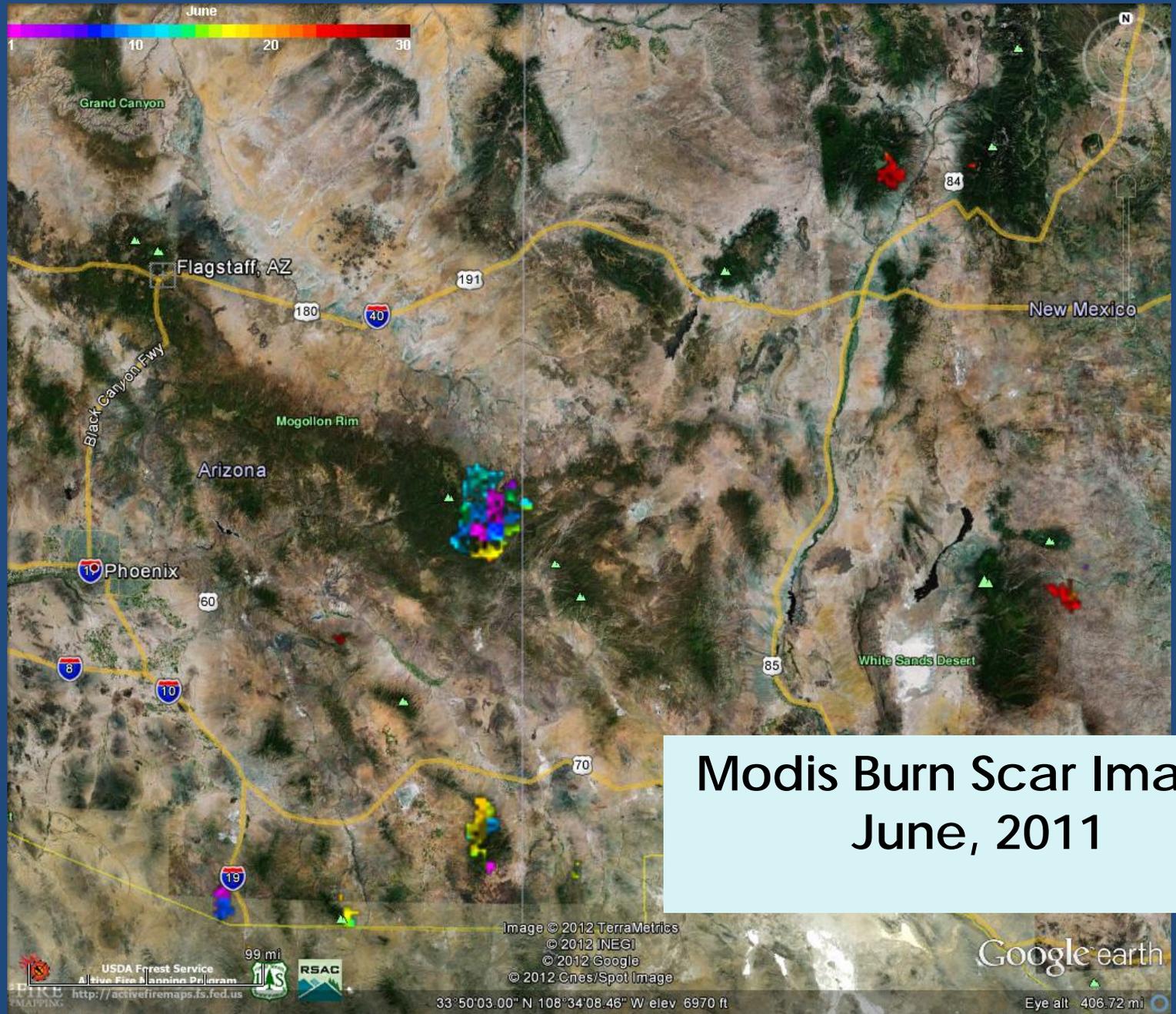
**Arizona wildfire sets new  
record at 469,000 acres**

**Wildfire season off to a raging  
start across Southwest, South**

Area the size of Connecticut has burned; drought, La Nina blamed for reduced moisture

**Horseshoe 2 fire becomes 5th largest  
wildfire in Arizona history**

**Las Conchas fire near Los Alamos  
largest in New Mexico history**



Modis Burn Scar Image, June, 2011



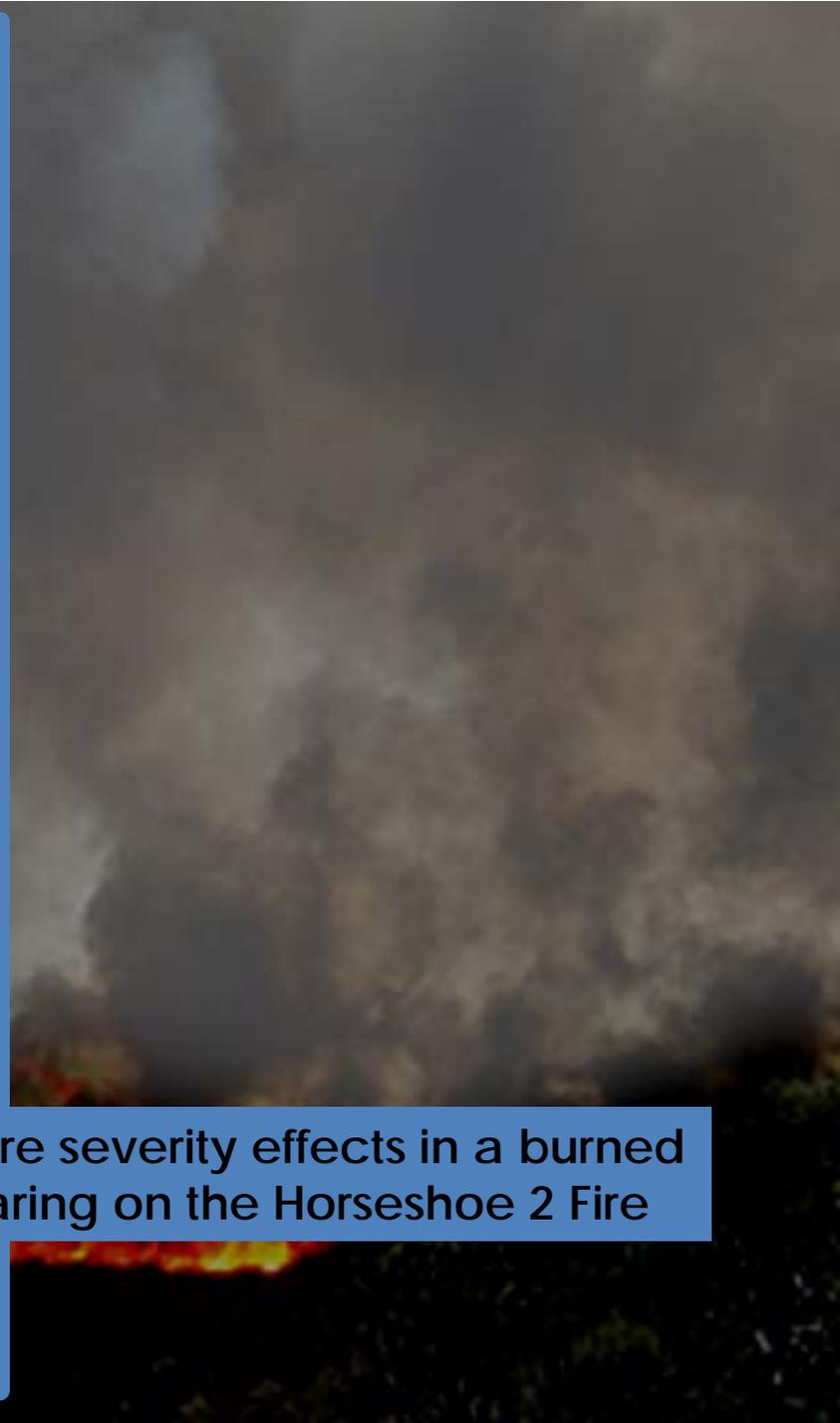
Wallow Fire moves along forest floor, May 31<sup>st</sup>. Picture courtesy of Inciweb



Crown fire behavior on the Wallow Fire  
Picture courtesy of Inciweb



Low fire severity effects in a burned clearing on the Horseshoe 2 Fire





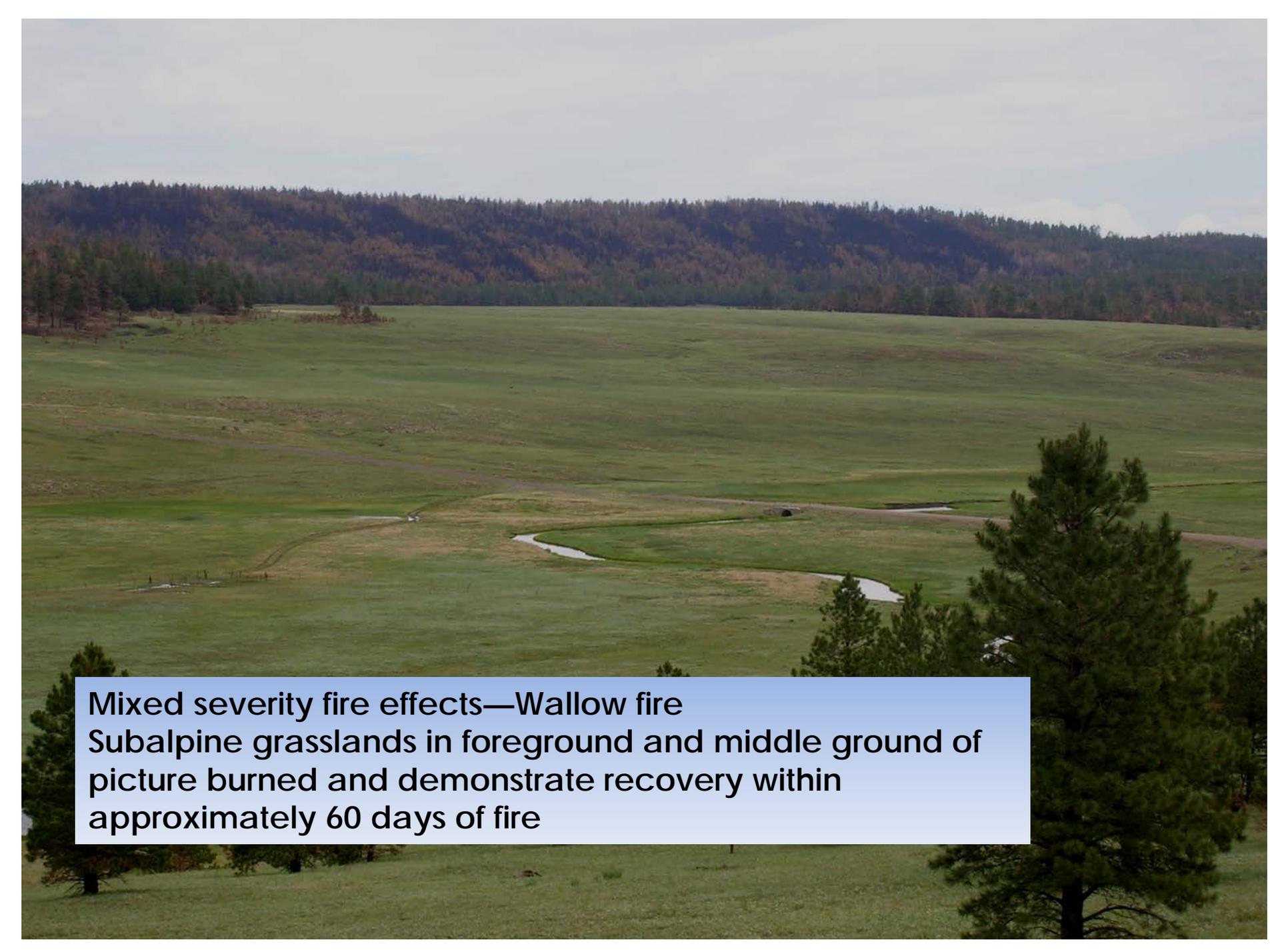
High fire severity effects on the Horseshoe 2 Fire



Miller Fire – May 8, 2011



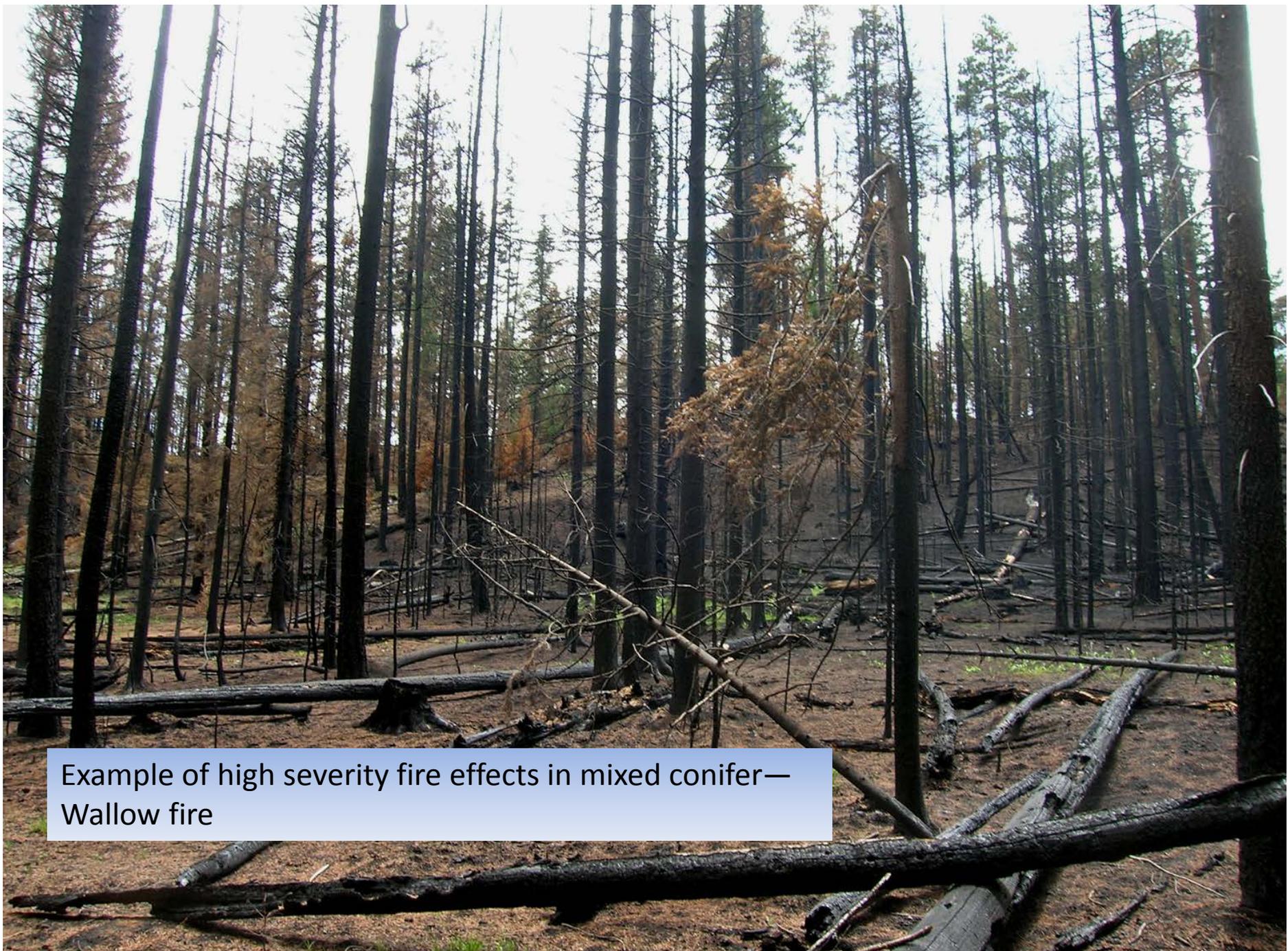
Mixed severity fire effects—Wallow fire



Mixed severity fire effects—Wallow fire  
Subalpine grasslands in foreground and middle ground of picture burned and demonstrate recovery within approximately 60 days of fire



Low severity fire effects in dry mixed conifer—  
Wallow fire



Example of high severity fire effects in mixed conifer—  
Wallow fire

# Methods

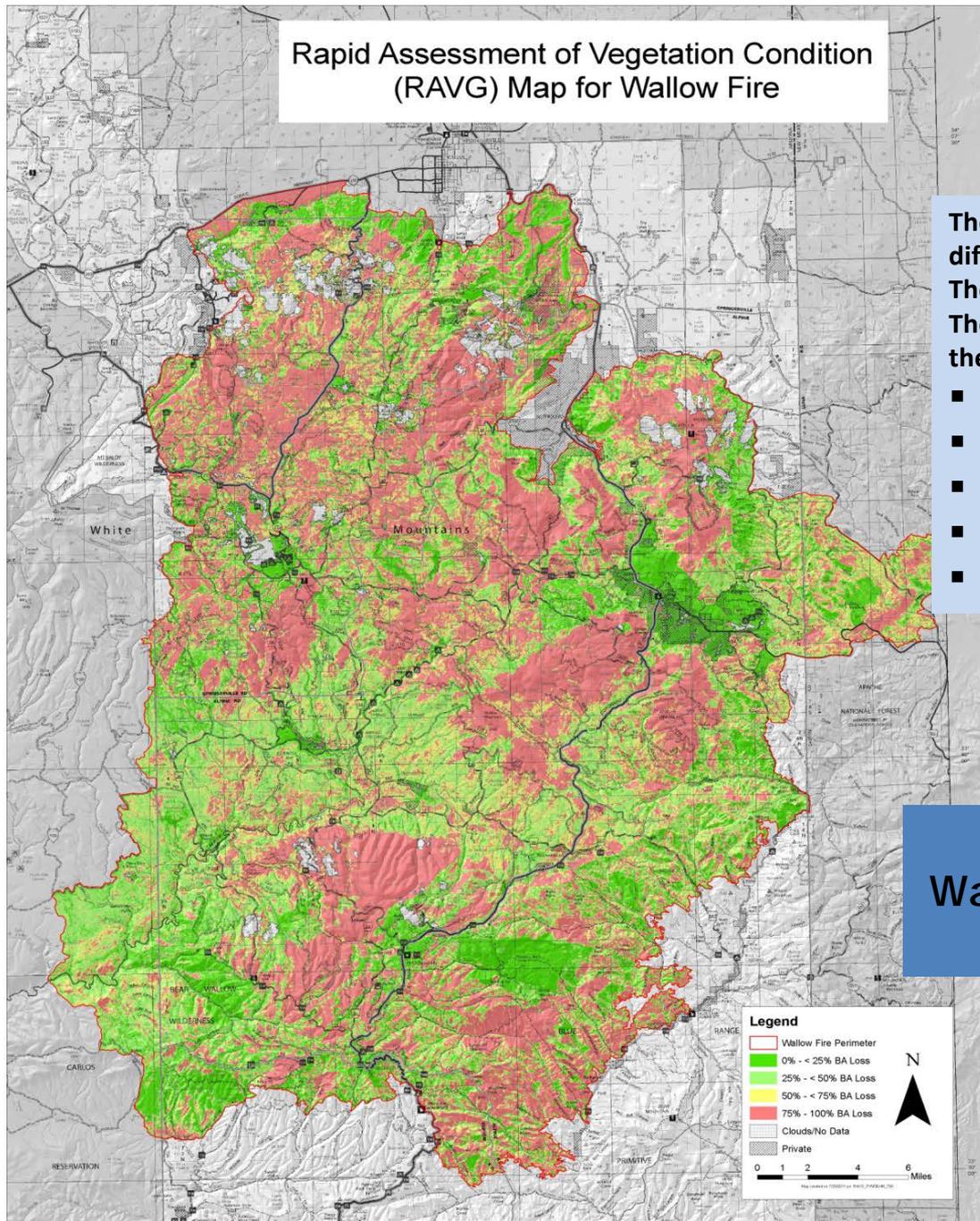
**Examined 8 of the largest 2011 fires in the southwest**

**(approximate acres)**

Fire Name	Cause	Size	Date Started
Wallow	Human	538,000	5/29/2011
Horseshoe 2	Human	240,000	5/8/2011
Las Conchas	Human	146,000	6/26/2011
Miller	Human	89,373	4/28/2011
Murphy	Human	67,000	5/30/2011
Last Chance	Human	58,000	4/24/2011
Mayhill	Human	33,000	5/9/2011
Monument	Human	30,000	6/12/2011

**Compared RAVG BA severity with biophysical setting and the expected historical fire regime from LANDFIRE data**

## Rapid Assessment of Vegetation Condition (RAVG) Map for Wallow Fire



The RAVG products are modeled from the Relative differenced Normalized Burn Ratio (RdNBR) (Miller & Thode 2007).

The final basal area loss layer is coded as four classes for the final product:

- Class 0 = outside fire perimeter
- Class 1 = 0% - < 25% BA loss
- Class 2 = 25% - < 50% BA loss
- Class 3 = 50% - < 75% BA loss
- Class 4 = 75% - 100% BA loss

RAVG map produced for the Wallow Fire by the Remote Sensing Applications Center

# BioPhysical Settings and Fire Regimes

- We focused on 4 BioPhysical Settings in two fire regimes that experienced fire in 2011
  - Fire Regime 1 – Frequent (0-35years) Low severity
    - Lower Montane Pine Oak
    - Ponderosa Pine Woodlands
  - Fire Regime 3 – mod frequency (35-100+) mixed severity
    - Piñon-Juniper Woodlands
    - Montane Mesic Mixed Conifer

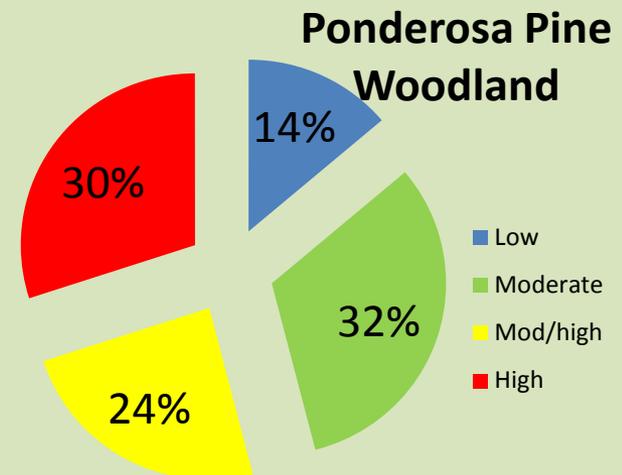
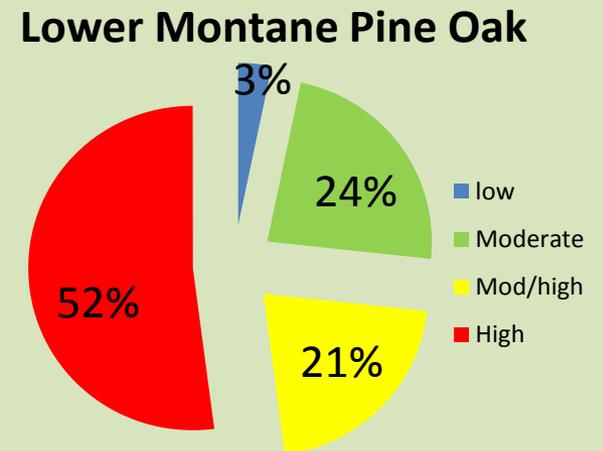
# Results

- Results from all 8 fires by Fire Regime for 4 BioPhysical Settings
- Results specific to individual fires

# Results from all 8 fires

## Frequent Low Severity Regimes

- Lower Montane Pine Oak forests
  - Burned on 4 of the 8 fires
    - Total of 97,454 acres
- Ponderosa Pine Woodlands
  - Burned on 4 of the 8 fires
    - Total of 300,000 acres

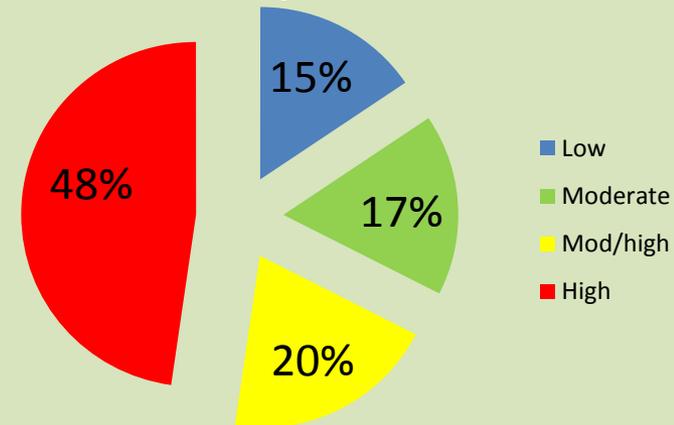


# Results from all 8 fires

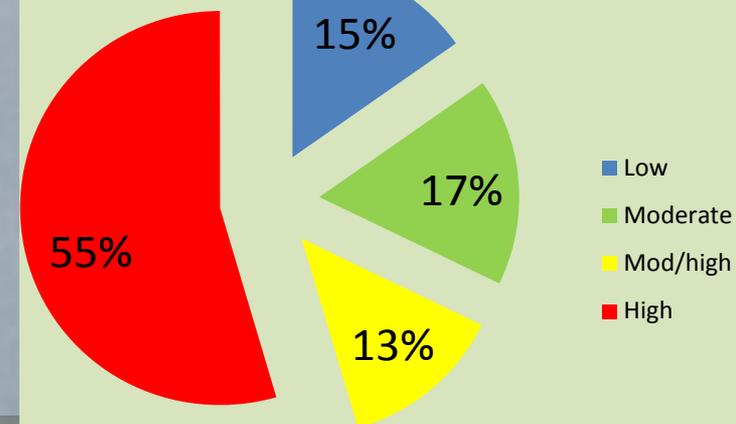
## Mod Frequency Mixed Severity Regimes

- Piñon Juniper Woodlands
  - Burned on 5 of the 8 fires
    - Total of 126,000 acres
- Mesic Montane Mixed Conifer
  - Burned on 2 of the 8 fires
    - Total of 84,000 acres

Piñon Juniper Woodlands



Mesic Montane Mixed Conifer



# Results Specific to Fires

BPS Name	Severity	Las Conchas		Miller		Wallow		Mayhill	
Ponderosa Pine Woodland	Low	6,692	22%	4,309	26%	29,586	12%	424	8%
	Moderate	6,046	20%	7,779	46%	81,022	33%	617	12%
	Mod/high	5,052	16%	3,232	19%	62,211	25%	774	15%
	High	12,987	42%	1,435	9%	71,297	29%	3,339	65%

# Results Specific to Fires

BPS Name	Severity	HorseShoe2		Miller		Monument		Murphy		Mayhill	
Piñon Juniper Woodland	Low	9,945	14%	7,155	23%	611	8%	1,190	14%	753	9%
	Moderate	9,149	13%	9,277	30%	1,079	13%	1,217	14%	757	9%
	Mod/high	12,981	18%	6,970	23%	1,721	21%	2,011	24%	1,313	15%
	High	38,866	55%	7,076	23%	4,636	58%	4,084	48%	5,684	67%

# Conclusions

## Fire size isn't the whole story

- How did those acres burn and in what ecosystem type?
- How would they have burned historically? How departed have they burned?
- The concern should be with areas that burn outside of historical conditions
- Severity analyses should include field data (CBI Plots) and should also be examined 1 year post fire.
- Severity analyses also indicate potential areas for insect population concerns and fuel treatment needs.