Grand Lake Hazard
Fuel Reduction 2004
Rocky Mountain National Park

Goal:

"…to reduce the threat of catastrophic fire to life and property in the Town of Grand Lake and within the adjacent portions of Rocky Mountain National Park. The goal of the project is to reduce fuel loads and reduce the potential of crown fire by changing the array of live fuels by systematic forest thinning…"

Specific Objectives:

- Reduce fuel loading of dead and down woody debris greater than 1-inch diameter by 80%
- Remove 90% of all pole-sized trees growing into overstory crowns
- Establish average overstory crown spacing of a minimum of 5-7 feet
- Limb all trees to 5 feet above ground level

How'd we do?

Stand Structure

Pre-treatment

Post-treatment

Stand Structure

Pre-treatment

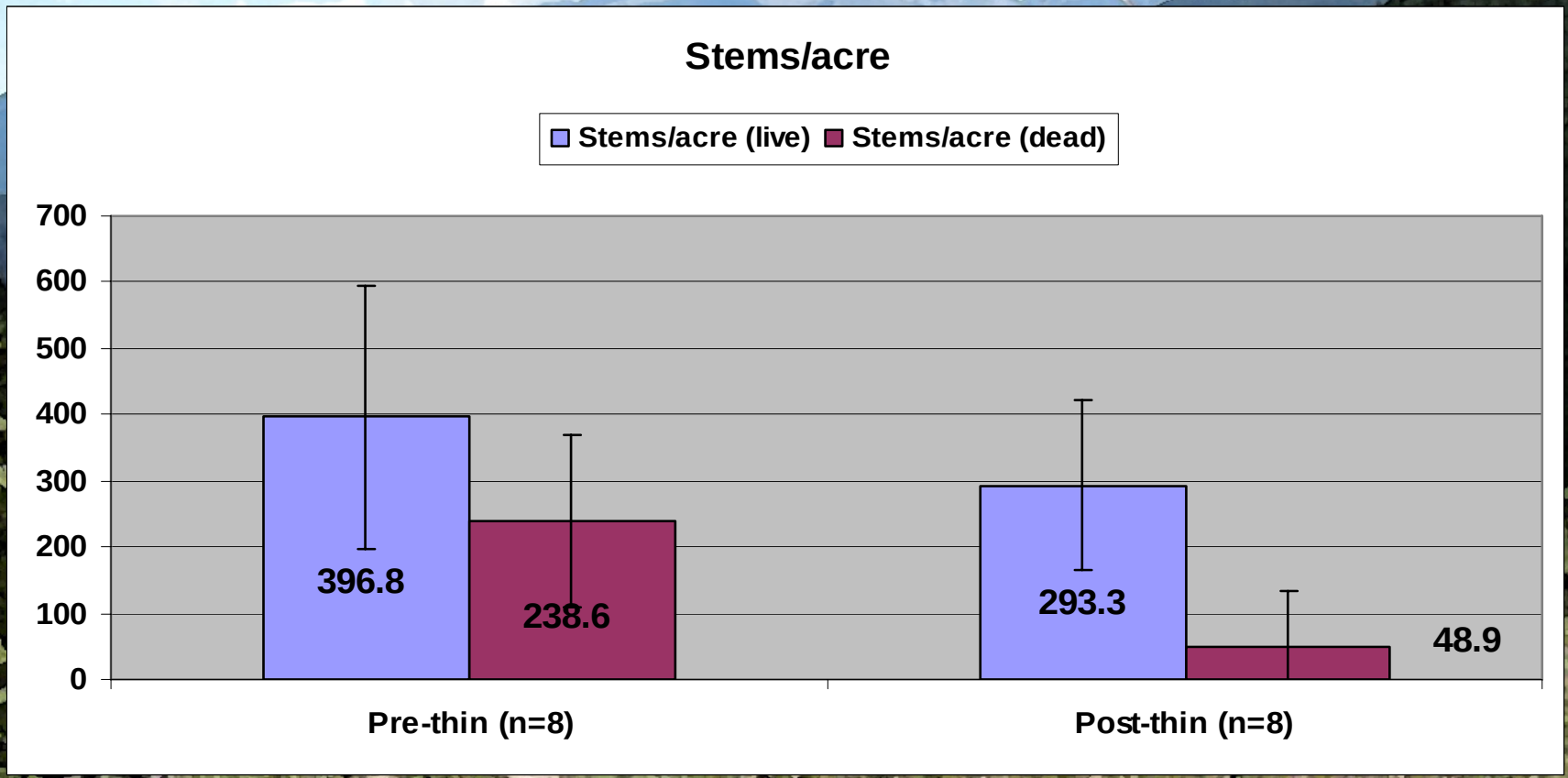
Post-treatment

Stand Structure

Live tree size class distribution pre- and post treatment			
	Pre-treatment (live stems/acre)	Post-treatment (live stems/acre)	Percent change
Seedlings	20	9	-55%
Poles	193	121	-37%
Overstory	184	164	-11%
TOTAL	**397**	**294**	**-26%**

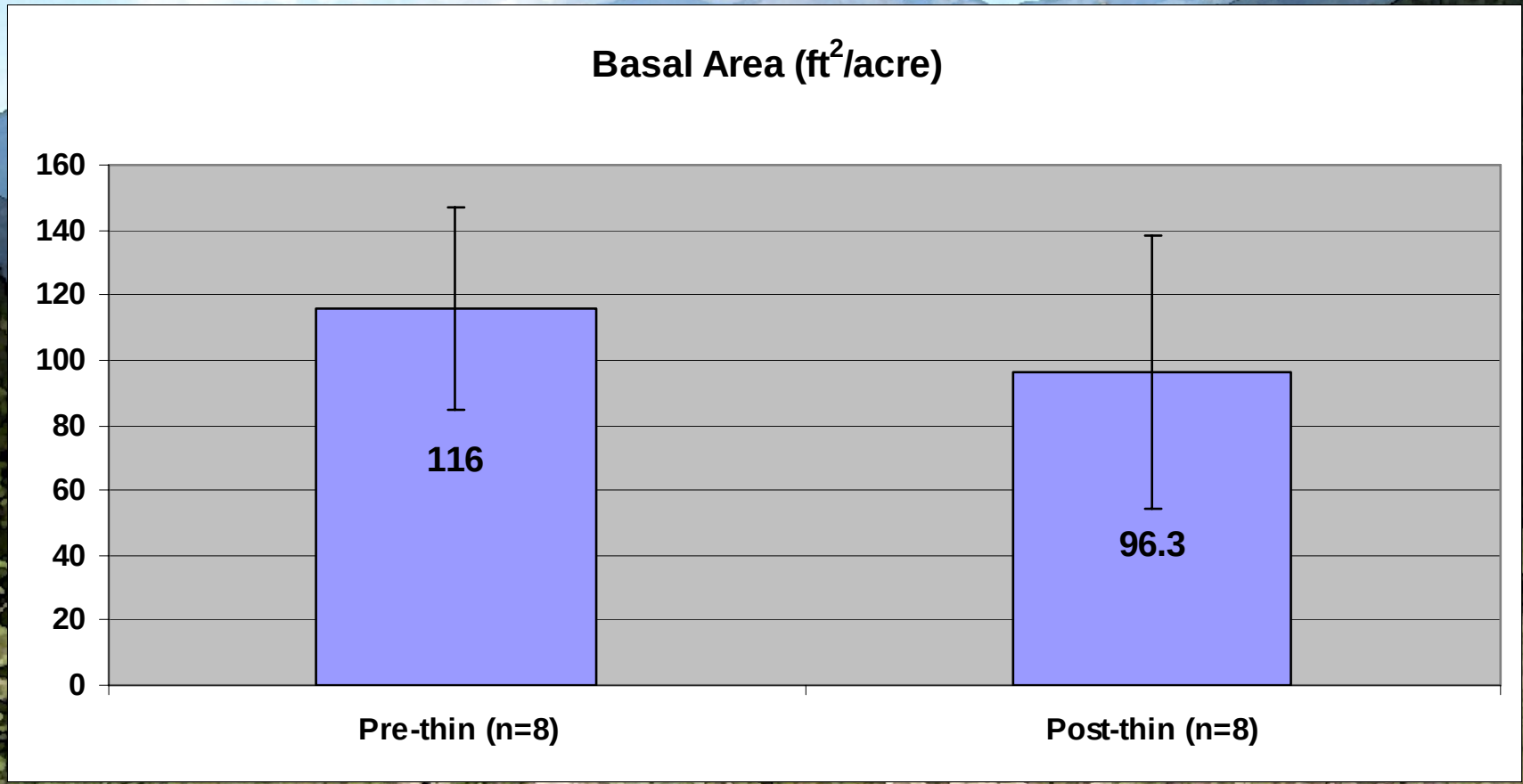
Standing dead tree size class distribution pre- and post treatment			
	Pre-treatment (dead stems/acre)	Post-treatment (dead stems/acre)	Percent change
Seedlings	0	0	N/A
Poles	210	35	-83%
Overstory	29	14	-52%
TOTAL	**239**	**49**	**-79%**

Stand Structure



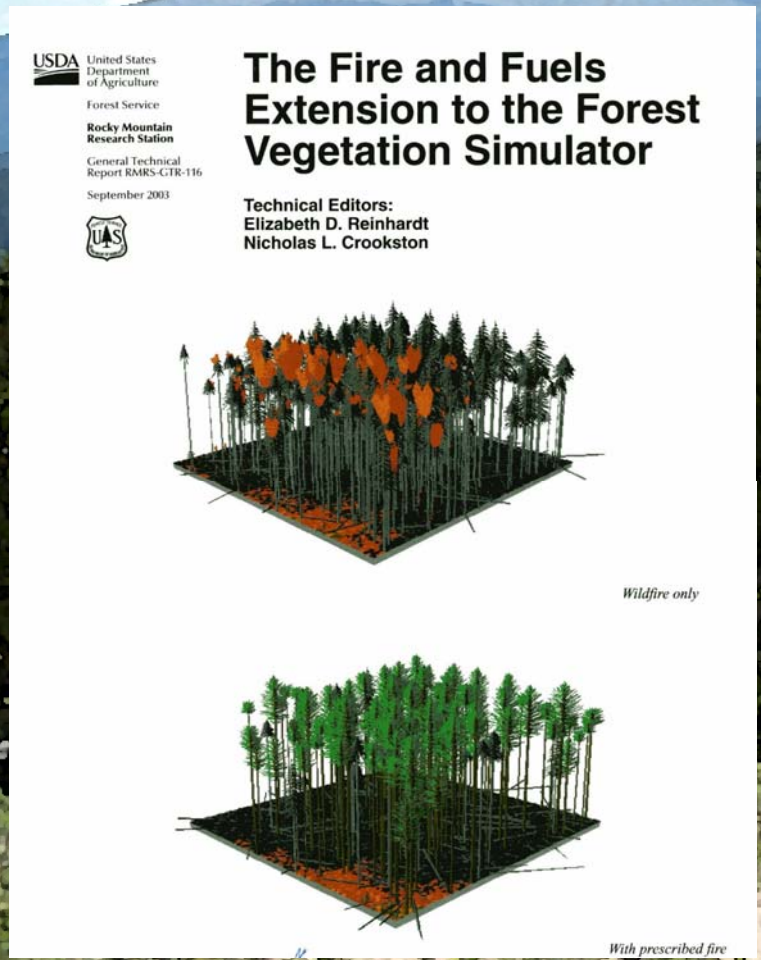
- 26% reduction in live stems/acre
- 79% reduction in dead stems/acre

Stand Structure



- 17% reduction in live basal area

Canopy Characteristics



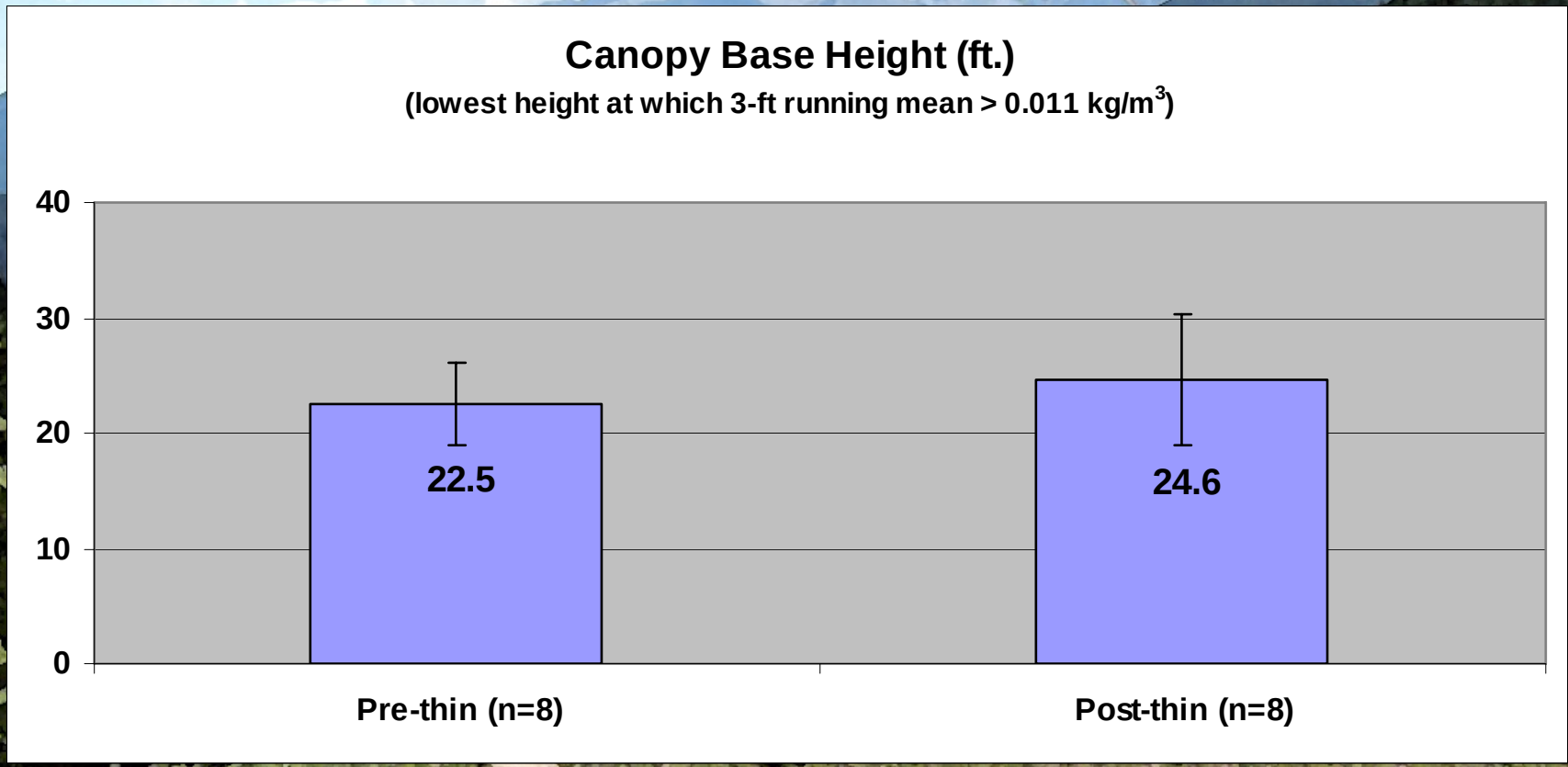
- Links stand development, fuel dynamics, fire behavior, fire effects
- Fire hazard assessment
- Fuels treatment design (silvicultural and/or prescribed fire)
- Allows comparisons of treatment alternatives over time
- Site specific projections of:
  - Surface fuel loading
  - Stand structure/composition
  - Fire potential (surface & crown)
  - Snags
  - Fire behavior
  - Fuel consumption
  - Tree mortality
  - Smoke production

Canopy Characteristics

	Pre-treatment	Post-treatment	Percent change
Canopy base height (ft.)	22.5	24.6	**9%**
Canopy bulk density (kg/m^3)	0.104	0.085	**-18%**
Canopy cover (%)	67.9	55.8	**-18%**
Crown Competition Factor	118	97	**-18%**

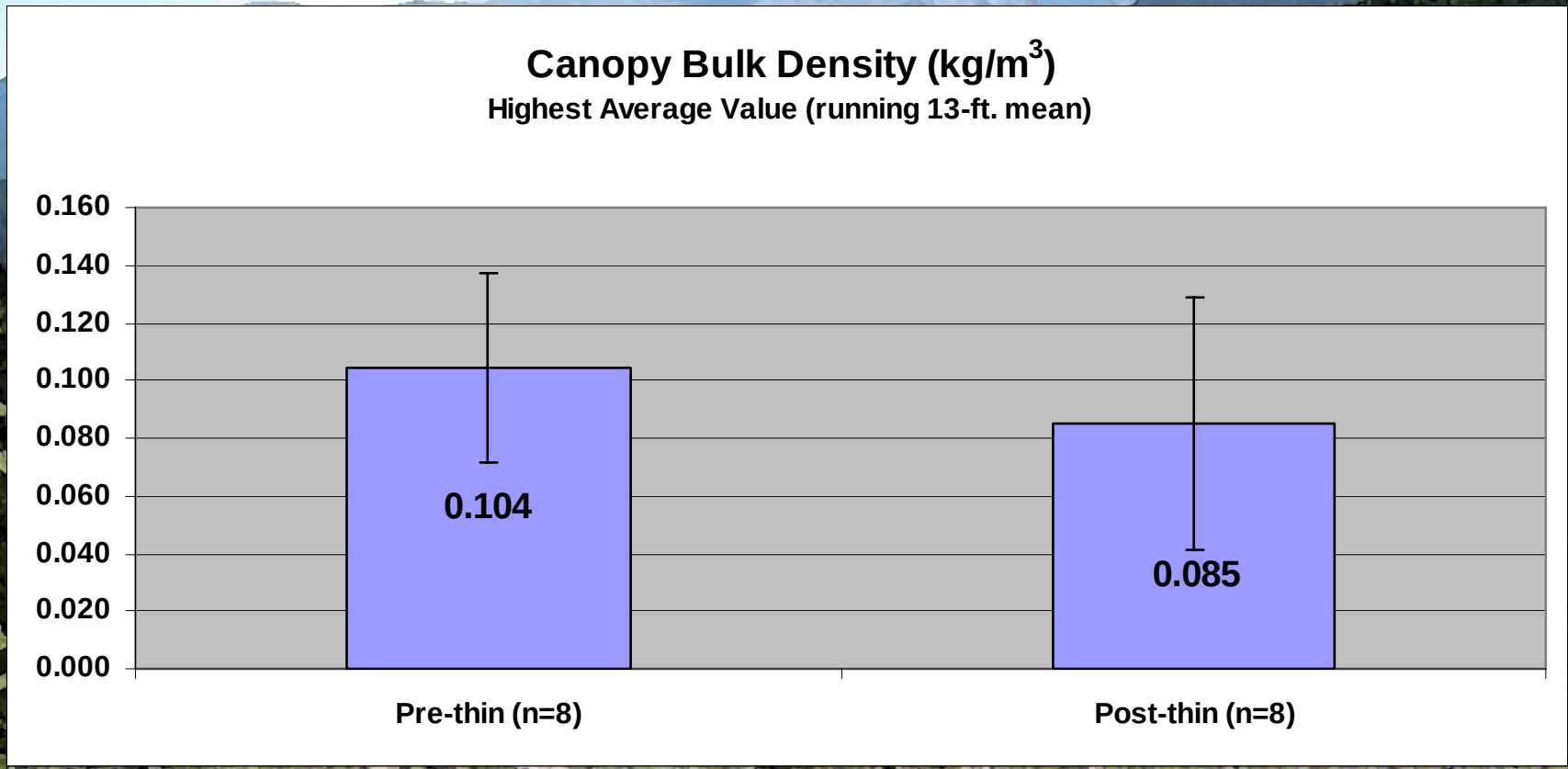
- **CBH = lowest height at which 3-ft running mean > 0.011 kg/m^3 (30 lb/acre/ft.)**
- **CBD = highest average 13-ft running mean**

Canopy Characteristics



- 9% increase in canopy base height

Canopy Characteristics



- 18% reduction in canopy bulk density

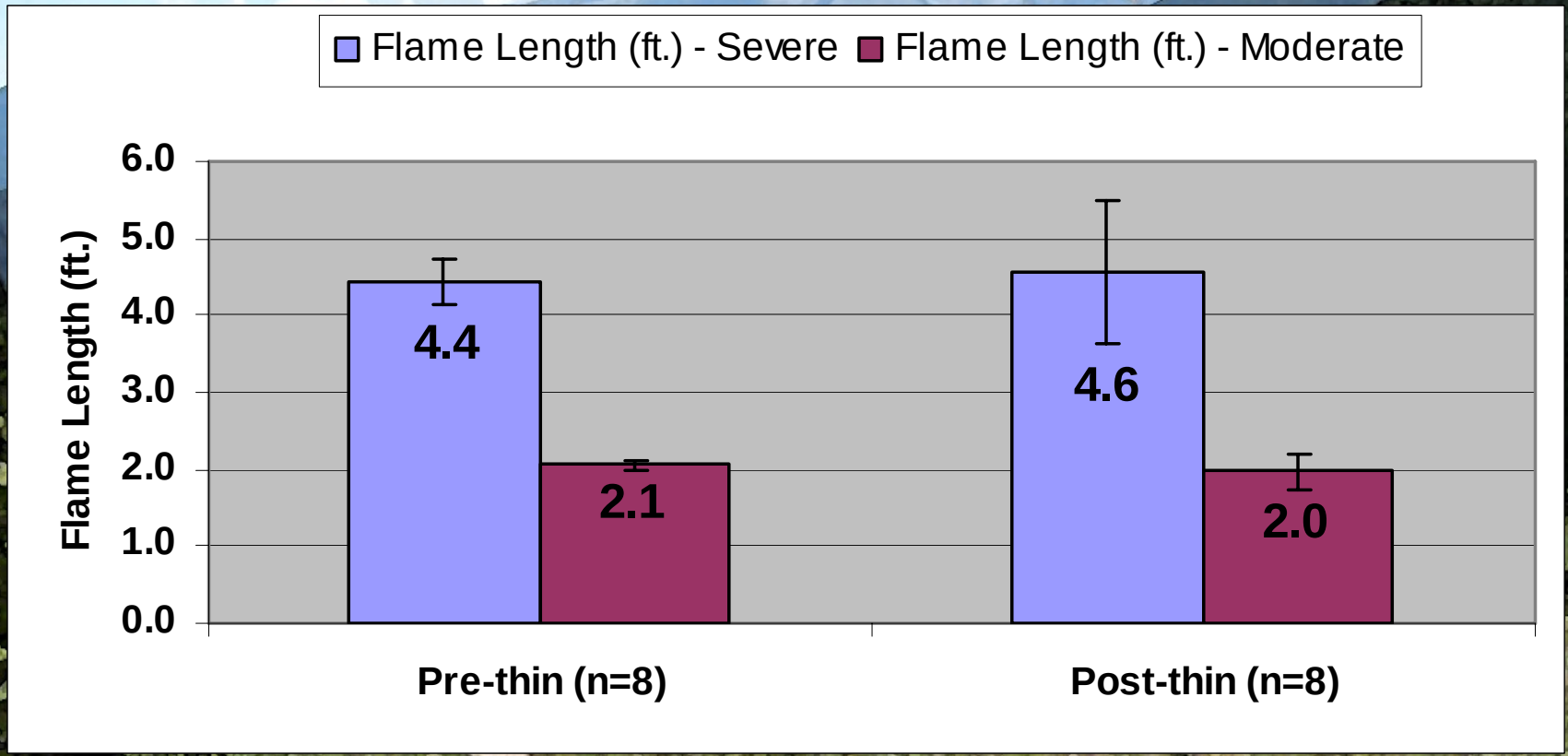
Potential Fire Behavior

			Fuel moisture by size class/type (%)					
Fire Condition	20 ft.Wind (mph)	Temp (°F)	1-hr	10-hr	100-hr	1000-hr	Duff	Live
Severe	20.0	70	4	4	5	10	15	70
Moderate	6.0	70	8	10	12	16	125	120

Treatment effects on potential fire behavior estimated under “moderate” and “severe” burning conditions (model defaults)

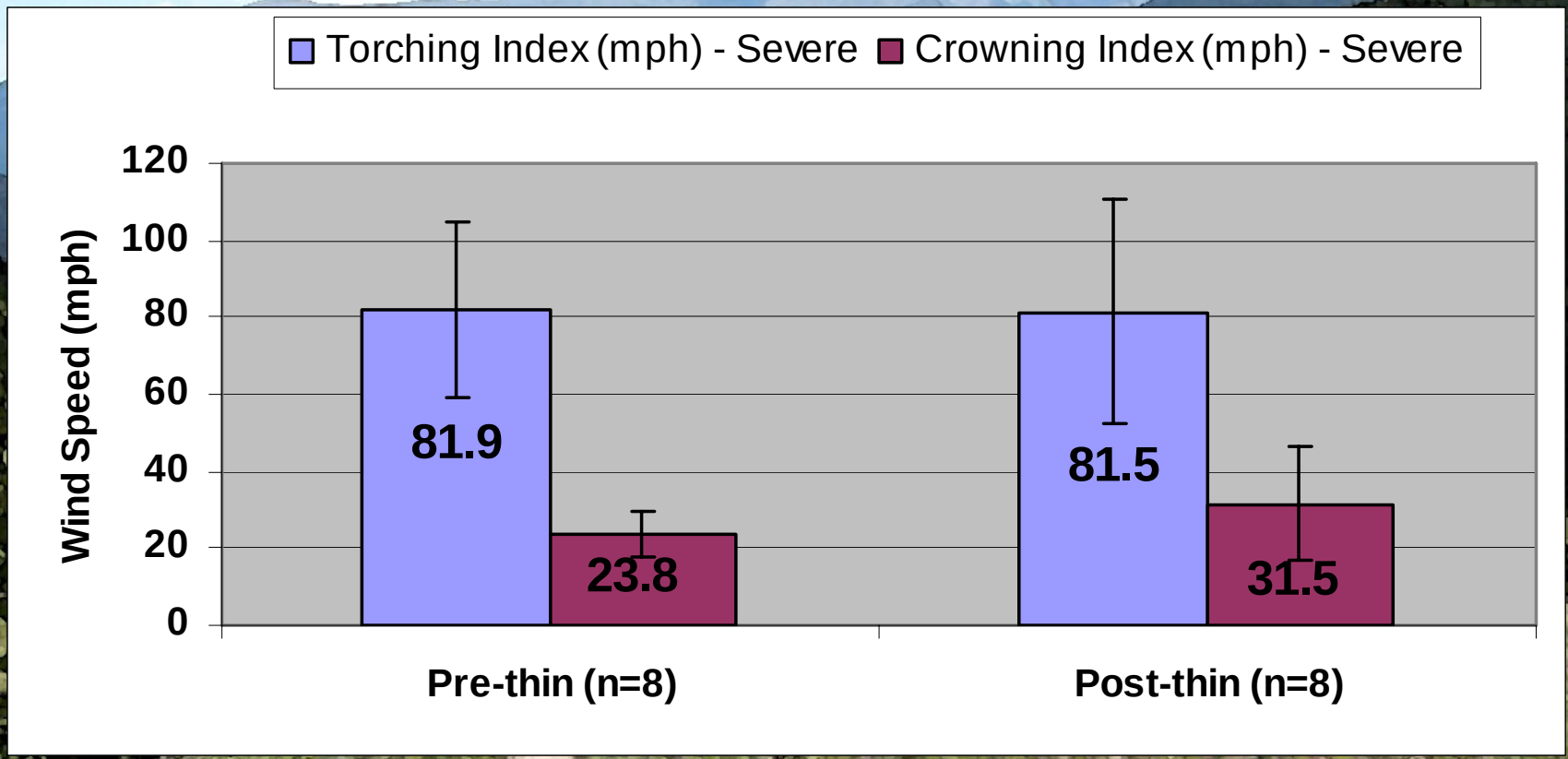
Surface fire predicted under both scenarios for <u>both</u> pre- and post-treatment conditions

Canopy Characteristics



Predicted flame lengths unchanged following treatment

Canopy Characteristics



- Torching index unchanged
- 24% increase in Crowning Index

Potential Fire Behavior

			Fuel moisture by size class/type (%)					
Fire Condition	20 ft.Wind (mph)	Temp (°F)	1-hr	10-hr	100-hr	1000-hr	Duff	Live
Severe	20.0	70	4	4	5	10	15	70
Moderate	6.0	70	8	10	12	16	125	120

	Flame length (ft.)		Fire type		Torching index - severe (mph)	Crowning index - severe (mph)	Potential Mortality - severe (%BA)	Potential Mortality - moderate (%BA)
	Severe	Moderate	Severe	Moderate				
pre-treatment	4.4	2.1	Surface	Surface	81.9	23.8	69.6	65.5
post-treatment	4.6	2.0	Surface	Surface	81.5	31.5	69.6	65.5

Specific Objectives:

- Reduce fuel loading of dead and down woody debris greater than 1-inch diameter by 80%
  - Not measured yet, piles still present
- Remove 90% of all pole-sized trees growing into overstory crowns
  - No: 37% reduction in pole-sized trees (live)
- Establish average overstory crown spacing of a minimum of 5-7 feet
  - ??? Not measured
- Limb all trees to 5 feet above ground level
  - Also not measured, but probably achieved

How'd we do?

Questions?

Boundary Hazard Fuel Reduction 2002-2003

Florissant Fossil Beds National Monument

Goal:

This project will:

- **reduce the risk of wildland fire to the facilities and occupants of numerous private homes located near the boundaries of Florissant Fossil Beds National Monument**
- **facilitate the use of prescribed fire designed to achieve long-term resource benefit and ecosystem sustainability**
- **create a minimum of a 300-foot wide buffer along the park boundary where live and dead fuels will be thinned and either removed or burned on site. In the event of a running crown fire, the increased canopy spacing and decrease in surface fuels will cause the fire to drop to the ground and slow fire spread enough to allow fire personnel to safely and more effectively protect structures and stop fire spread.**

Specific Objectives:

- Reduce fuel loading of dead and down woody debris greater than 1-inch diameter by 80-100%
- Increase live crown spacing to an average of 10 feet
- Provide a fuel break to slow progress of undesirable fires

How'd we do?

Stand Structure

Pre-treatment

Post-treatment

Stand Structure

Pre-treatment

Post-treatment

Stand Structure

	Pre-treatment (average)			Post-treatment (average)		
Species	Seedlings/acre	Poles/acre	Overstory/acre	Seedlings/acre	Poles/acre	Overstory/acre
PIEN	264.1	118.4	64.6	28.3	0.0	26.7
PIPO	33.5	17.1	46.2	11.2	0.0	29.4
PSME	67.6	228.5	86.6	33.5	0.0	36.8
POTR	118.4	101.9	11.3	293.9	96.2	9.9
TOTAL	**483.7**	**465.9**	**208.7**	**366.9**	**96.2**	**102.8**

	Overall Composition	
	Pre-treatment	Pre-treatment
PIEN	39%	10%
PIPO	8%	7%
PSME	33%	12%
POTR	20%	71%

Surface Fuel

	Pre-treatment	Post-treatment	
Fuel Type	**Loading (tons/acre)**	**Loading (tons/acre)**	**Percent change**
1-hr	0.25	0.27	**8%**
10-hr	1.40	3.16	**126%**
100-hr	2.48	0.93	**-63%**
1000-hr	4.26	1.11	**-74%**
Litter	9.10	8.10	**-11%**
Duff	11.90	9.60	**-19%**
TOTAL	**29.4**	**23.2**	**-21%**

70% reduction in 1”+ diameter fuels

Canopy Characteristics

	Pre-treatment	Post-treatment	Percent change
Canopy base height (ft.)	3.3	18.5	**456%**
Canopy bulk density (kg/m^3)	0.180	0.106	**-41%**
Crown Competition Factor	154.3	90.7	**-41%**

- **CBH = lowest height at which 3-ft running mean > 0.011 kg/m^3 (30 lb/acre/ft.)**
- **CBD = highest average 13-ft running mean**

Potential Fire Behavior

			Fuel moisture by size class/type (%)					
Fire Condition	20 ft.Wind (mph)	Temp (°F)	1-hr	10-hr	100-hr	1000-hr	Duff	Live
Severe	20.0	70	4	4	5	10	15	70
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Treatment effects on potential fire behavior estimated under “moderate” and “severe” burning conditions (model defaults)

Potential Fire Behavior

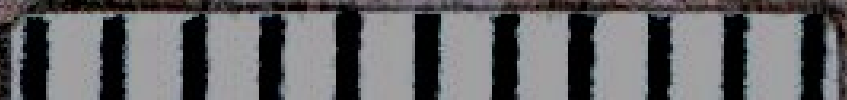
	Flame length (ft.)		Fire type		Torching index - severe (mph)	Crowning index - severe (mph)	Potential Mortality - severe (%BA)	Potential Mortality - moderate (%BA)
	Severe	Moderate	Severe	Moderate				
pre-treatment	67.2	3.3	Active	Passive	5.2	14.7	99.7	56.7
post-treatment	4.5	2.4	Surface	Surface	40.0	22.1	50.7	44.0

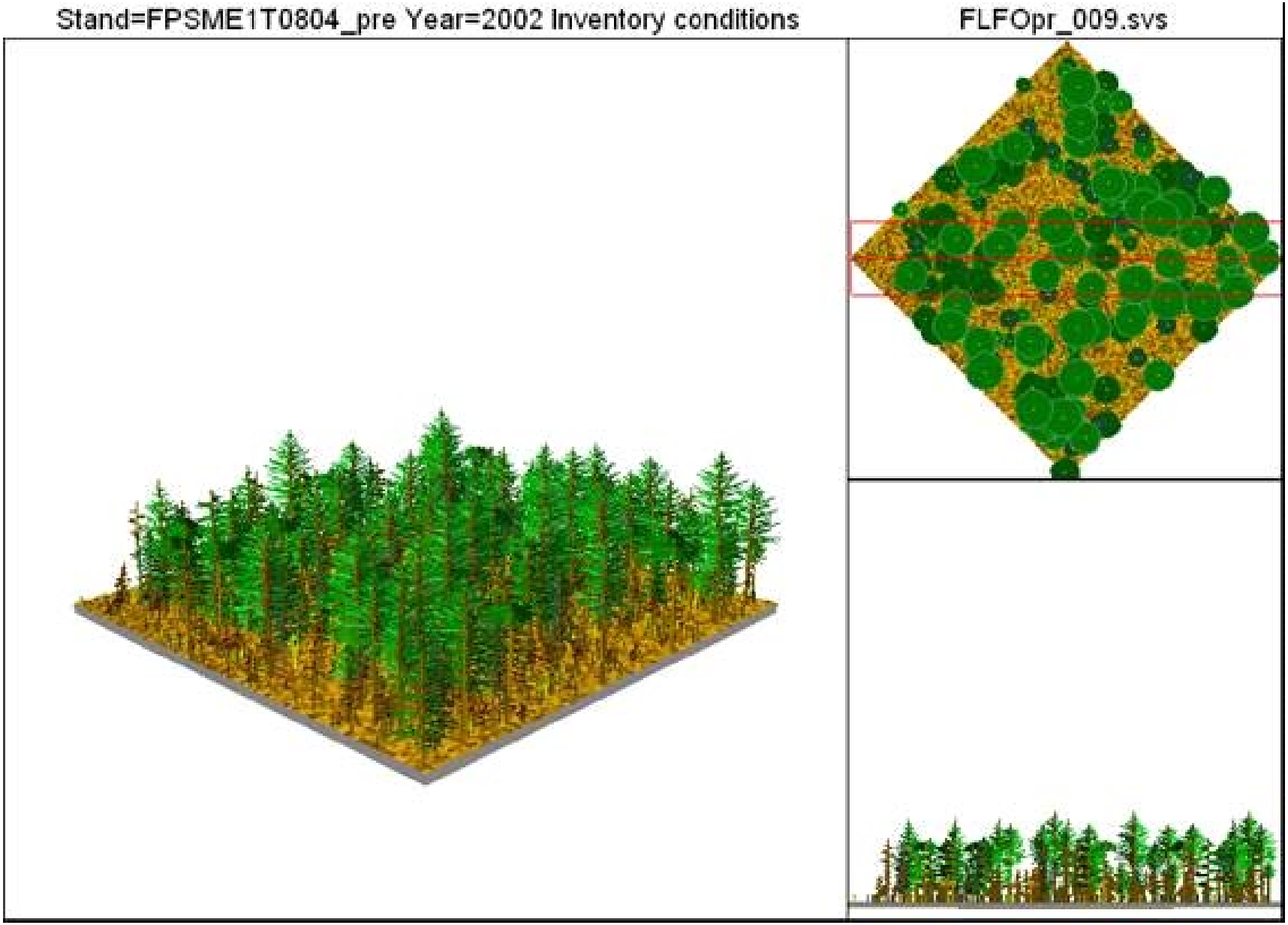
- **Crowning predicted under <u>both</u> scenarios for pre-treatment stand**
- **Surface fire predicted in post-treatment stand**

Specific Objectives:

- **Reduce fuel loading of dead and down woody debris greater than 1-inch diameter by 80-100%**
  - **No: 70% reduction in 1”+ diameter fuels**
- **Increase live crown spacing to an average of 10 feet**
  - **??? Not measured**
- **Provide a fuel break to slow progress of undesirable fires**
  - **Maybe (objective somewhat vague)**

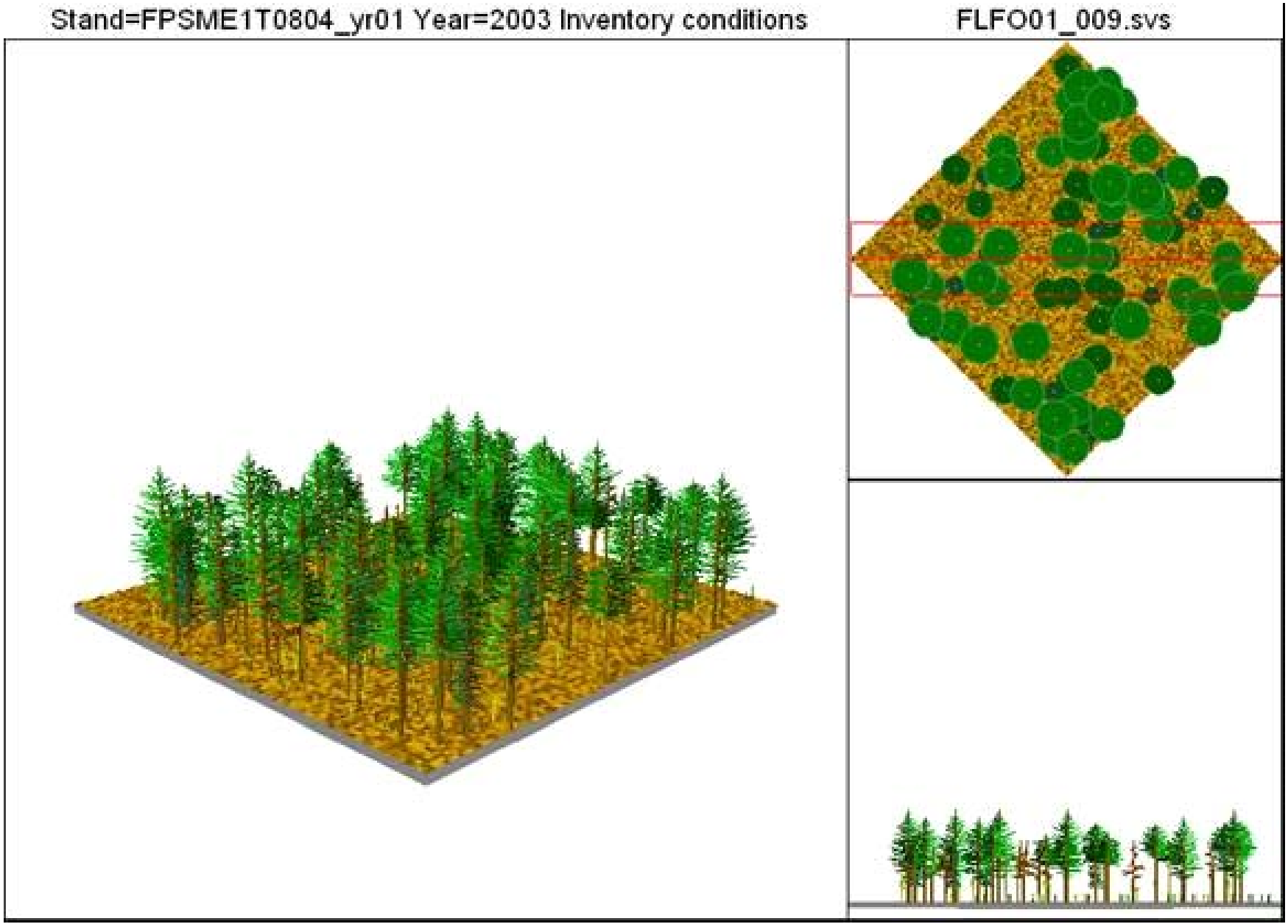
How’d we do?



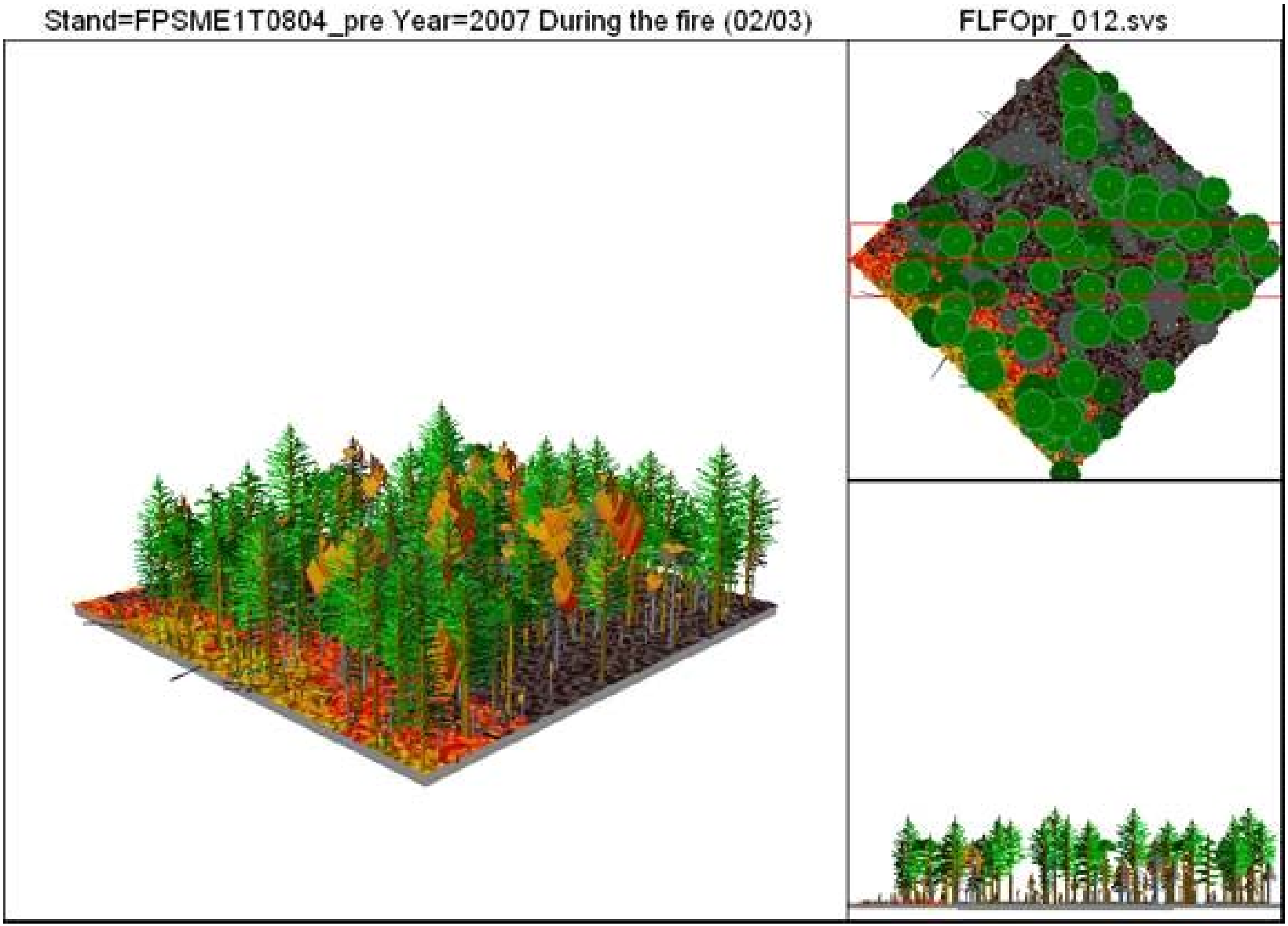


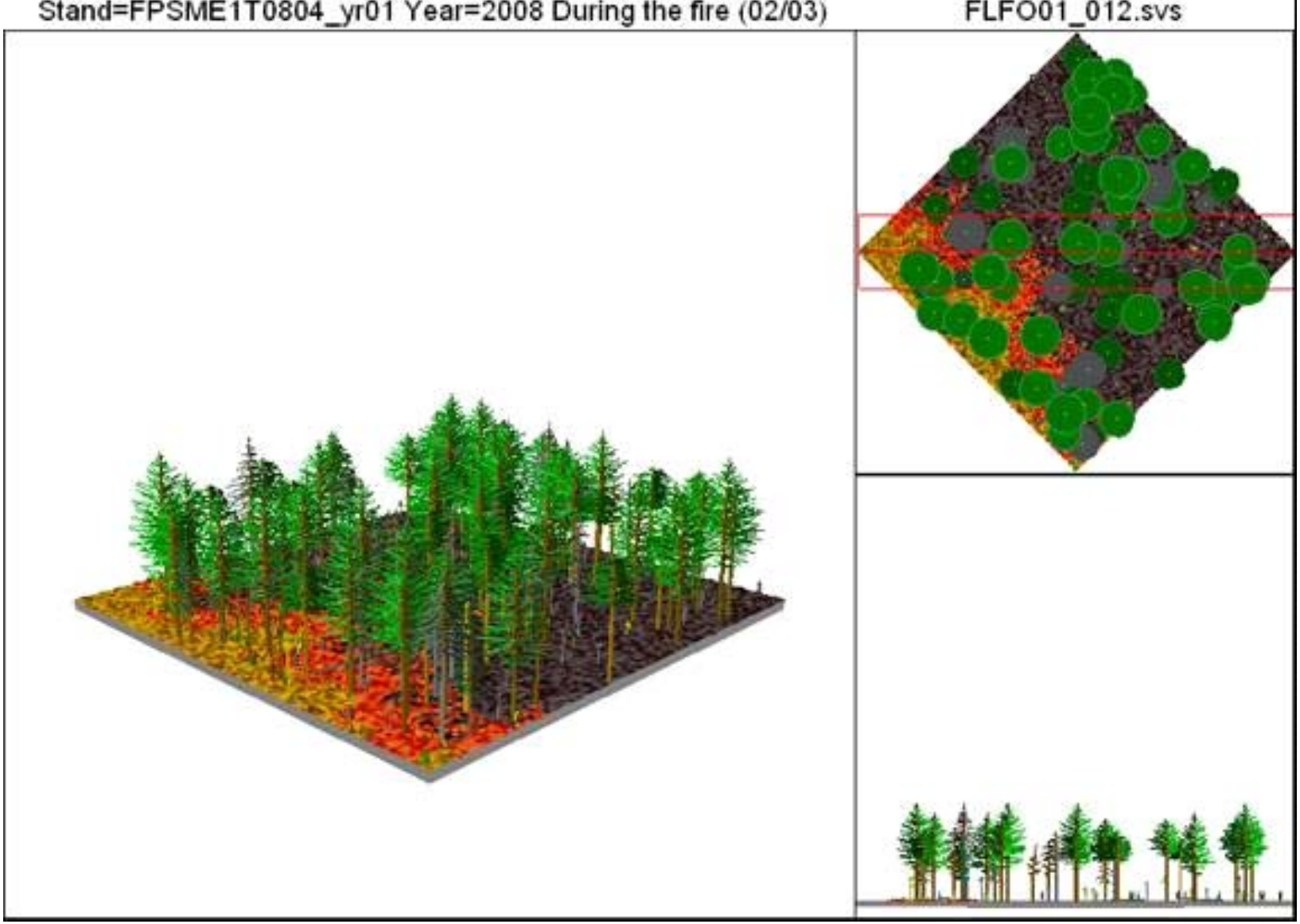
Plot 4: Pre-treatment stand

Plot 4: Post-treatment stand



Plot 4: Pre-treatment stand burning under “moderate” scenario





Plot 4: Post-treatment stand burning under “moderate” scenario

Questions?