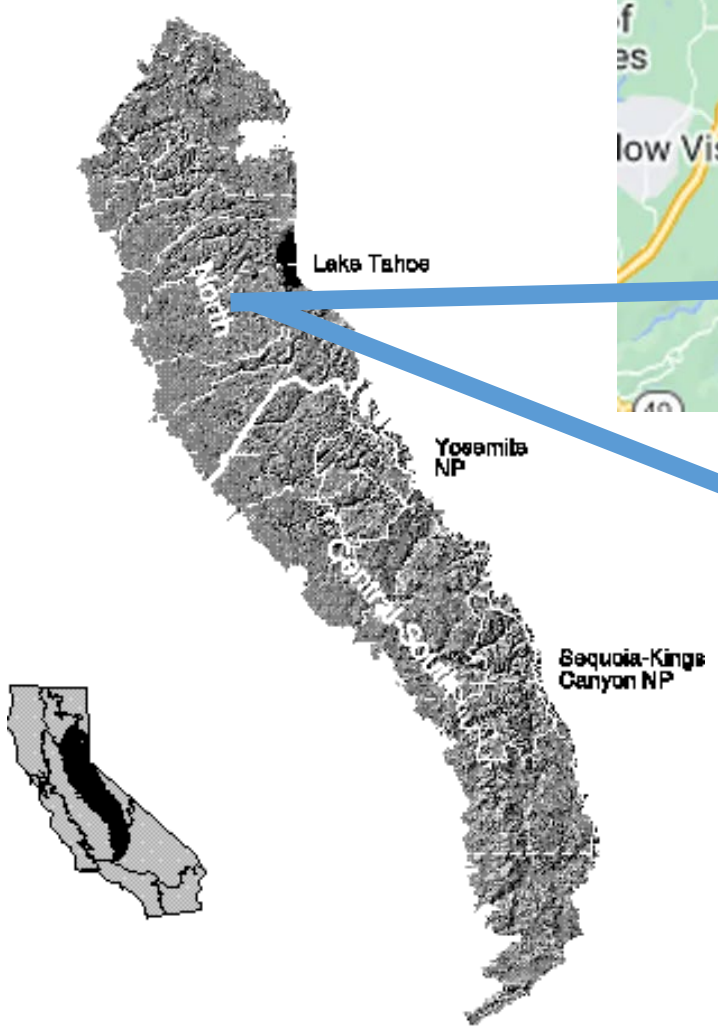
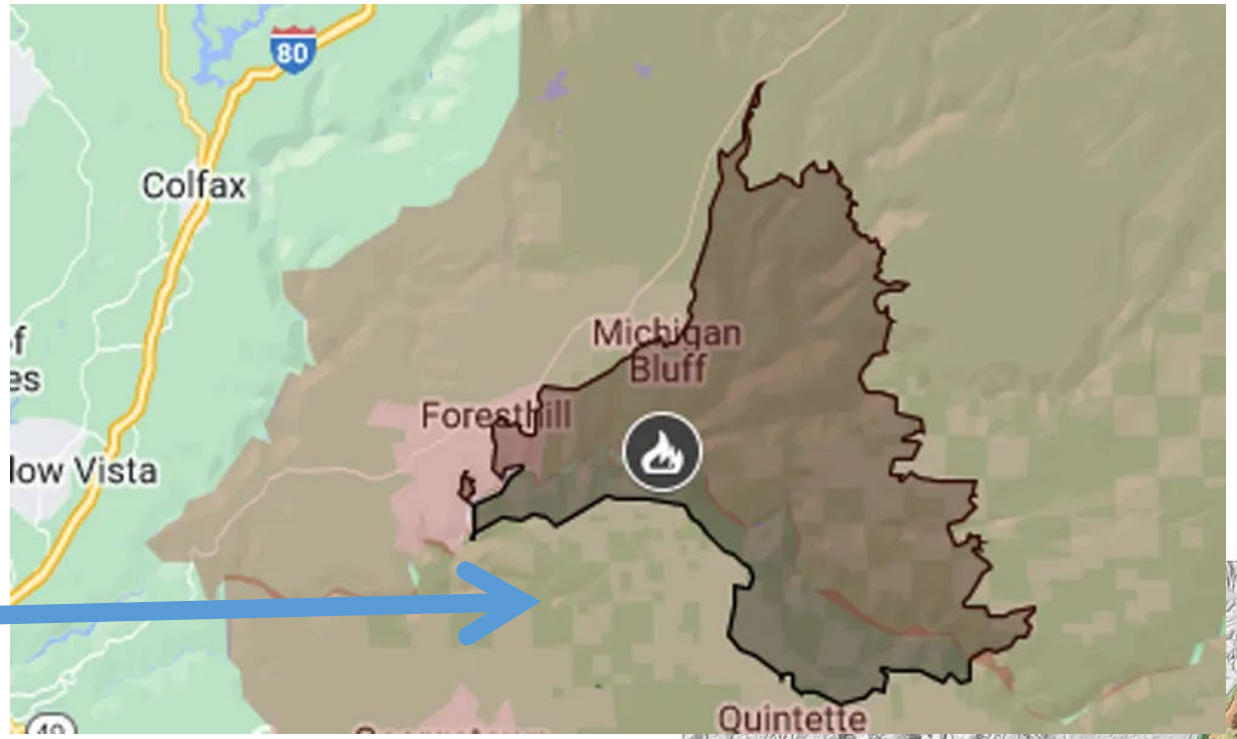
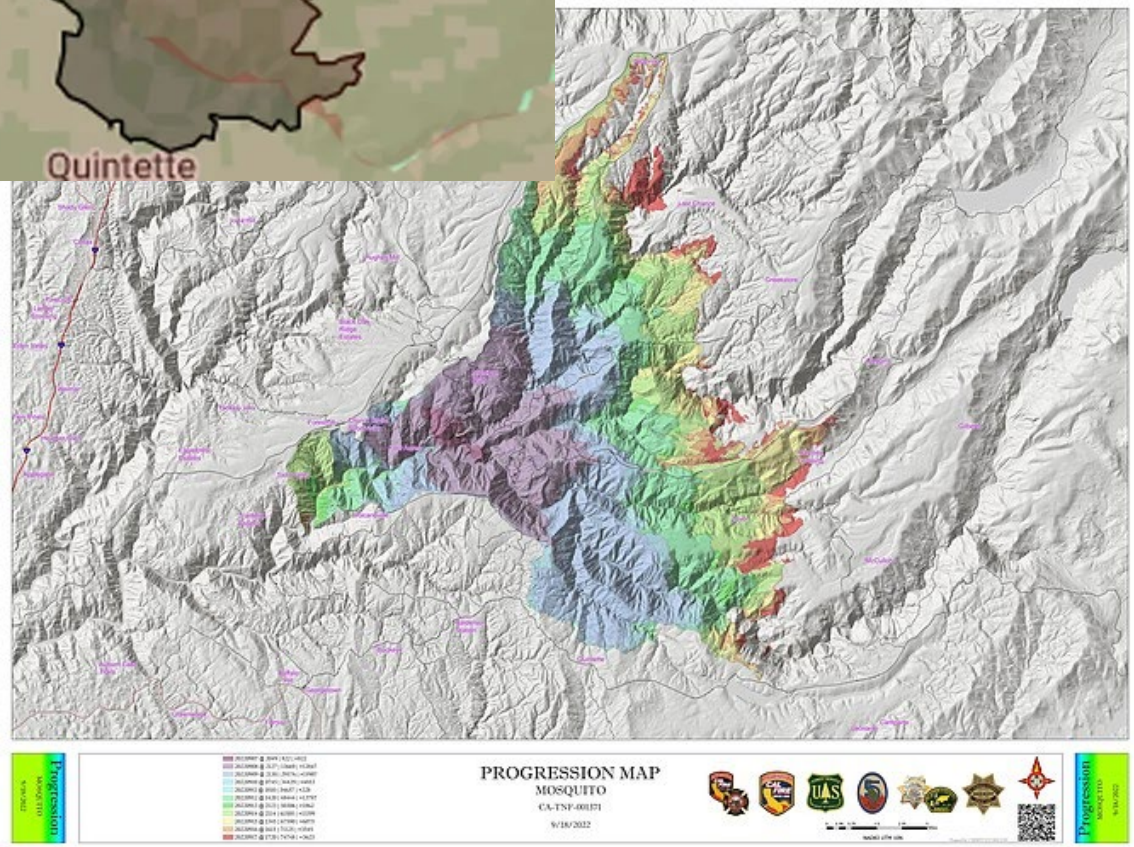
Interactions of the Mosquito Fire with Forest Management
and
Reforestation Demonstration at Blodgett Forest

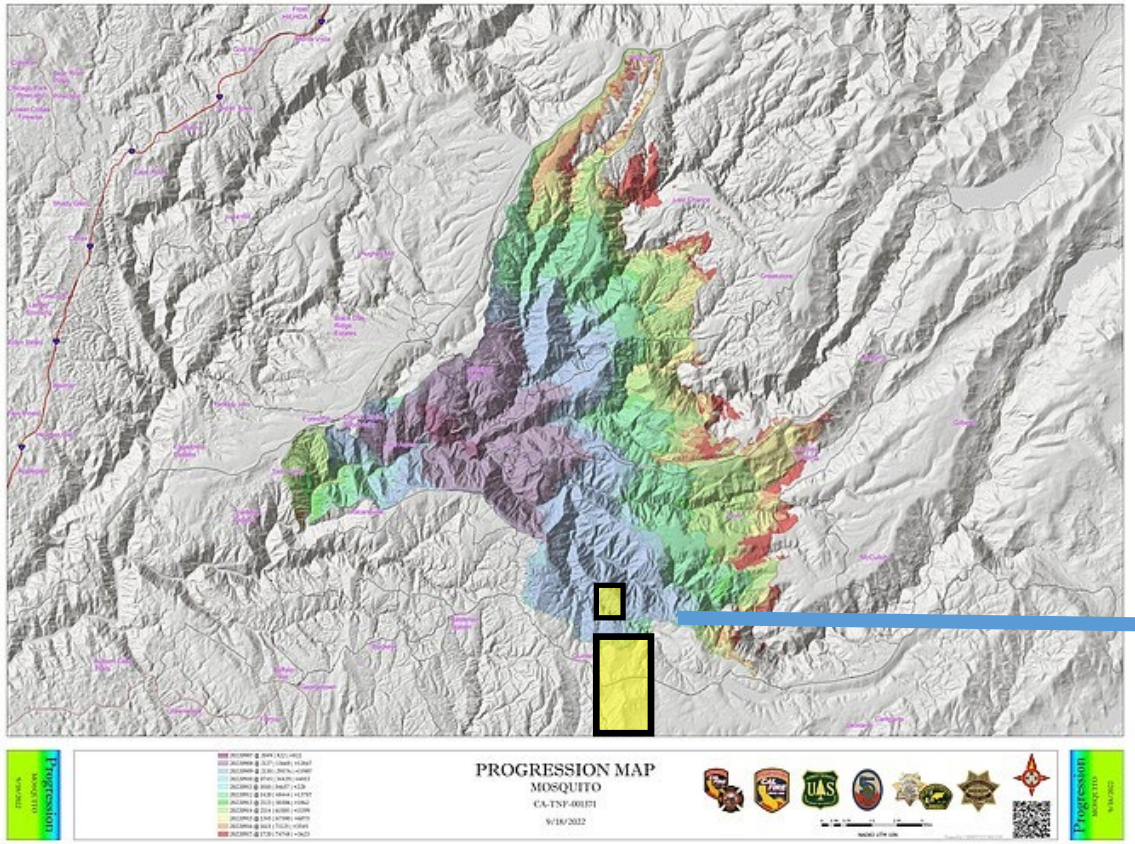
Rob York

ACCG Sep. 20, 2023


Lake Tahoe
Yosemite NP
Sequoia-Kings Canyon NP


80
Colfax
Michigan Bluff
Foresthill
Quintette


PROGRESSION MAP
MOSQUITO
CA-TNF-001371
9/18/2022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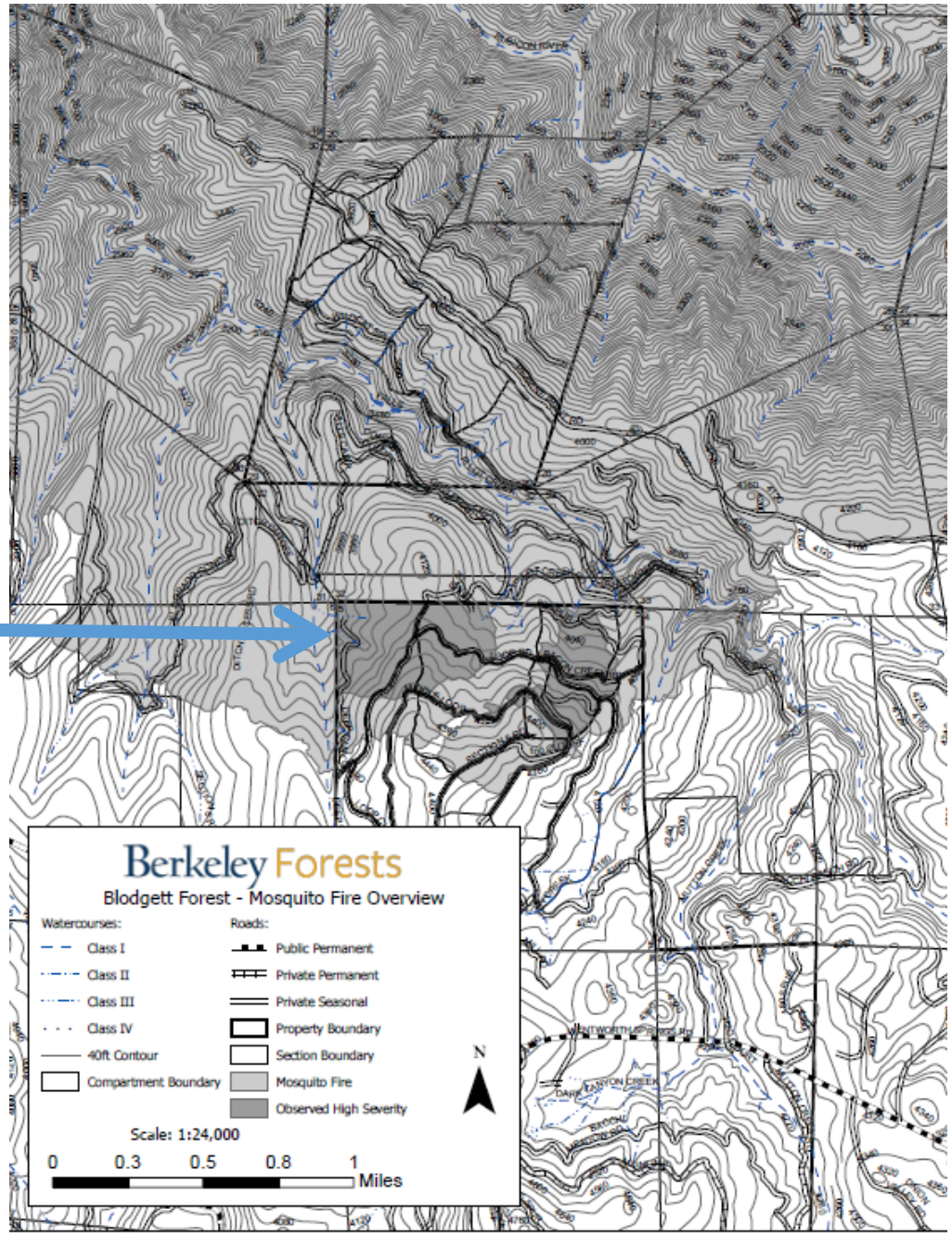
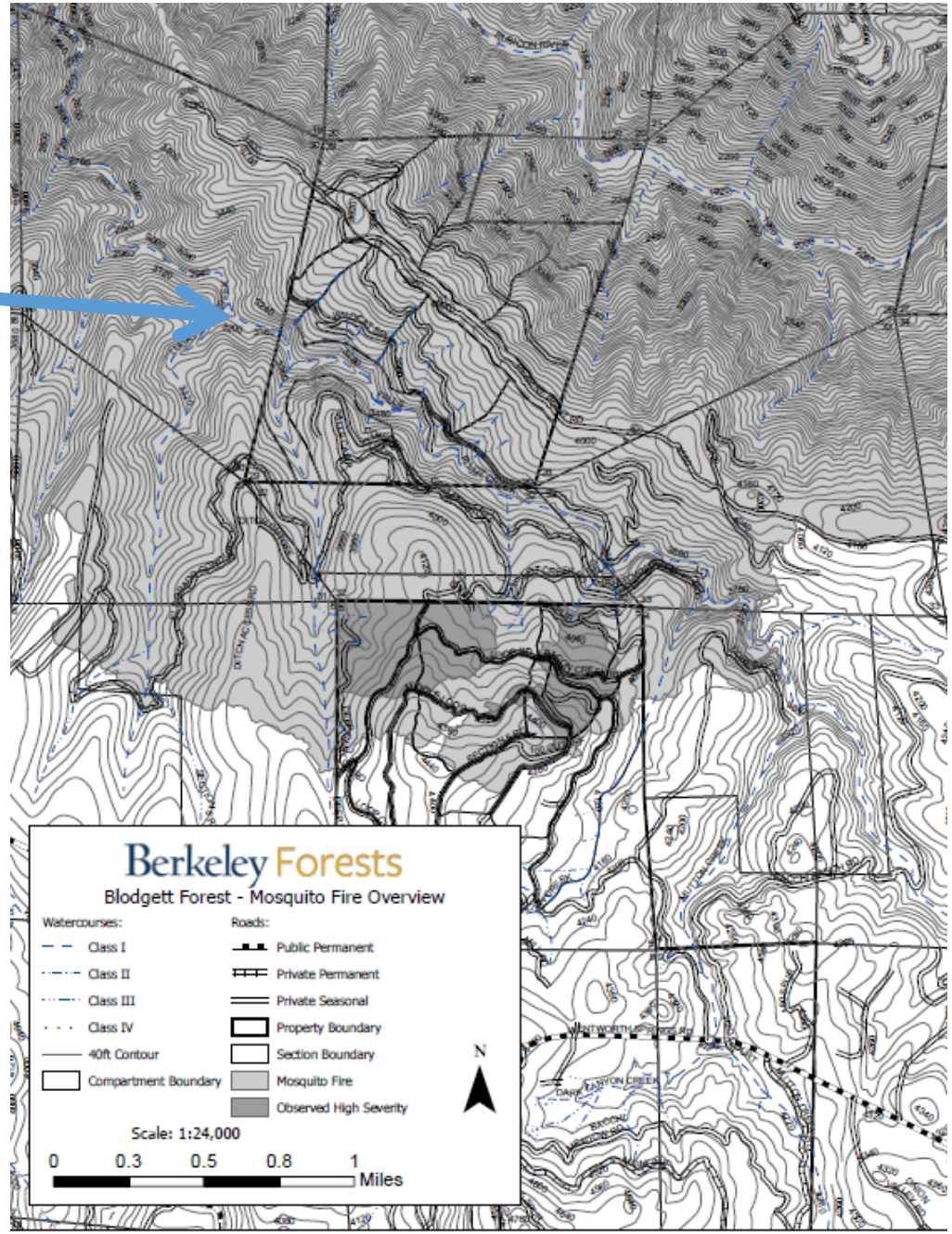

Berkeley Forests
Blodgett Forest - Mosquito Fire Overview
Watercourses:
Class I
Class II
Class III
Class IV
40ft Contour
Compartment Boundary
Roads:
Public Permanent
Private Permanent
Private Seasonal
Property Boundary
Section Boundary
Mosquito Fire
Observed High Severity
N
Scale: 1:24,000
0 0.3 0.5 0.8 1
Miles

What about this piece?

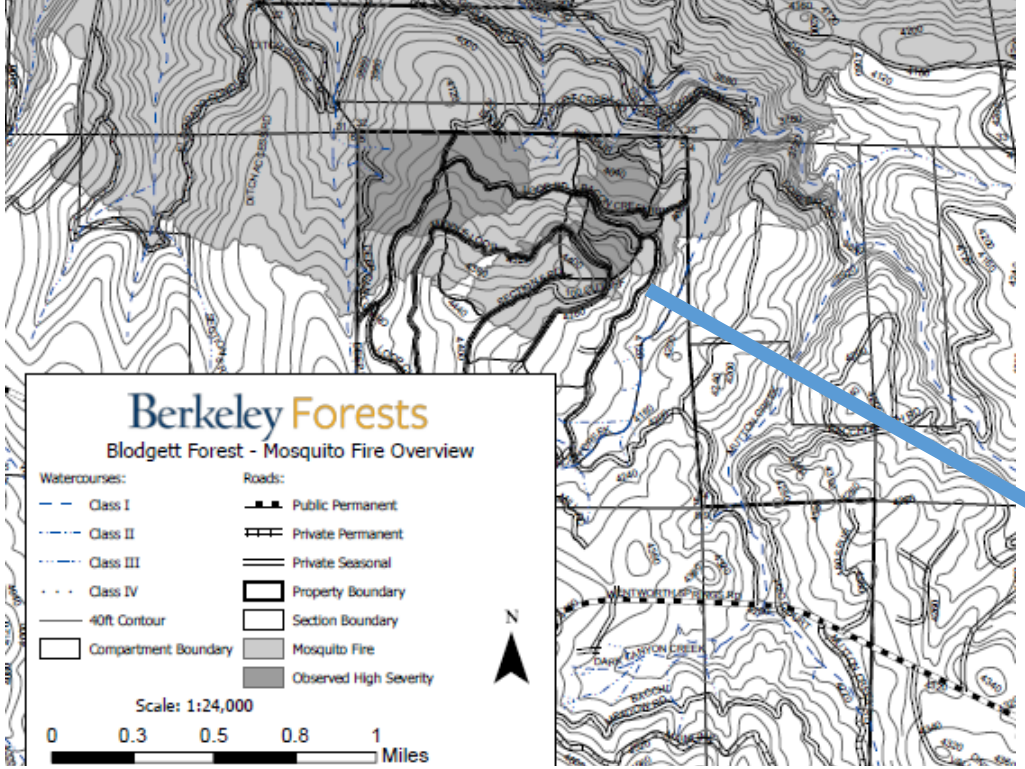
- 100% Mortality- expected outcome, when fire weather is extreme

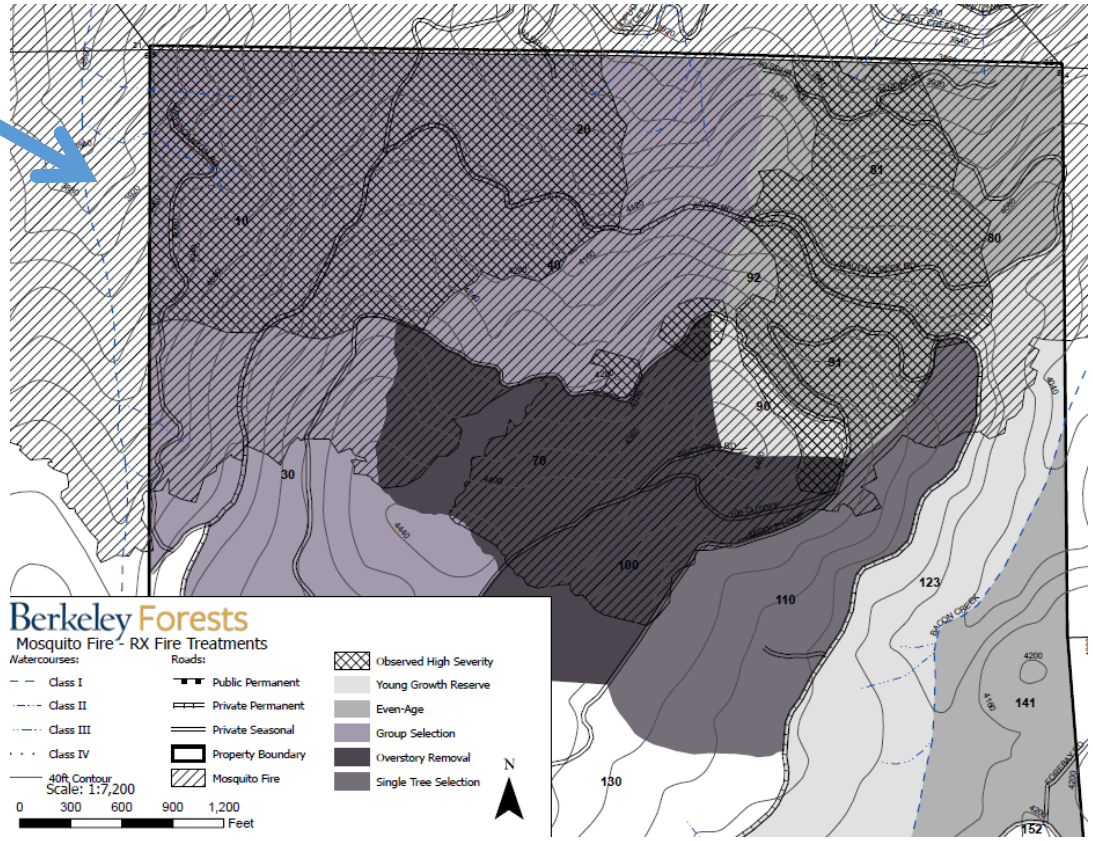
- Because of a lack of BOTH:

  - On-site fuel treatments
  - Landscape fuel treatments



Drilling down onto the Main Tract





Opportunity to observe fire interacting with several management regimes:

- Group selection without Rx fire
- Group selection with Rx fire
- Rx fire only
- No recent treatments
- Planted forests of different age classes
- Herbicide v. no-herbicide use

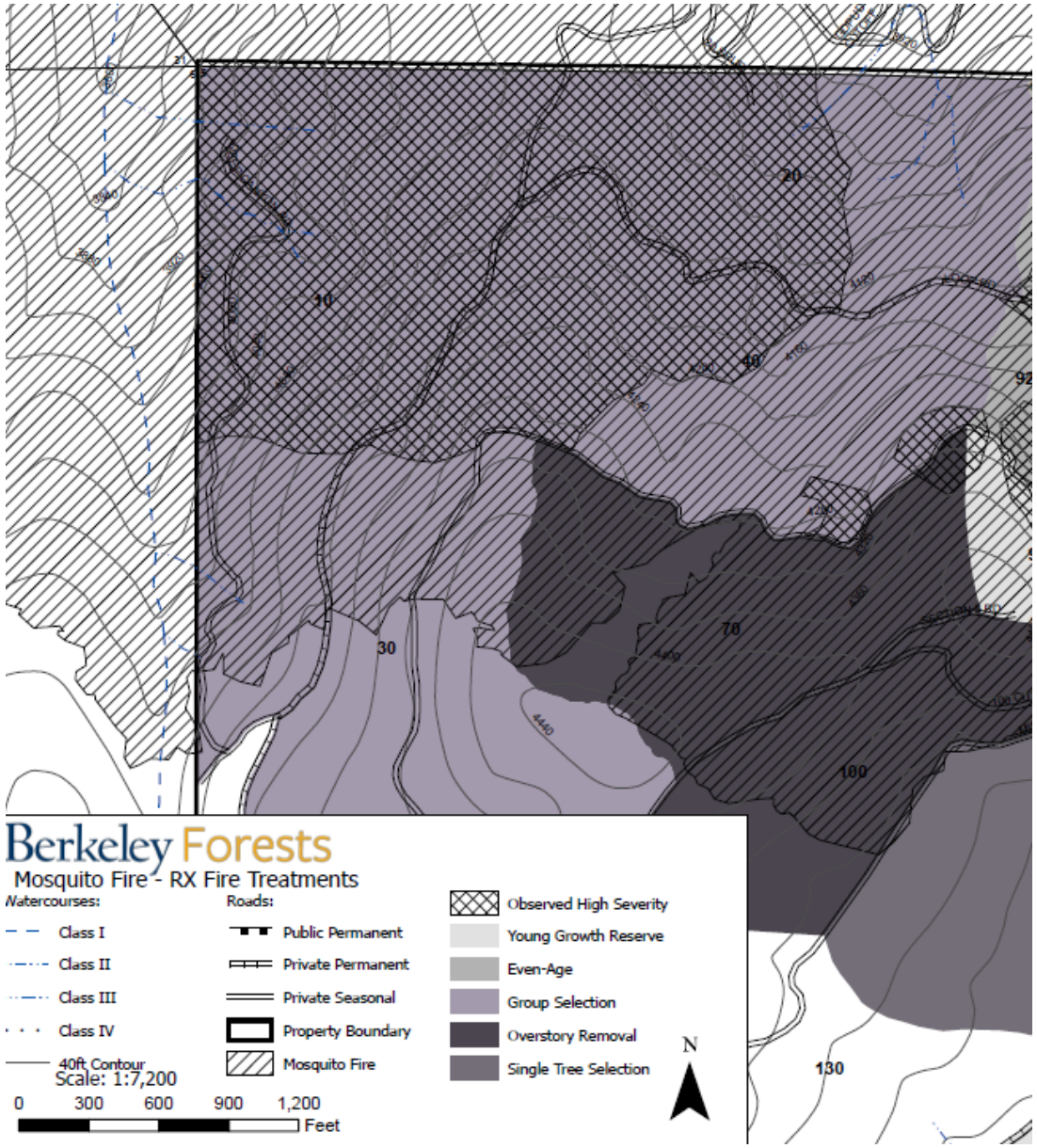
Compartment 10

Group selection for the last 50 years

- Harvest of 0.5 to 1.5 acre gaps every ~12 years
- Commercial thin in “matrix”
- Most harvests “conventional”
- Most recent harvest was “whole tree yarding”

DReGS score (out of 5): 3

- Strength: heterogeneity, moderate overall density
- Weakness: high surface fuel load; dense ladder fuels; proximity to USFS untreated land



Compartment 10 effects: Mostly high severity

Why?

- On a “fire highway”
- Next to no-Tx stand and ~20yr old planted forest
- No surface fuel-reduction treatments
- No ladder fuel-reduction treatments

- What good is heterogeneity without surface fuel reduction?

Comp 10: Demonstration of what we know

Treatment priority for reducing fire severity

1. SURFACE FUELS!
2. Ladder fuels
3. Species composition
4. Canopy fuels

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Forest Ecology and Management 211 (2005) 83–96

Forest Ecology and Management

www.elsevier.com/locate/foreco

Basic principles of forest fuel reduction treatments

James K. Agee [a,*], Carl N. Skinner [b]

[a] *College of Forest Resources, Box 352100, University of Washington, Seattle, WA 98195, USA*
[b] *USDA Forest Service, Pacific Southwest Research Station, 3644 Avtech Parkway, Redding, CA 96002, USA*

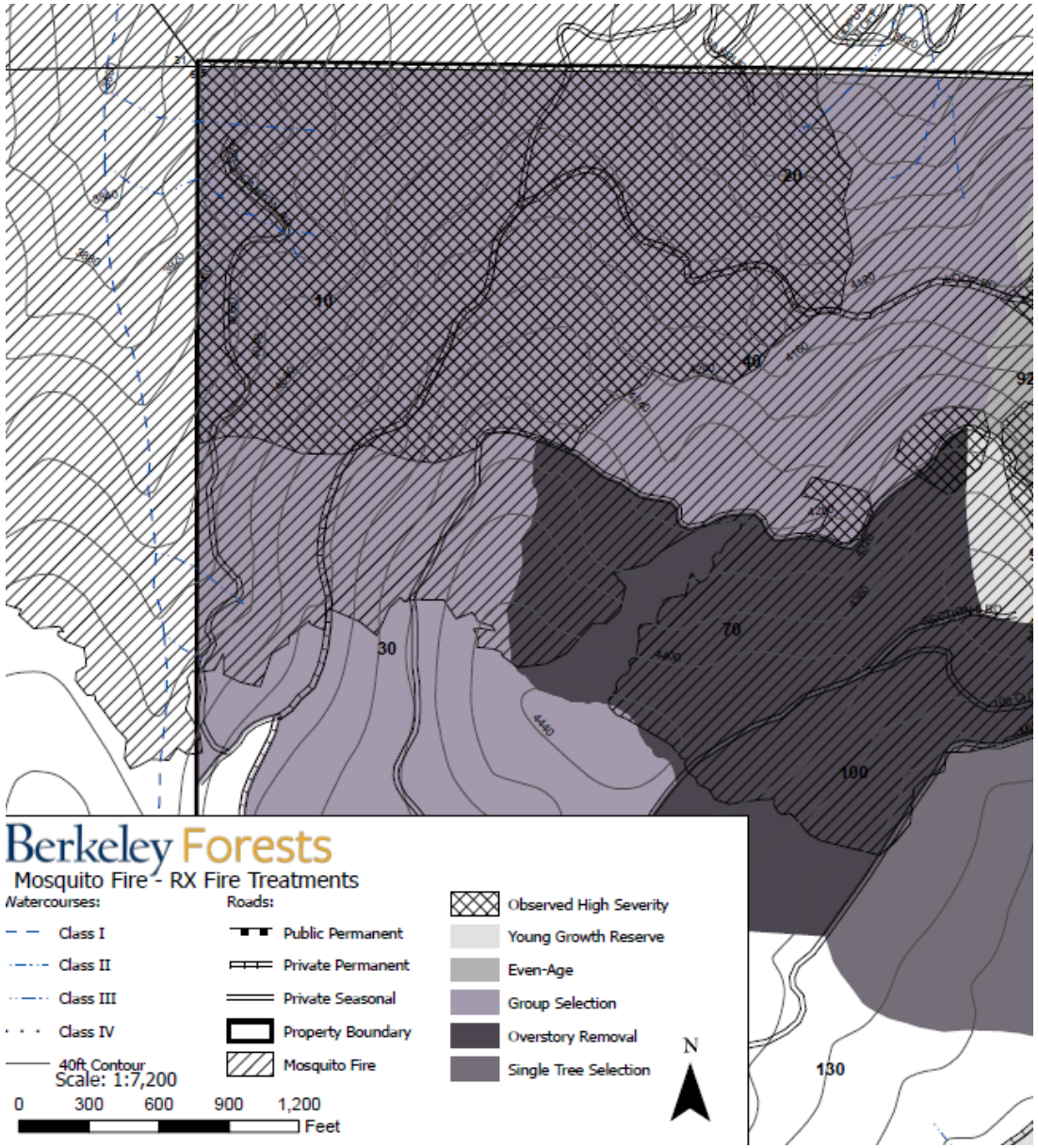
Compartment 30

Group selection for the last 30 years

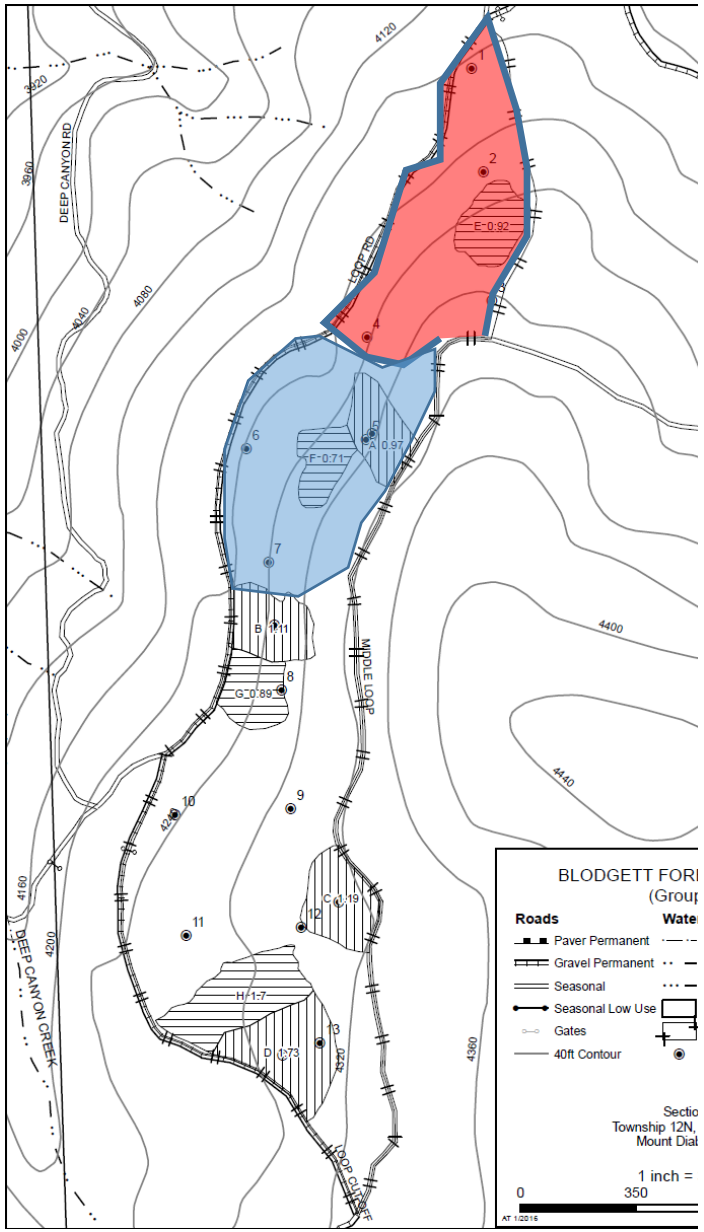
- Harvest of 0.5 to 1.5 acre gaps every ~12 years
- Commercial thin in “matrix”
- Half of harvests were “conventional”
- Half were “whole tree yarding”
- **Mastication + Winter burning twice in past 10 years**

DREGS score: 4

- Strength: coarse heterogeneity, low-moderate overall density, low ladder fuels, Rx fire
- Weakness: Winter Rx burning was marginal; lots of edge without large core area



Compartment 30 effects: High and low severity



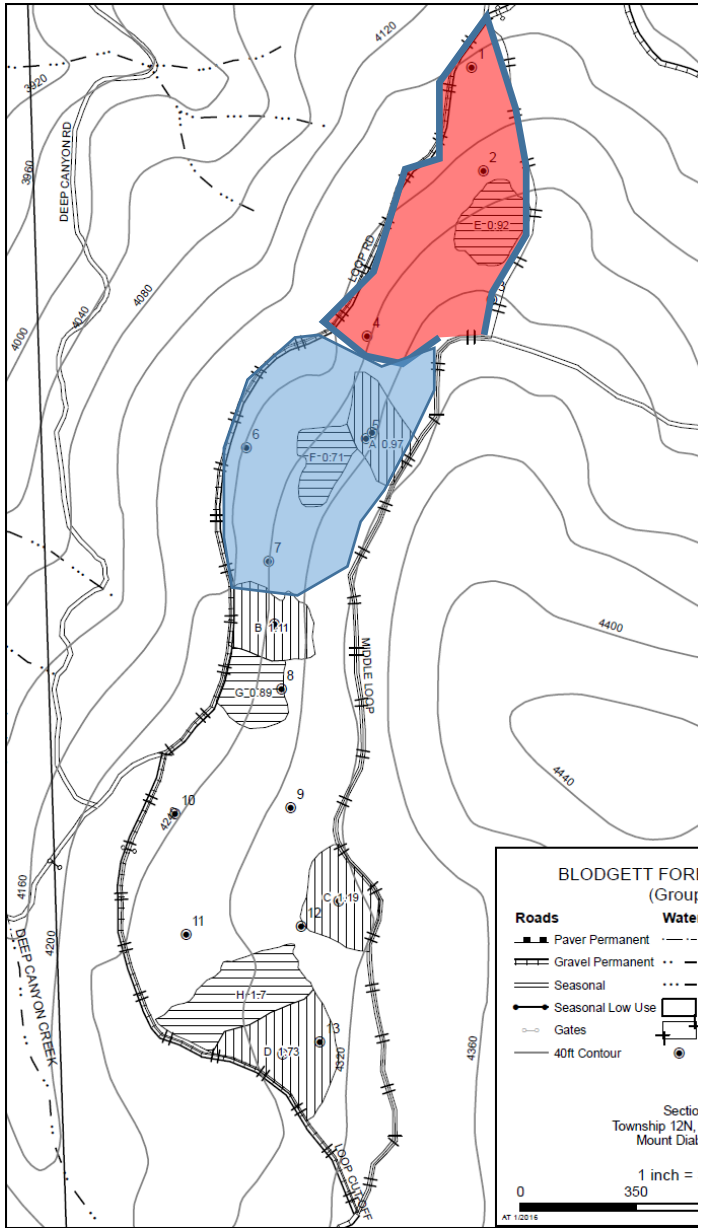
Why high and low severity

High:

- Alignment with wind and topography
- Winter burning grade “C”
- Edge effects from wildfire momentum

Low:

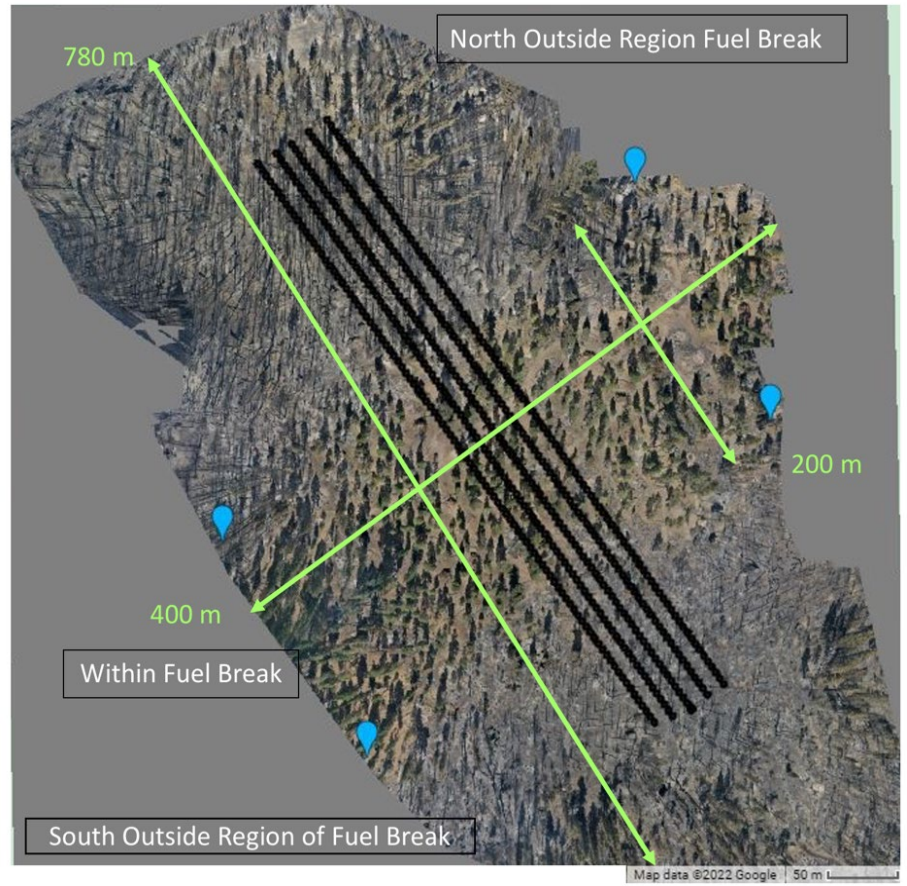
- Low surface fuels from better Rx burns
- Heterogeneity (even young stands had low severity)



Comp 30: Demonstration of what we know

- Fuel treatments work!

- But they have to be large to have true effectiveness



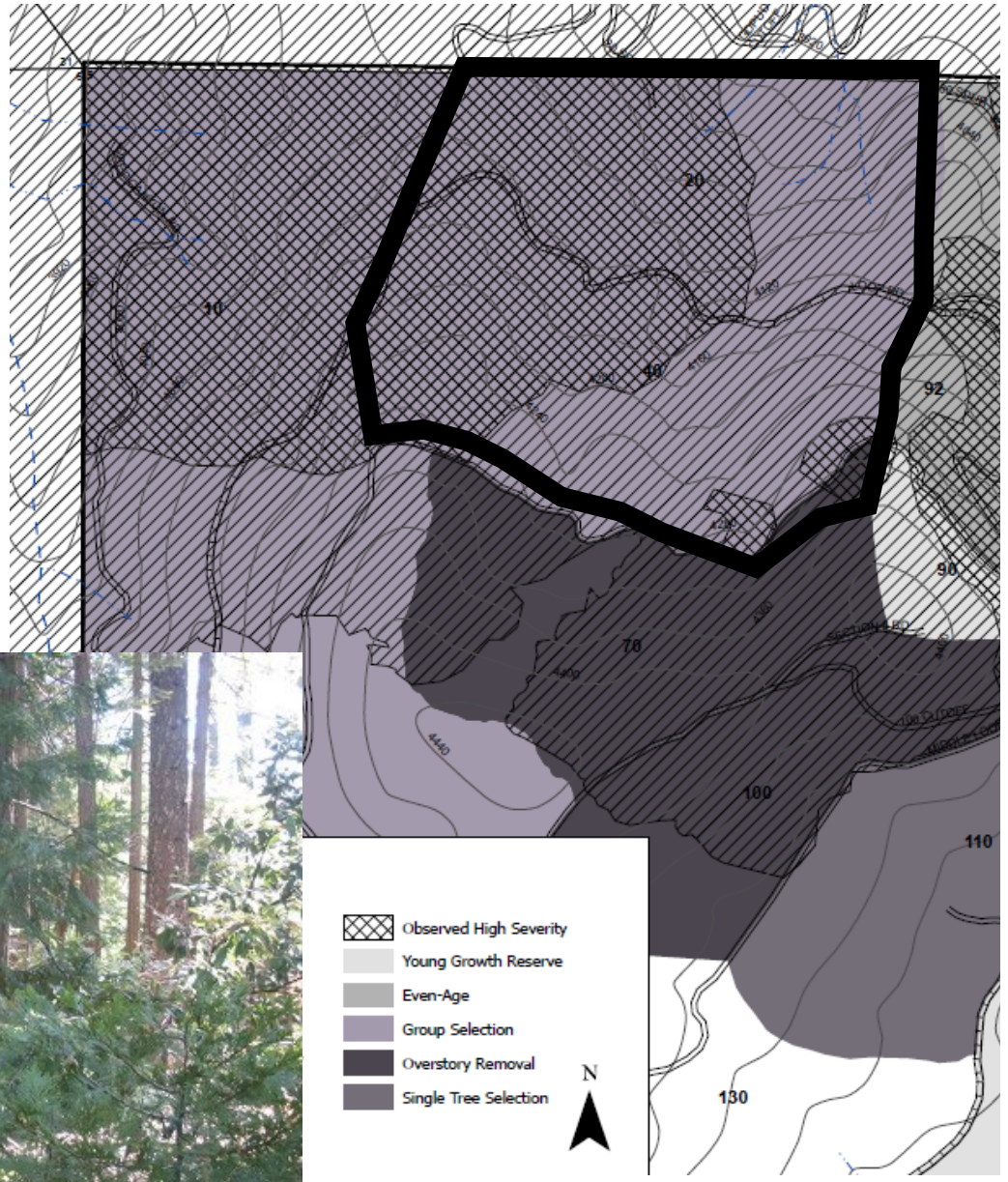
- How big? Draw to Ridge

Compartment 20 and 40

Limited Group selection in mature stands
Control for Fire and Fire Surrogate Study
No fuel treatments (mech or rx burn)

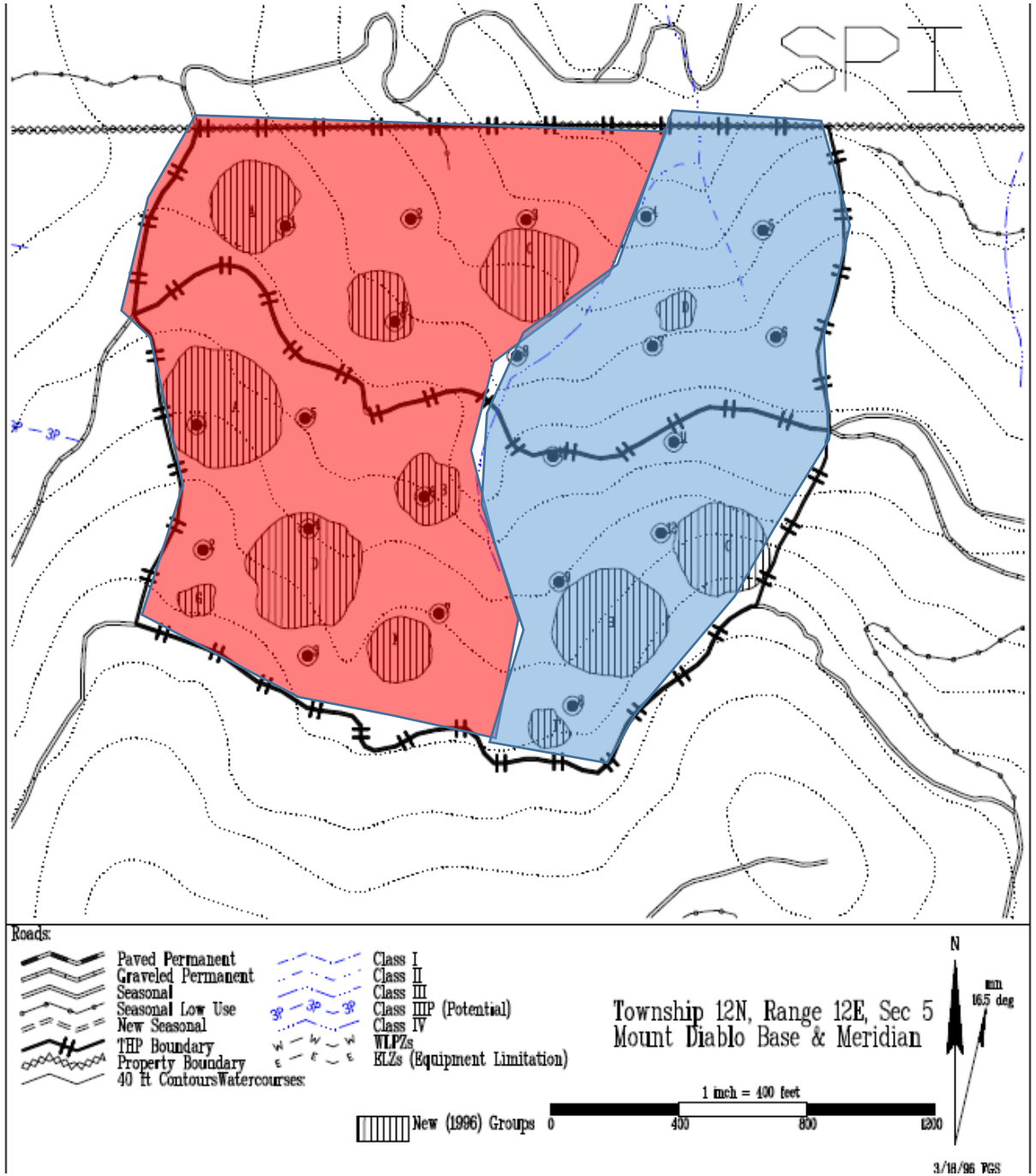
DREGS score: 1

- Strength: some coarse heterogeneity; large, tall trees; ladder fuels not “connecting”
- Weakness: Very large surface fuel loads



Mostly High, with some mixed severity

Mixed severity- started at watercourse; resulted in ~15% mortality of canopy trees



Why did it go from high to mixed?

Watercourse played a role

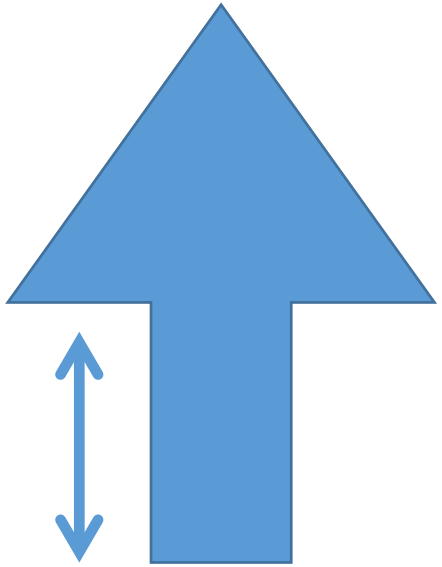
Then tree size was enough:

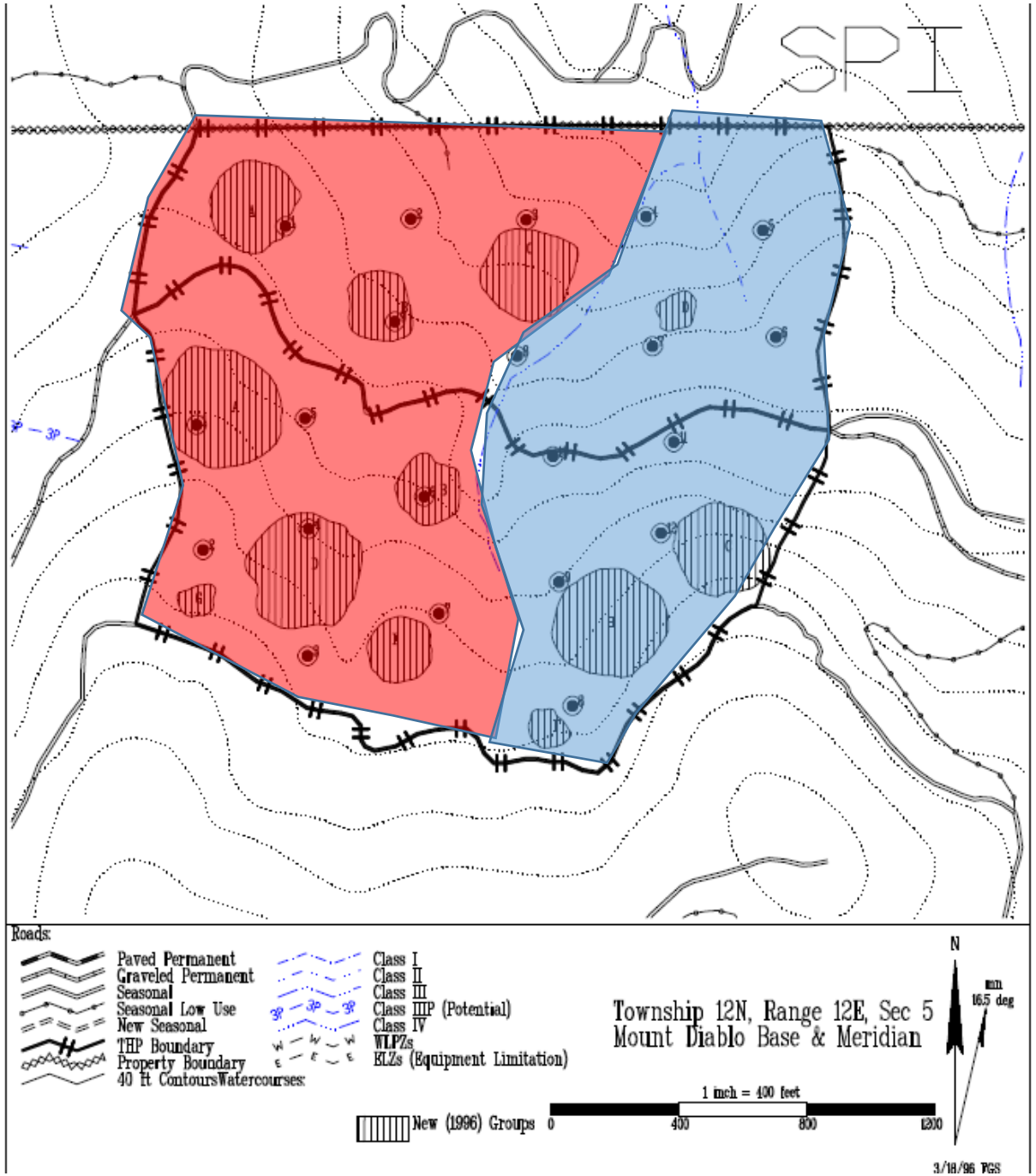
Large trees, high HCB

Enough to overcome high fuel load

Torching is a factor of:

- Heat intensity from ground
- **Height to crown base**
- Live fuel moisture

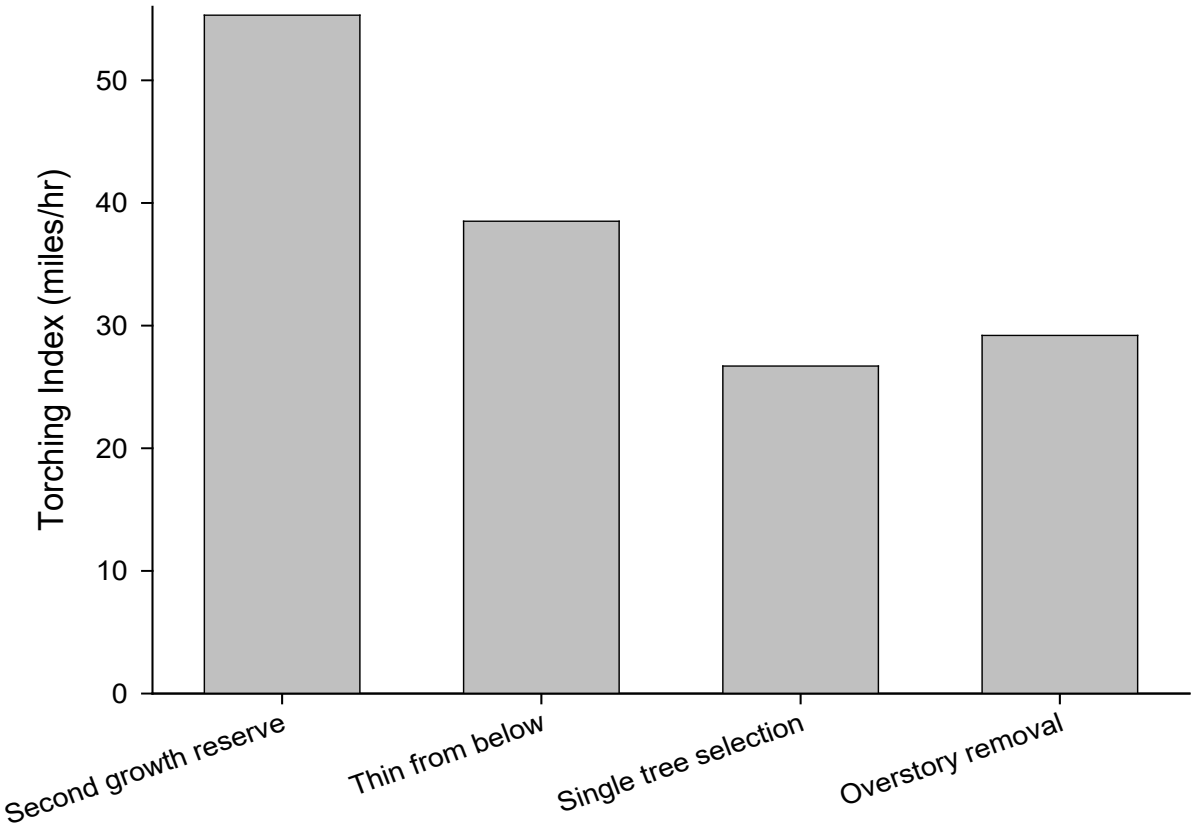




Demonstration of what we know

Large trees without ladder fuels can lower severity in moderate weather/topo conditions

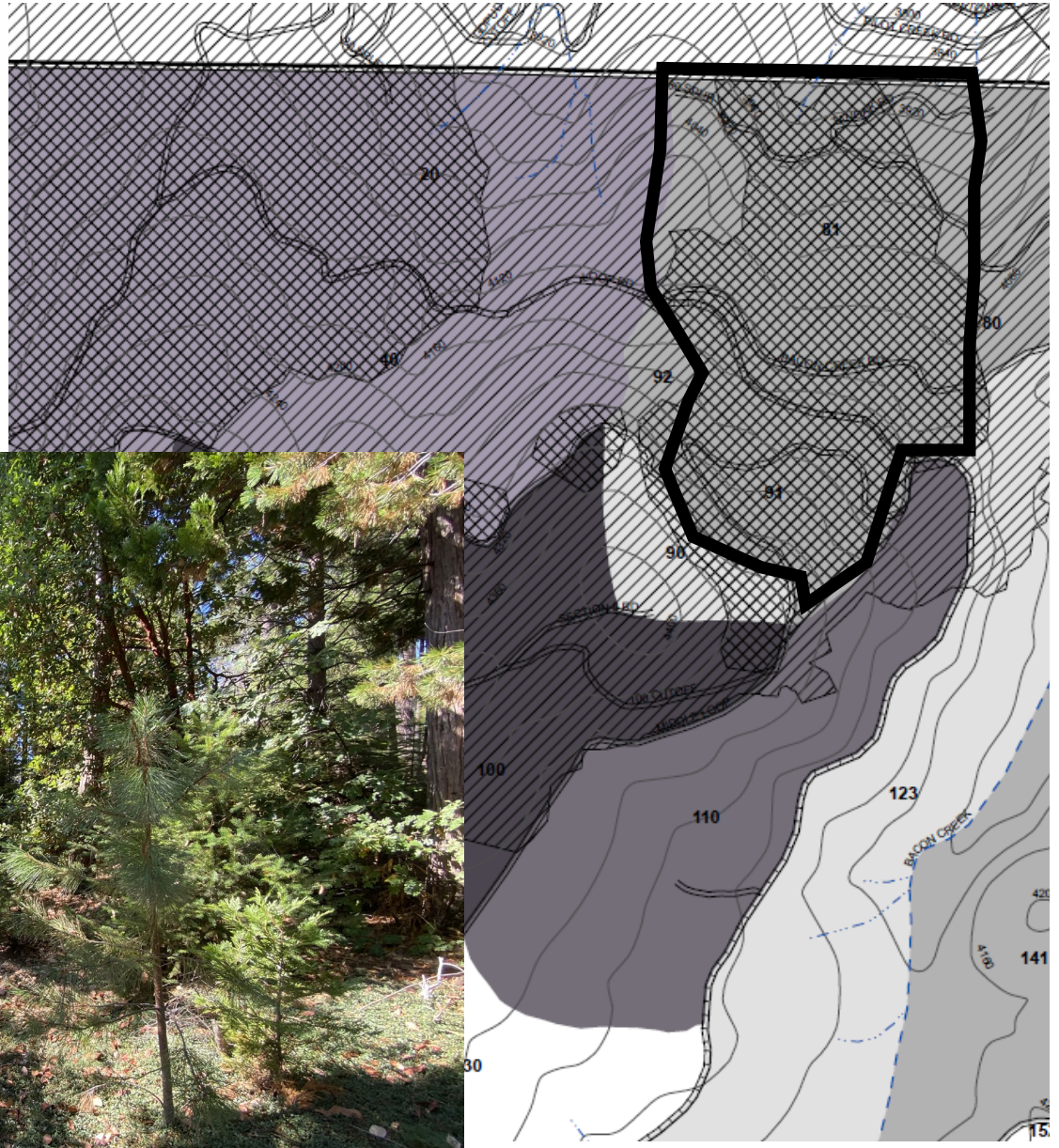
But they are not sufficient in severe conditions



Stephens and Moghaddas 2005; Cons. Bio

Compartment 80/81

Planted forest
Regenerated with shelterwood and clearcut harvests 20 and 25 yrs ago
Mastication 10 to 15 yrs ago

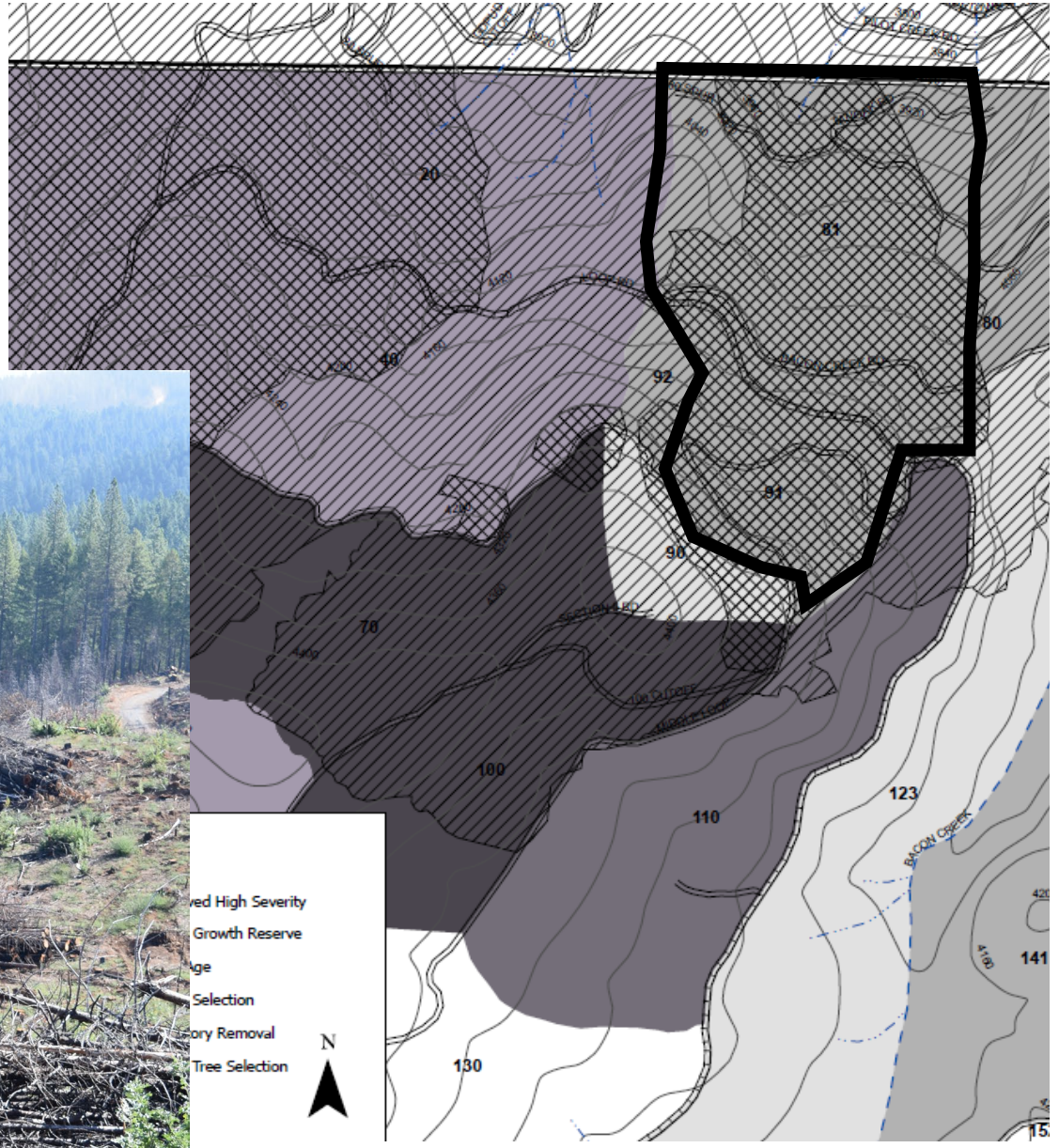


Dregs score = 2
Strengths:
Site prepared
Veg control?
Thinned?

Weakness:
No recent surface fuel Tx
High density
Large, homogenous patch

High severity effects

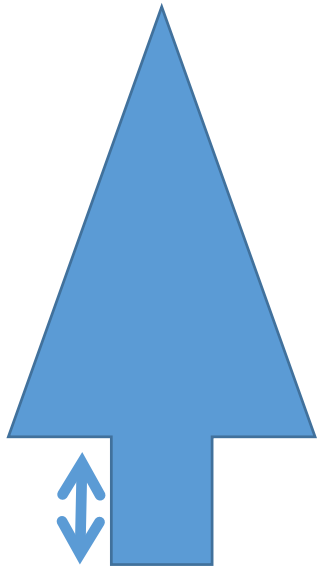
- Severity changed from low to high **on all sides**



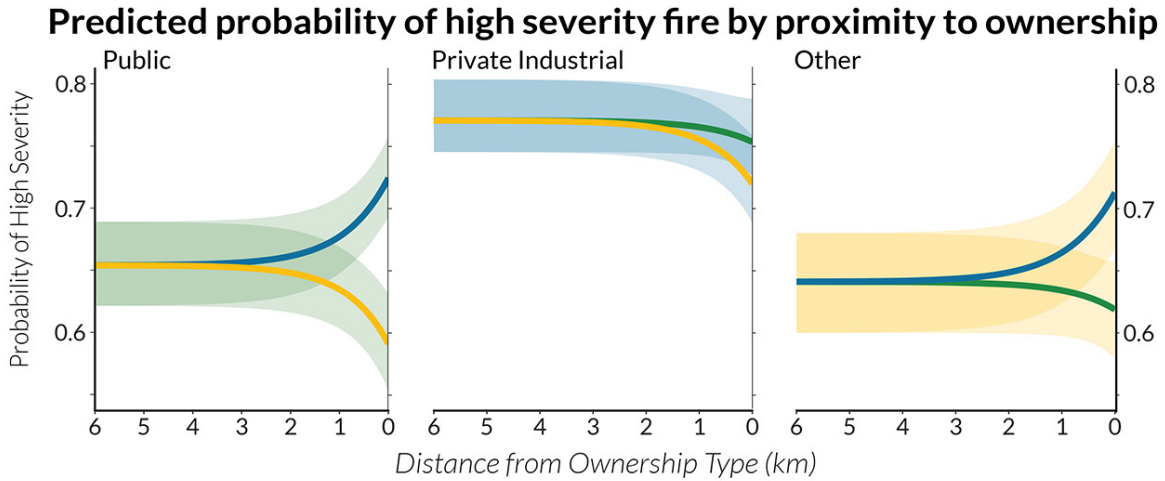
Demonstrating what we know: Planted, young stands are vulnerable to high severity effects

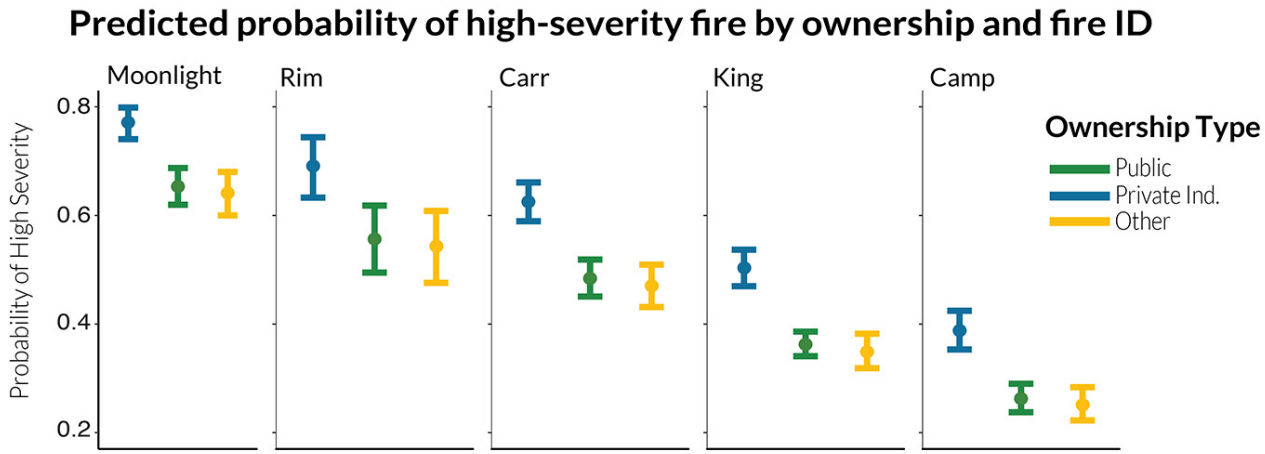
Torching is a factor of:

- Heat intensity from ground
- **Height to crown base**
- Live fuel moisture



Doesn't take much heat intensity to cause torching in small trees



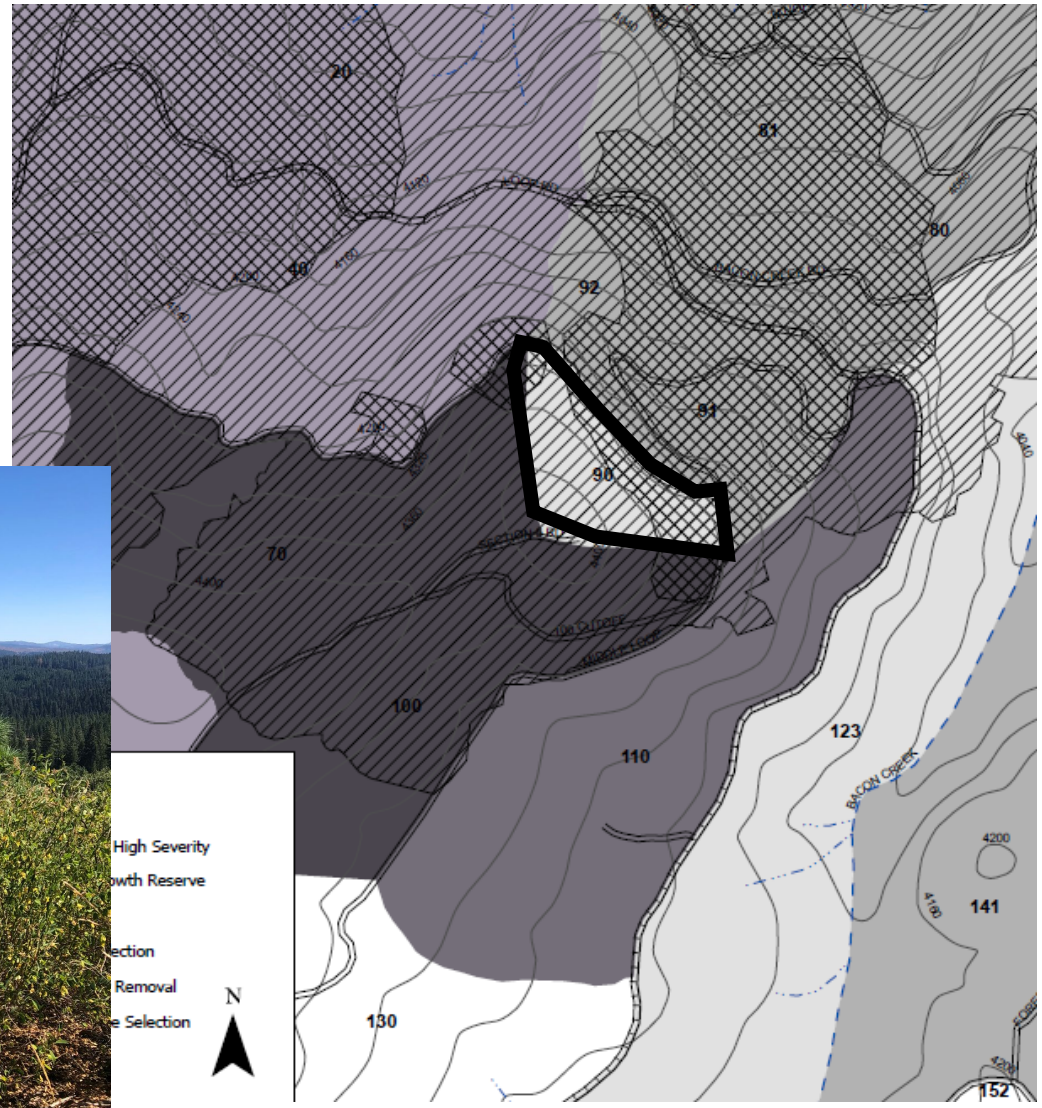


Levine et al. 2022; Front Ecol Environ

Comp. 90- Young Growth Reserve

Clearcut in 2018
Planted **NO HERBICIDE OR THINNING**
Dregs score: 2
Strengths:
Site prepared
Shrubs are young and mostly Ceanothus

Weakness:
No veg control (HEAVY shrubs)?
No PCT?



Low severity effects

Despite High severity adjacent and downhill

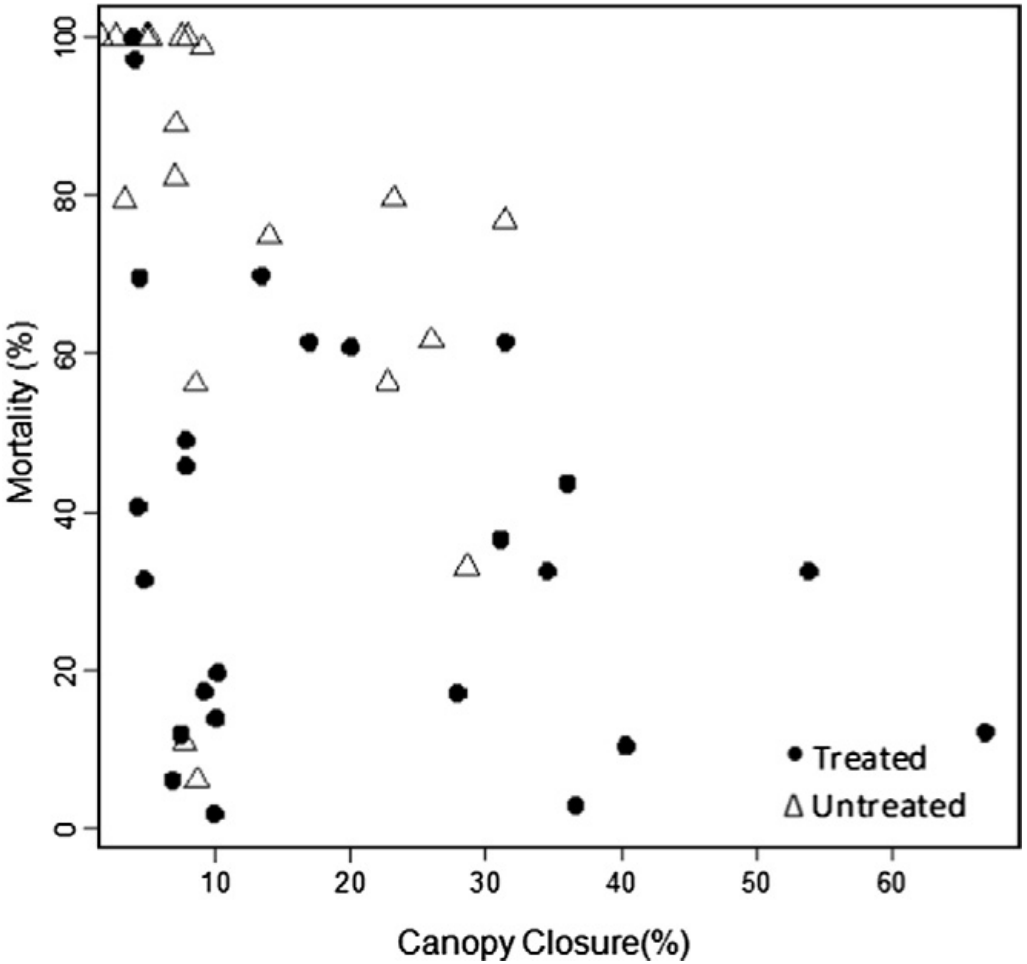
Shrubs sometimes torched in isolated patches; sapling survival ~ 90%

Demonstrating what we know: site prep is a big factor in young stand severity

Severity is often either the same or higher when density is lowered in young stands

My hand-waiving:

Shrubs, especially Ceanothus, are often a *heat sink* during moderate weather fires



Lyons-Tinsley and Peterson 2012: FEM

Comp. 70/100- High graded + small gaps

High-graded (large tree removal) for 30 years

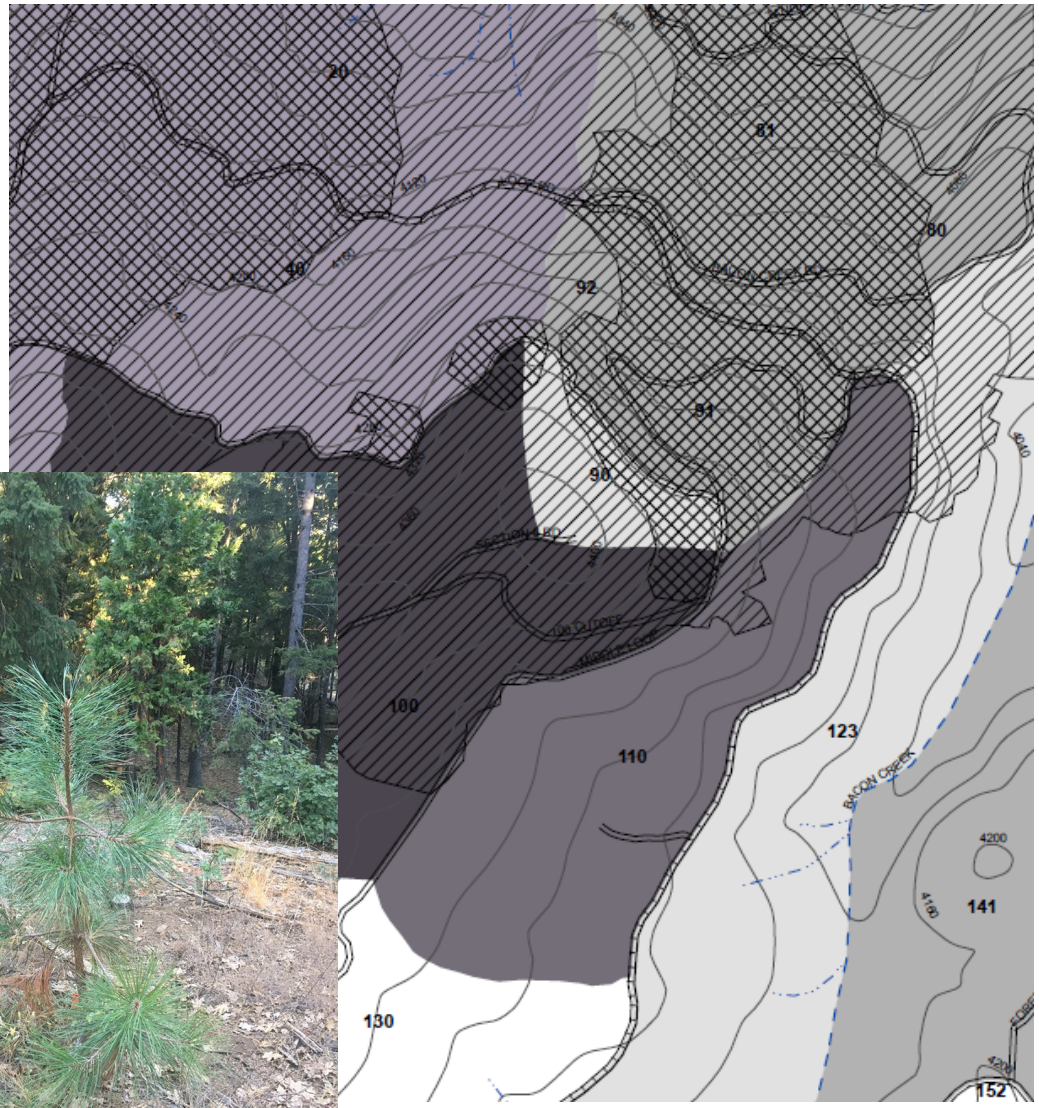
Study of the use of small gaps as an alternative to herbicide

Seedlings planted 6 years earlier in 1/5 acre gaps, with and without herbicide applied

DReGS score: 1

Strengths: heterogeneity

Weaknesses: Lack of large trees; no surface fuel tx's; Heavy surface fuel load

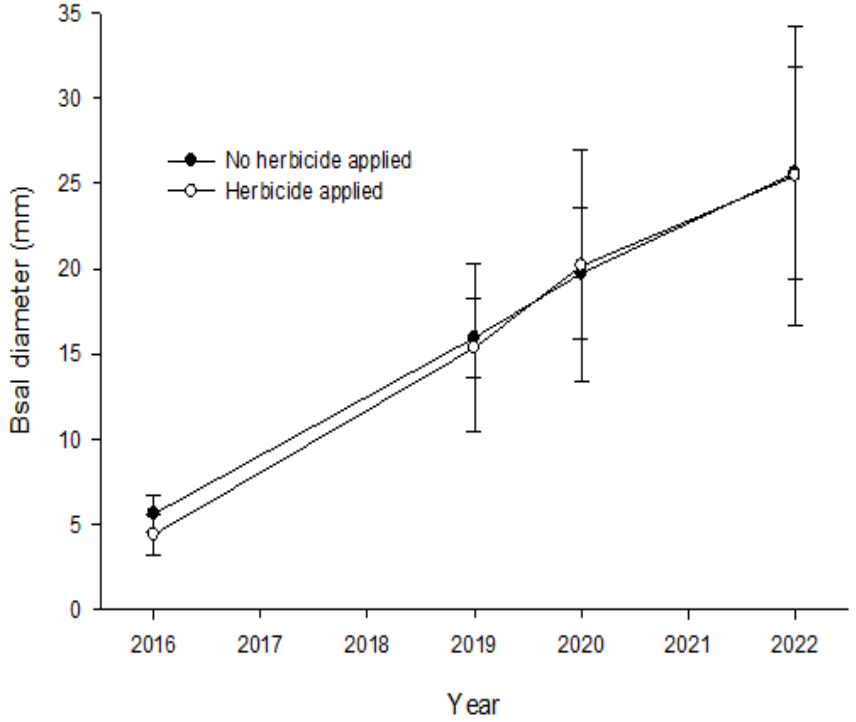


C70_100- Low to moderate severity effects

Why? Just guessing, but probably a combination of weather and reverse-edge effects

Initial results on study:

- No influence of herbicide on growth of saplings
- No influence of herbicide on wildfire-caused mortality



Lennon and York, In Prep

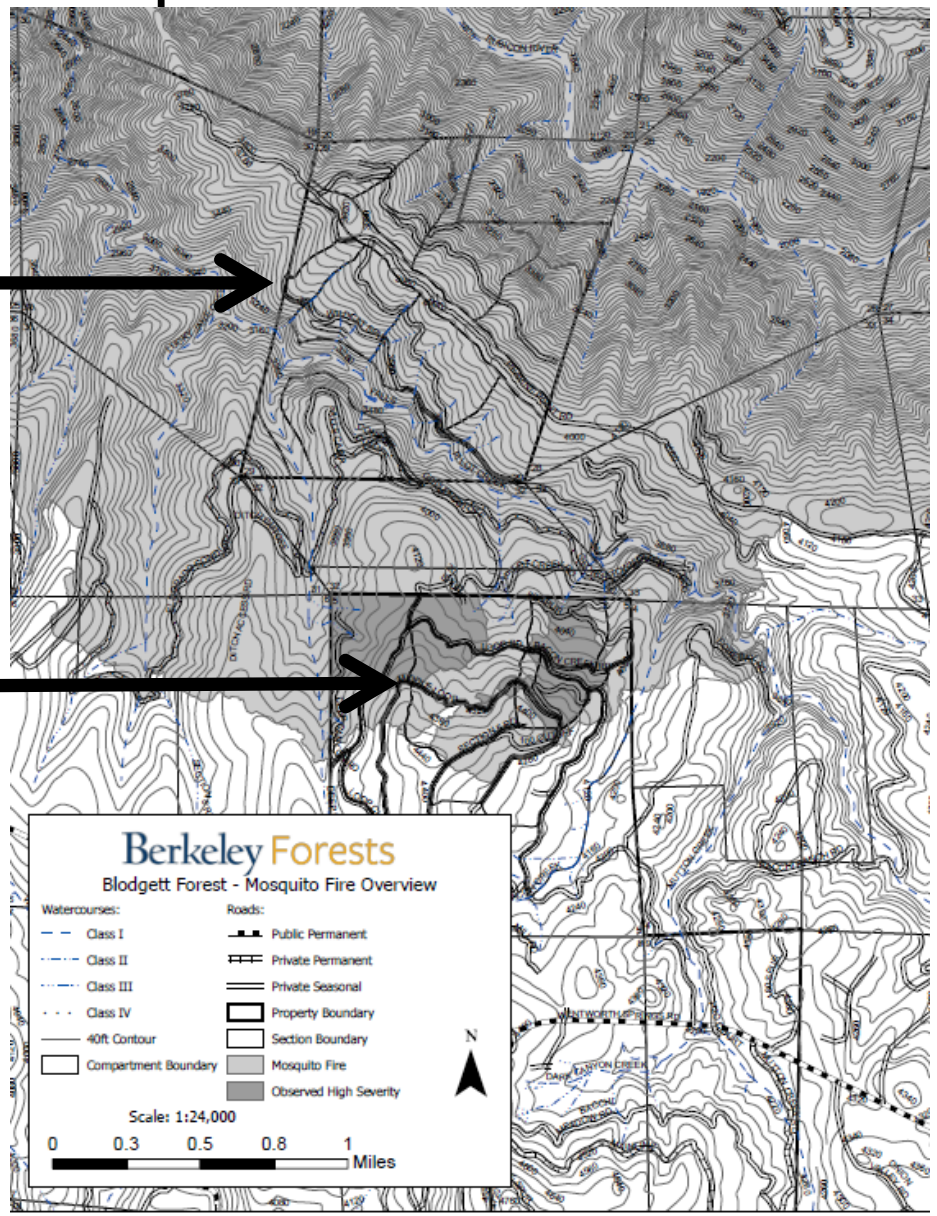
Big picture and forest and landscape scales

650 acres burned
100% high severity
No recent treatments

320 acres burned

146 acres (46%) with high severity
174 acres with low_mod severity

Recent treatment area:
22 acres with recent Rx fire
34 acres with recent Rx fire and Site Preparation < 12 years ago



Landscape treatment effects

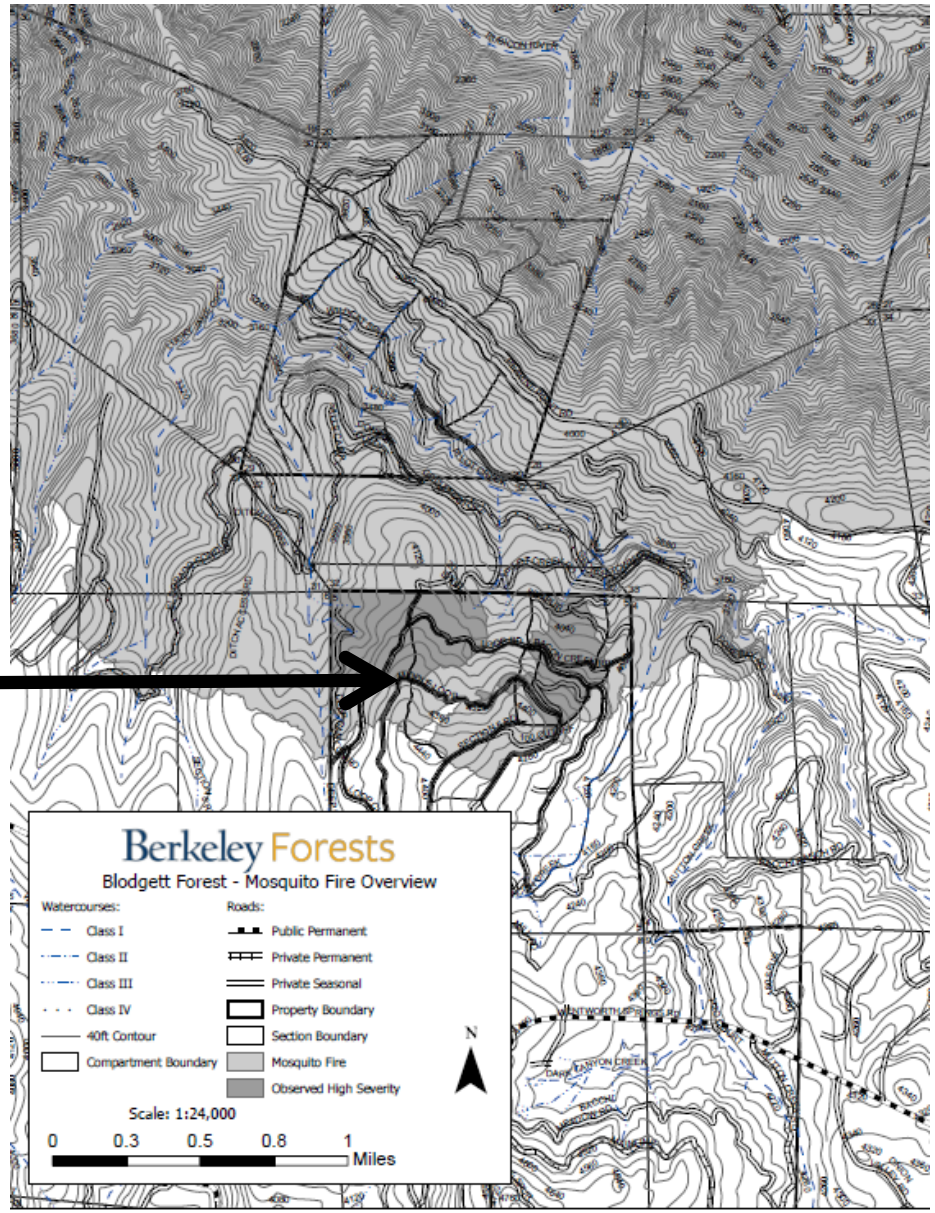
Generally, expect 25% treatment to modify wildfire over 50% of landscape…
a 200% return on investment

At Blodgett:

34 acres treated

High end estimate of return: 500%

Low end estimate: 175%



Where do we go from here?

Use Mosquito Fire for:

Mostly demonstration and education

Post – Fire management

Salvage operation:

High severity:
Salvage + mechanical site prep

Moderate severity:
Salvage *most* dead trees

Moderate and low severity

Leverage them as effective fuel treatment to be *maintained*

Build upon them to make larger areas with fuel treatments

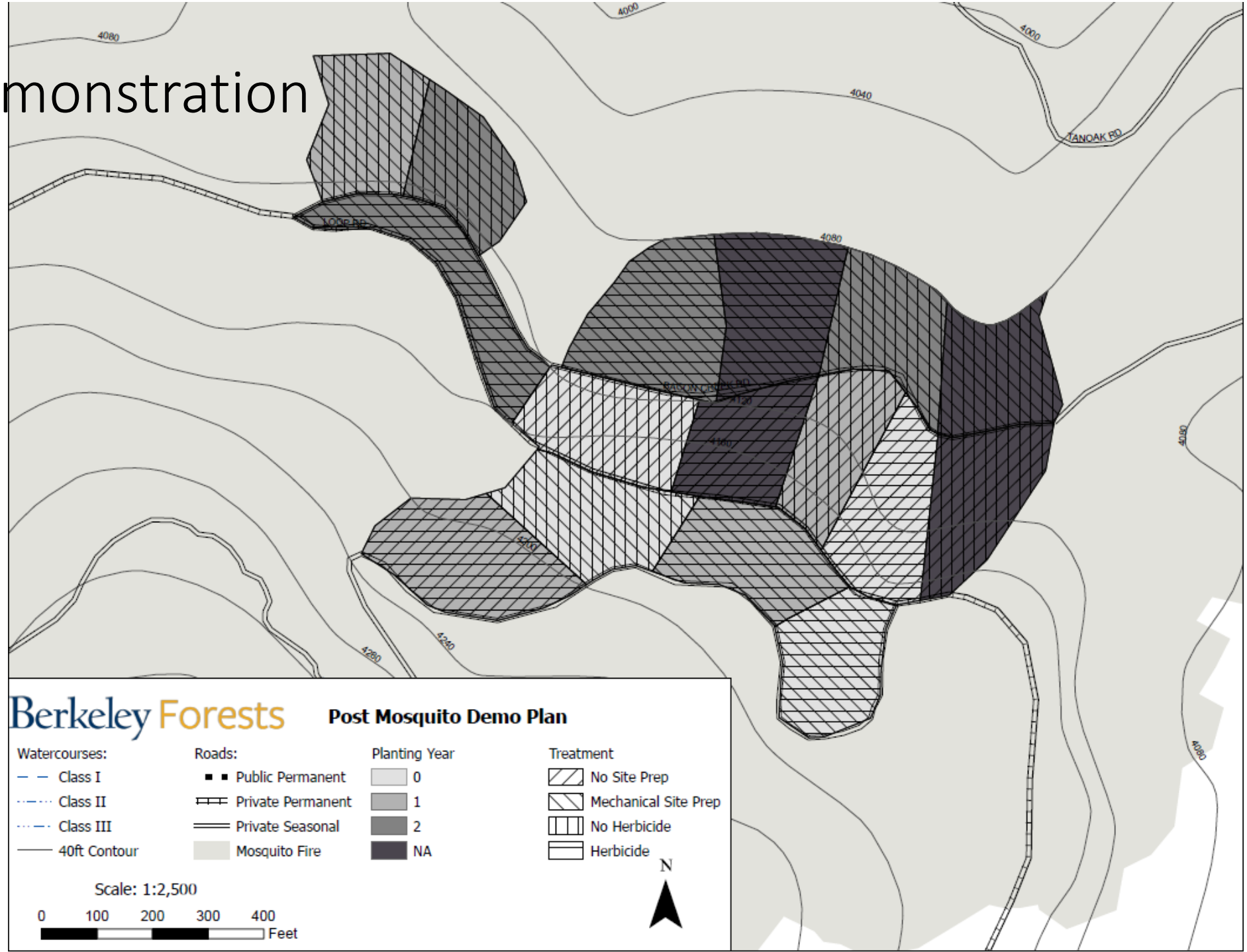
Reforestation Demonstration

Post fire forest development
Factor of:

1. Salvage Harvesting

2. Timing of Planting

3. Shrub control



Salvage, plant year 0, herbicide

No salvage, plant year 0, herbicide

Conclusion

What do you want to talk about after the next wildfire in Amador-Calaveras counties?

My way to confirm you will talk about low severity effects:

- Do a pirouette and look

For at least 50% of the time

- Can you run to the next draw/ridge?
- Can you see to the next draw/ridge?
- Answer must be yes to both