


Landscape-Level Fire Characteristics in Spanish Creek Watershed

UC Berkeley 
Fire Science Lab

Professor Scott Stephens

Dr. Brandon Collins

Jason Moghaddas

Dr. Emily Moghaddas

Dr. Kurt Menning



Research Focus

How do fuel treatments affect landscape-level potential fire behavior in the Spanish Creek Watershed?

2007 Wheeler fire from
Genesee Valley



General Study Area

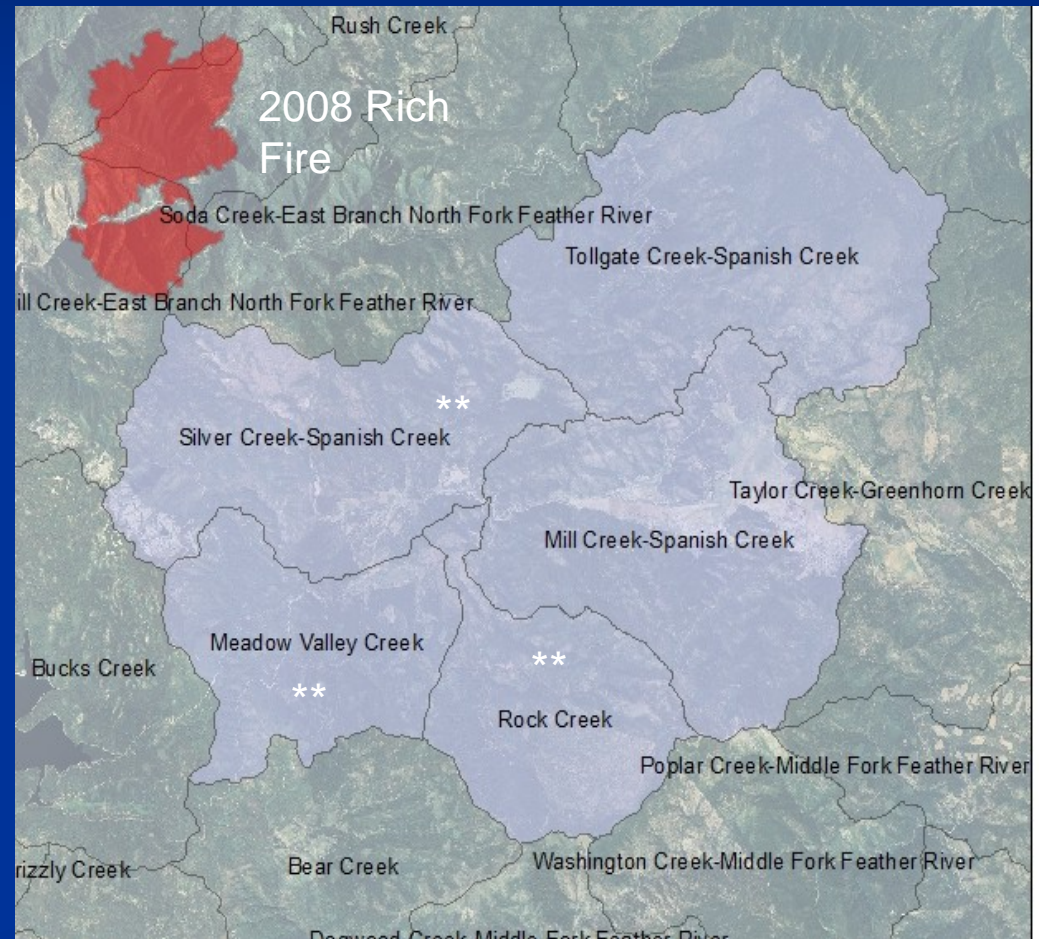
**Spanish Ck watershed,
Treatments completed**

Mixed conifer forest

**Fuel treatments:
Meadow Valley Project**

**Several wildfires in past
decade: 2008 Rich Fire**

**Assisted in calibration
of fire modeling**



Study Area Detail

46,000 acres

Multiple Land Allocations:

Deferred -1%

Offbase <1%

Spotted Owl Habitat Area -1%

Home Range Core Area -14%

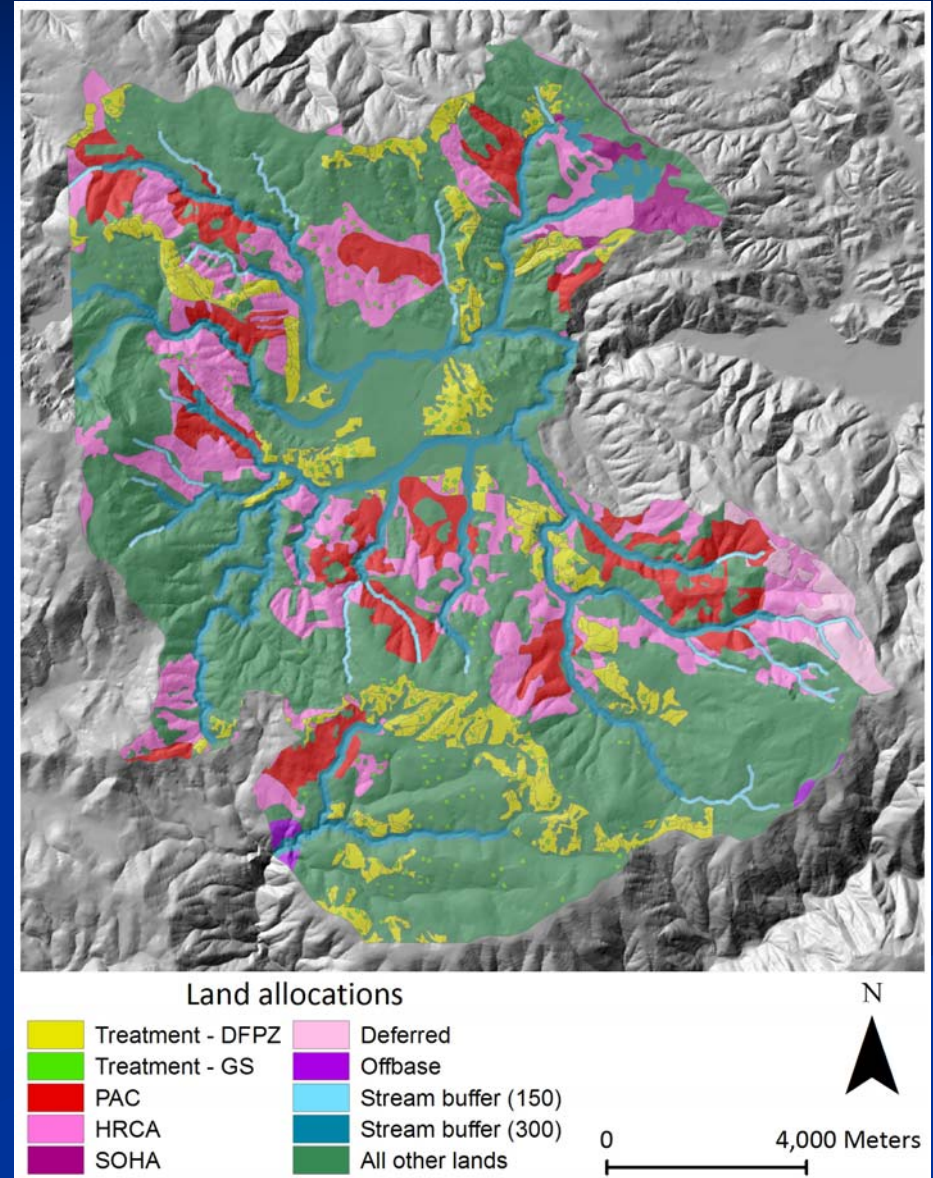
Protected Activity Center - 9%

Riparian Habitat Conservation Area
(150' & 300' buffers) -12%

Defensible Fuel Profile Zone - 9%

Group Selection - 1%

Other National Forest Lands – 53%

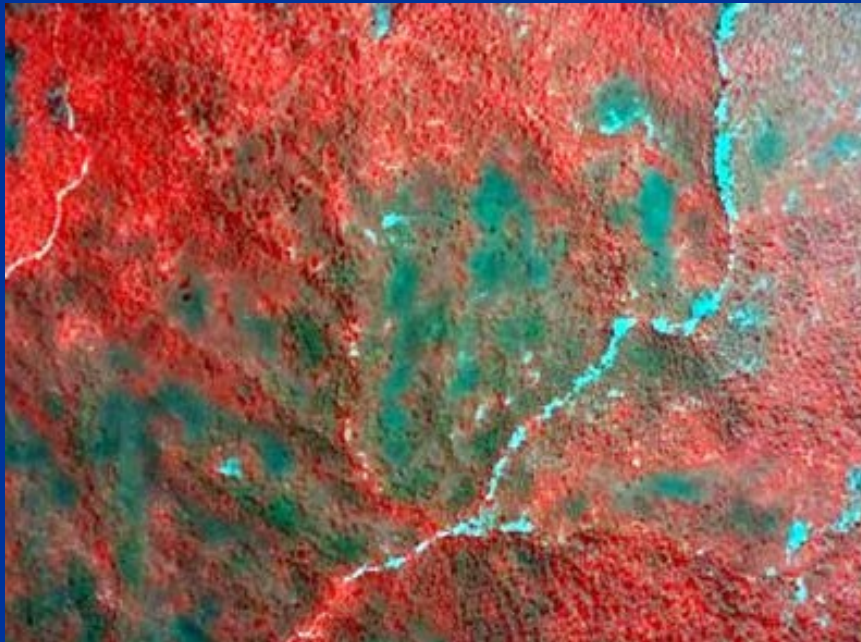


Building the “Virtual Landscape”

High resolution IKONOS imagery used to assess fine grain forest structure and build base FLAMMAP and FARSITE landscape

Overlaying *actual* treated DFPZ's and Groups in the Meadow Valley Project

FLAMMAP values were adjusted to reflect the range of values observed in pre & post-treatment field data collected from the Guard and Waters projects



FLAMMAP landscape further calibrated to accurately “remodel” the approximate the size and post-fire effects of the 2008 Rich fire

This was important

Burning with FLAMMAP

The landscape was burned at 97th percentile weather conditions

Weather Calculated from Cashman RAWS, filtering data for all weather between, June 1 - Sept 30, 2002-2008

Fuel Moisture (%)						Windspeed from Cashman RAWS	
1-hr	10-hr	100-hr	1,000-hr	Herb	Woody	1-Minute Windspeed	Wind direction
1.2%	2.1%	5.5%	6.4%	35.4%	60.7%	25 mph	225°

Winds vectored to 10m accuracy using "WindNinja"

Conditional Burn Probability Parameters

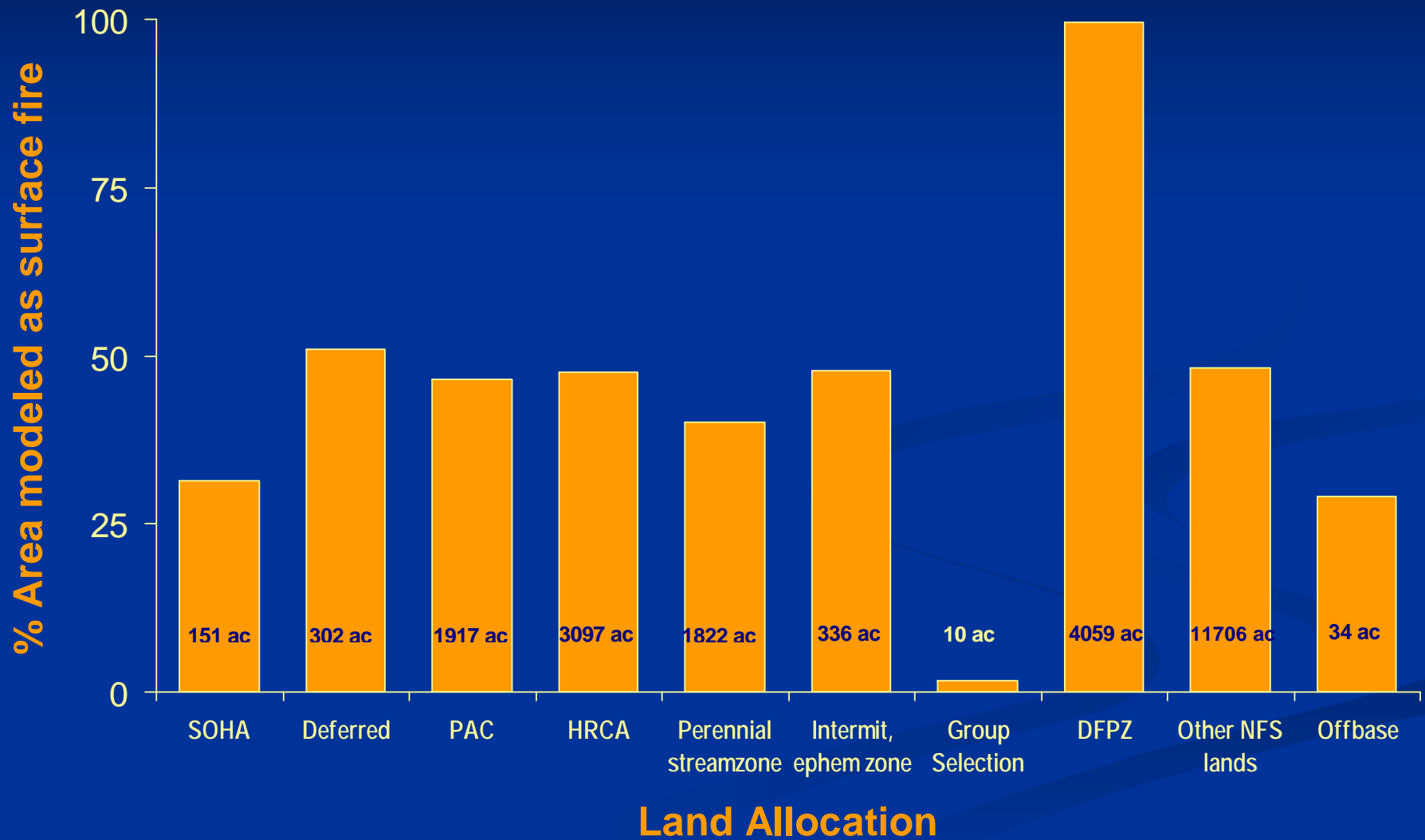
Fire probability in study area: FLAMMAP

30 meter node resolution

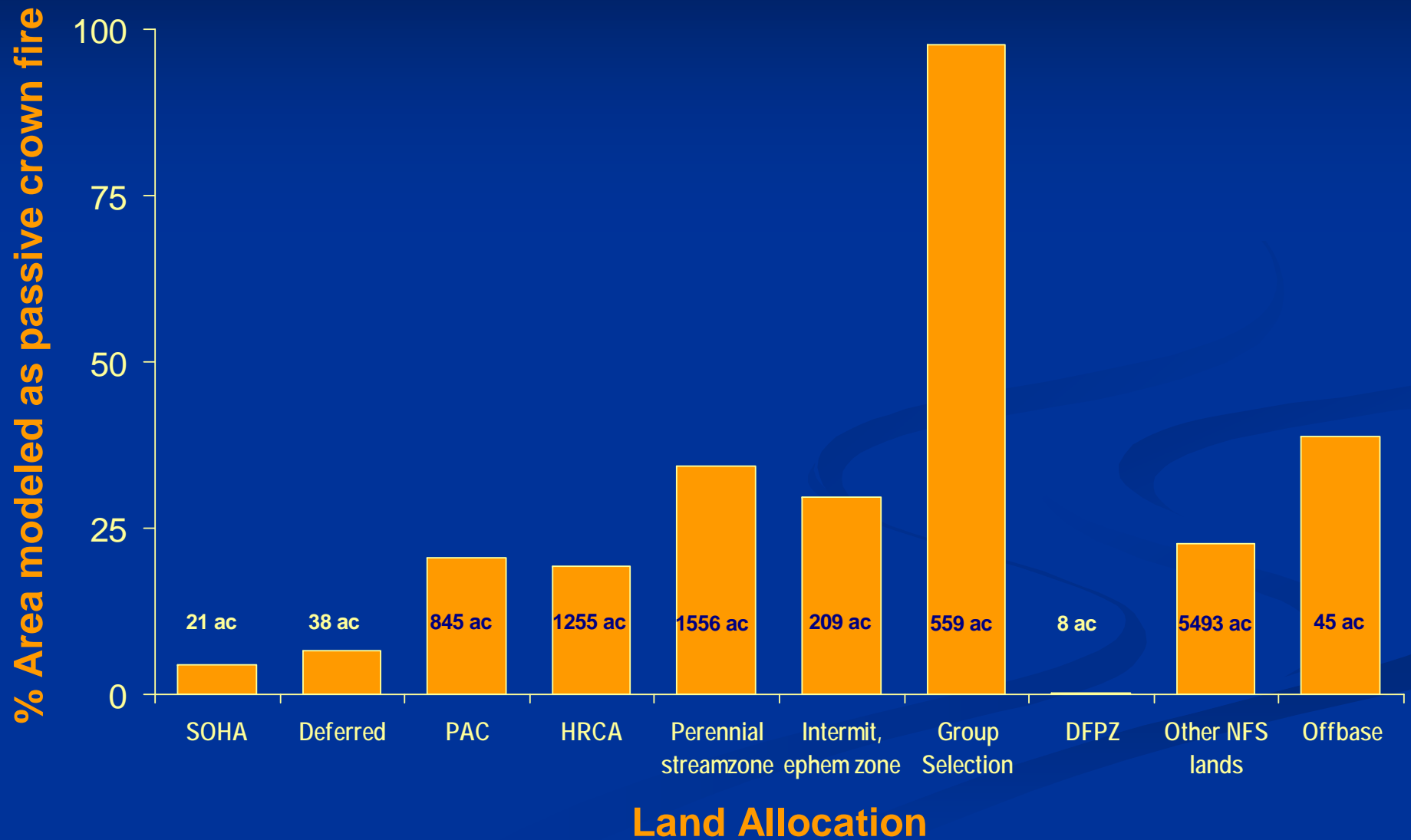
**Max simulation time three 5-hour burning periods
(900 minutes)**

Number of random ignitions = 1,000

Modeling results: Surface Fire



Modeling results: Passive Crown Fire



Modeling results: Active Crown Fire

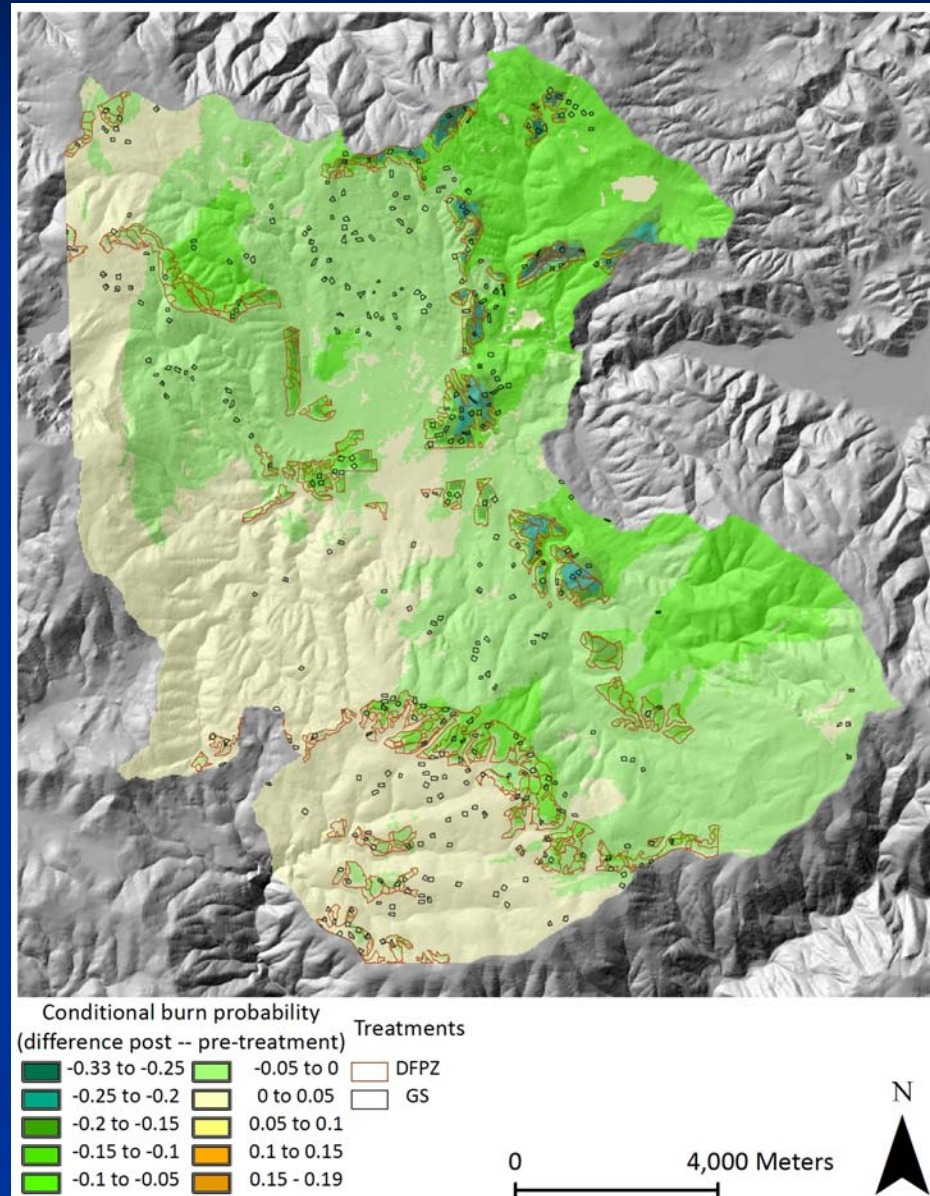


Change in Burn Probability

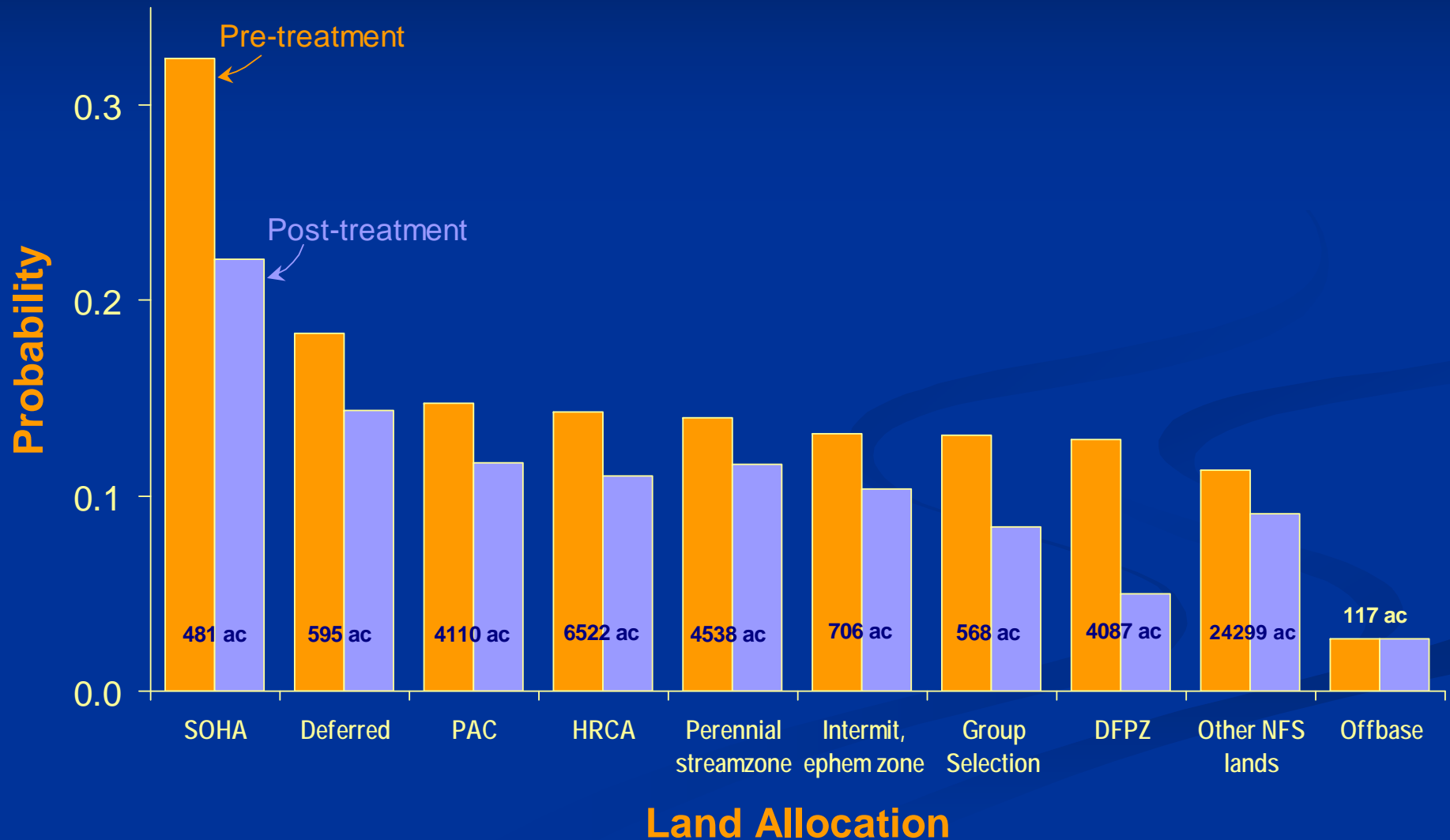
Post treatment – Pre
treatment landscape

Green color, lower
probability of burning

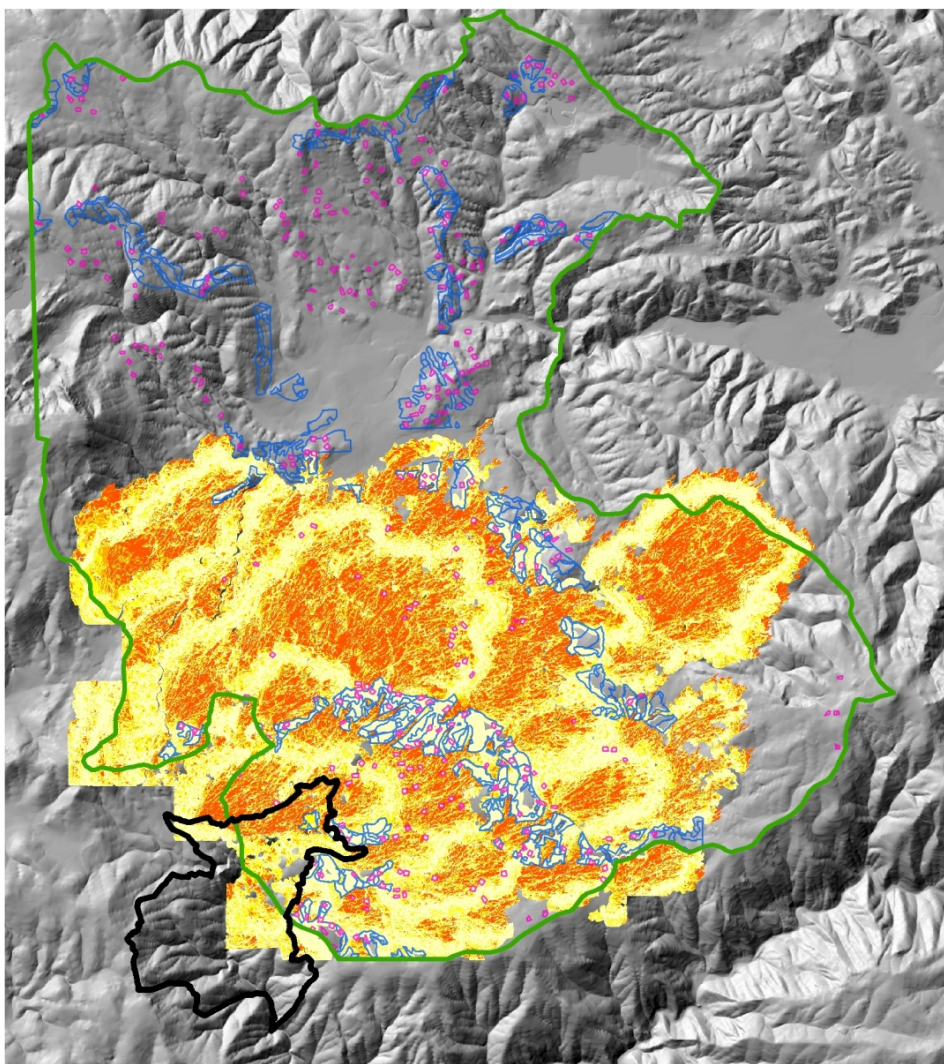
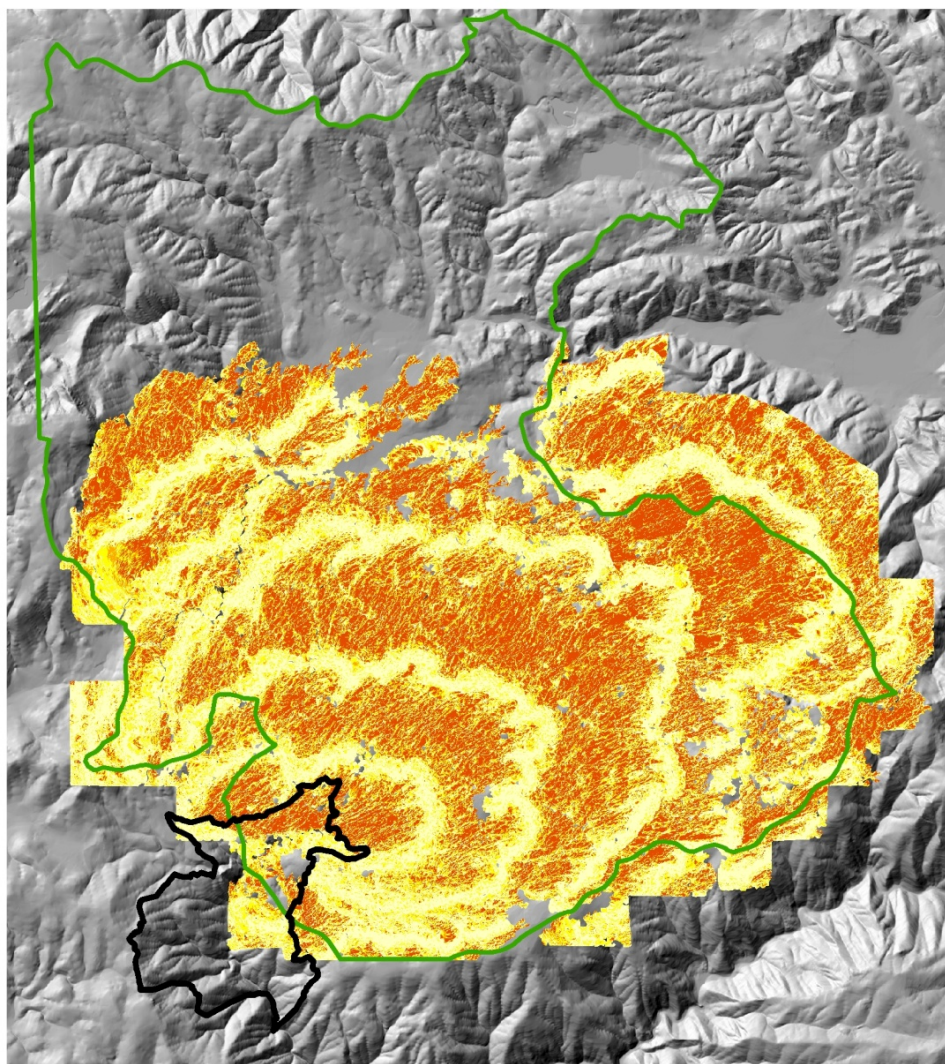
Treated areas have an
impact on area



Burn Probability by land allocation



Meadow Valley FARSITE fire simulation (fire coming up from Middle Fork Feather River Canyon)



Pre-treatment FARSITE simulation
(using 2008 Rich fire weather/duration)

Post-treatment FARSITE simulation
(using 2008 Rich fire weather/duration)

Flame length (m)

 <1.2	 2.5 - 3.3	 1999 Lookout fire
 1.3 - 2.4	 >3.3	 Meadow Valley study area

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Initial Findings

All land allocations had majority of fire type modeled as passive or active crown fire before treatment

No clear trends among untreated land allocations - all show similar results at the landscape scale

46% of deferred modeled as having passive and active crown fire

DFPZ's were modeled as surface fire

Group selections were modeled as passive crown fire

Wildfire from middle fork of Feather River moderated by fuel treatments in Meadow Valley

Only 10% of area treated, low end of recommendations

Manuscript in development on project

An aerial photograph of a mountainous landscape. In the foreground, there is a dense forest of green trees. In the middle ground, a large, flat-topped red rock cliff face is visible, partially obscured by mist or smoke. The background shows more forested hills under a hazy sky.

Fuel Treatment Longevity in the Northern Sierras

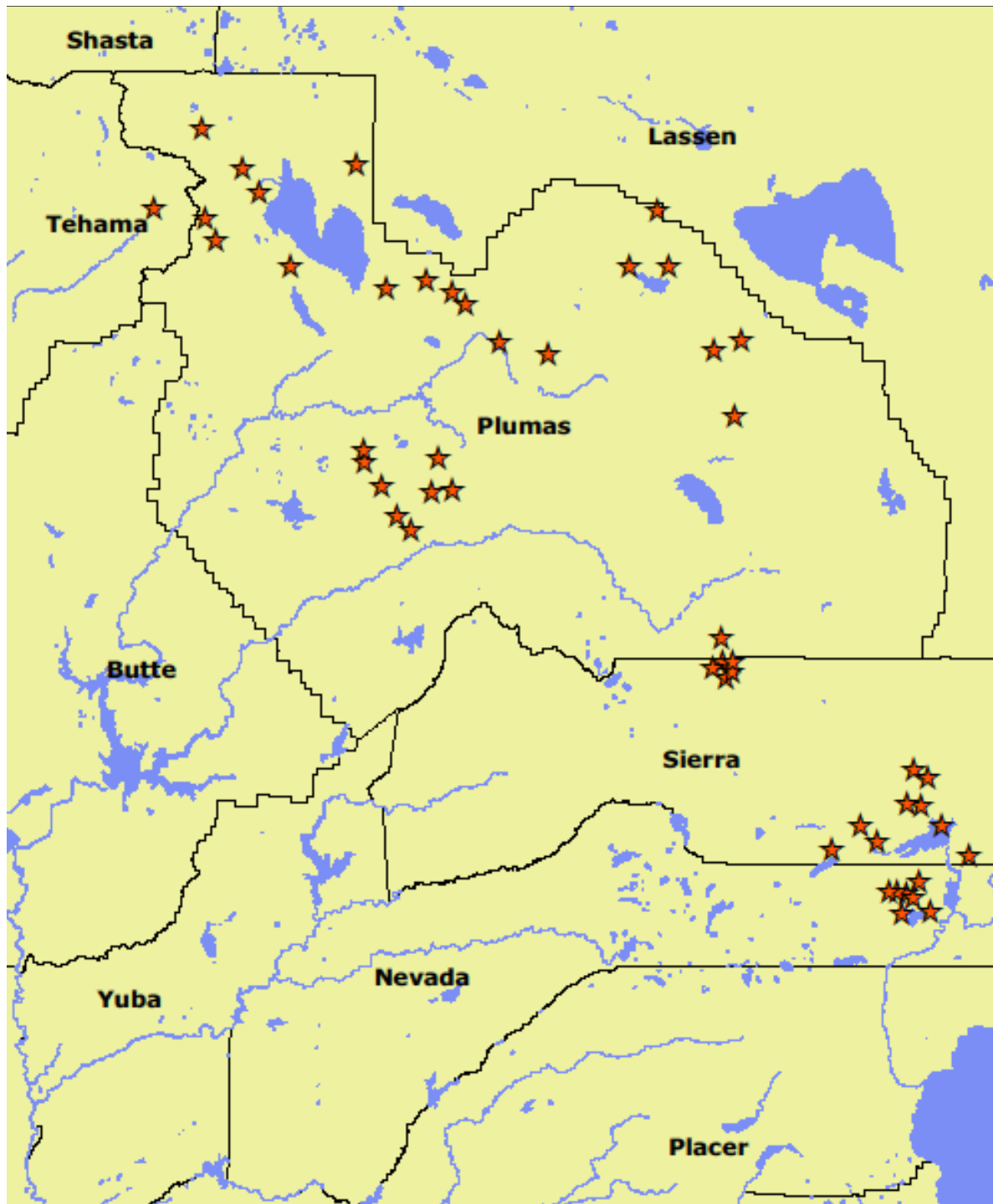
Lindsay A. Chiono

Ph.D. Candidate

Objectives

- Characterize vegetation and fuels development over time based on a chronosequence of fuel treatments.
- Sample across fuels reduction methods, forest types, and site qualities to assess their respective influences on treatment longevity.
- Develop projections for stand and fuel development for a range of fuel treatments.
- Develop treatment regimes for establishment and maintenance of DFPZ's.

	0 to 5 years	6-10 years	11+ years
Thin Only, North Aspect			
Thin Only, South Aspect			
Thin/Burn, North Aspect			
Thin/Burn, South Aspect			



50 Treatments Sampled:

Almanor RD: 2

Mt. Hough RD: 14

Beckwourth RD: 3

Sierraville RD: 6

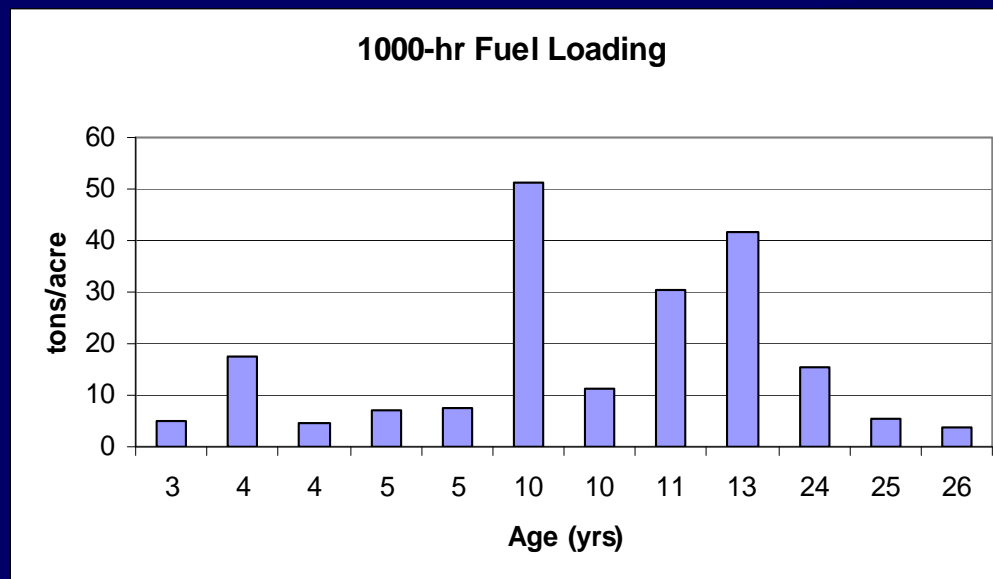
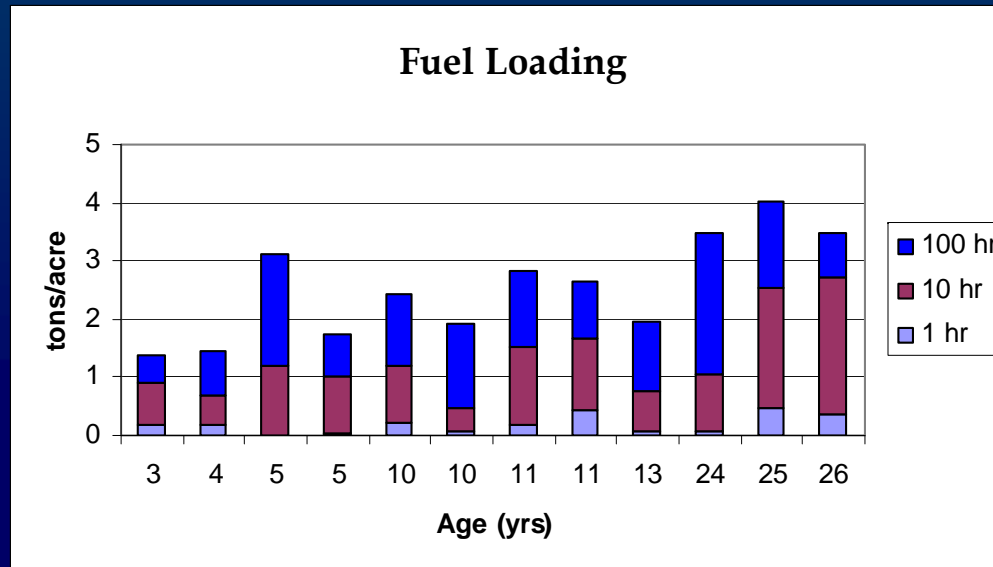
Truckee RD: 16

Collins Pine: 9

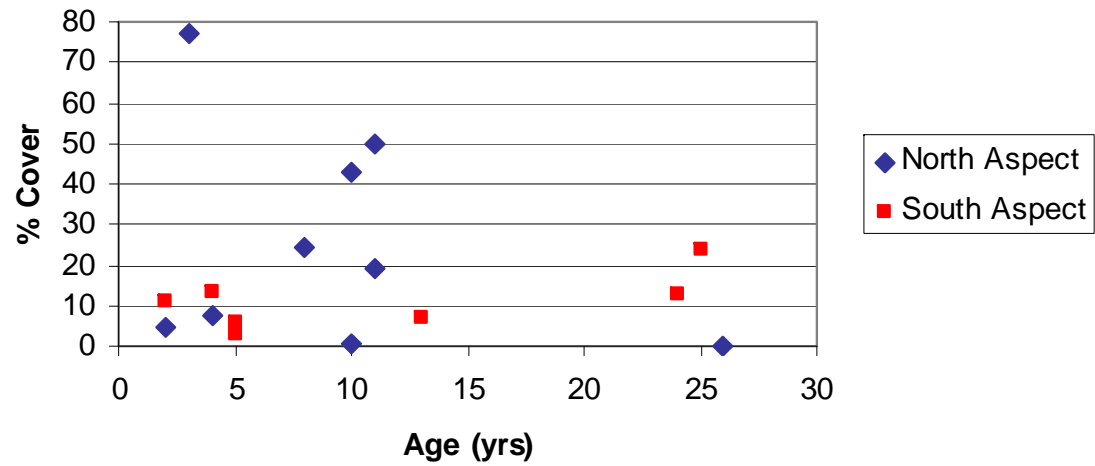
Preliminary Data

- Data from 16 treatments sampled in 2007 on the Plumas National Forest were analyzed to illustrate the information collected and the modeling of potential fire behavior.

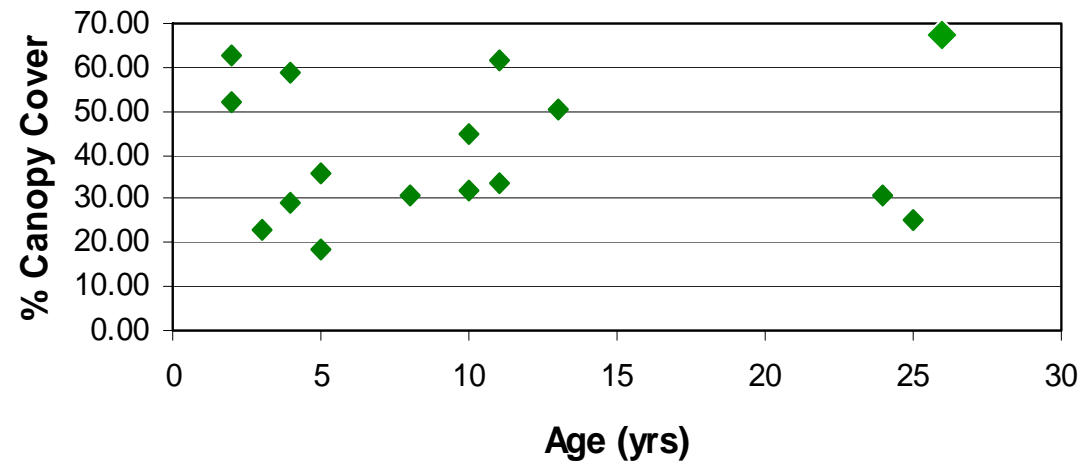
Site Characteristics: Fuel Loading



Shrub Cover



Canopy Cover



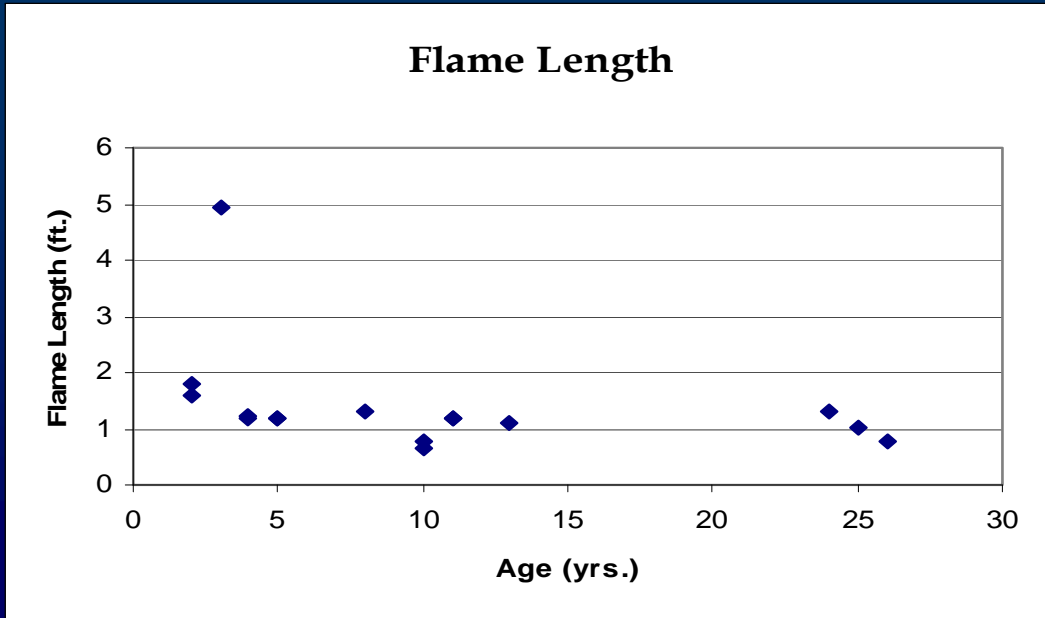
Analysis in FMAPlus



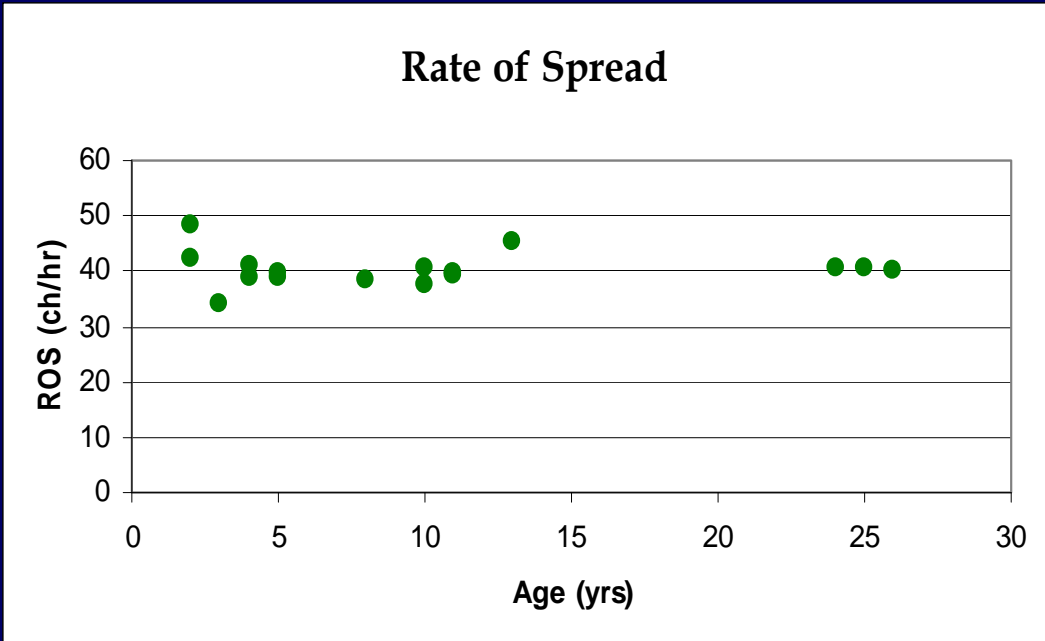
- FMAPlus allows the estimate of potential fire behavior and effects based on fuels and weather data.
- Inputs: tree measurements, fuel model, 90th and 97th percentile weather calculated from 45 years of historical RAWS data.
- Fire Behavior Outputs: include rate of spread, flame length, torching and crowning indices, and probabilities of tree mortality.



Photos courtesy of the Stephens Lab



Modeled flame length and fire rate of spread similar regardless of age of treatment



Similar results for Torching and Crowning indices

Summary

- Fuel breaks may be fairly long-lived in these forest types (full analysis ongoing)
- Stratification by site quality, forest type, and treatment type may help clarify trends
- Results applicable to mixed conifer forests near Quincy and to the east, not west-side mixed conifer forests that are more productive
 - Analysis of data continues

Acknowledgments

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stephens@nature.berkeley.edu

<http://www.cnr.berkeley.edu/stephens-lab/>