

# Wildfire in Mato Grosso's transitional forest: Initial effects on stem mortality and canopy structure, and consequences for future fire susceptibility

Jennifer K. Balch  
Dan C. Nepstad  
Lisa M. Curran

Paulo M. Brando  
Oswaldo de Carvalho  
Jr.  
Paul LeFebvre

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# Funding Institutions



HEINZ FAMILY PHILANTHROPIES

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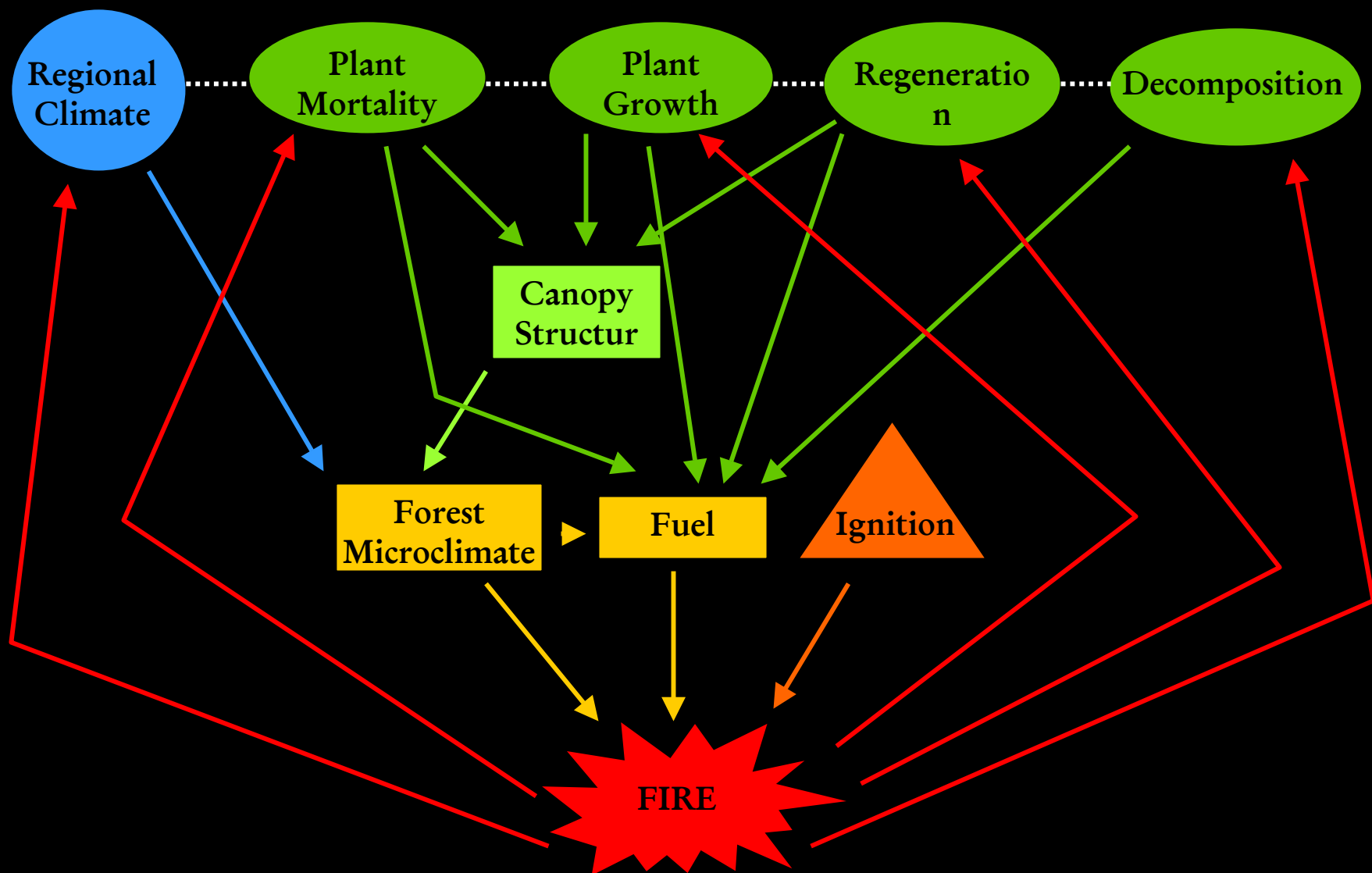
Yale University's  
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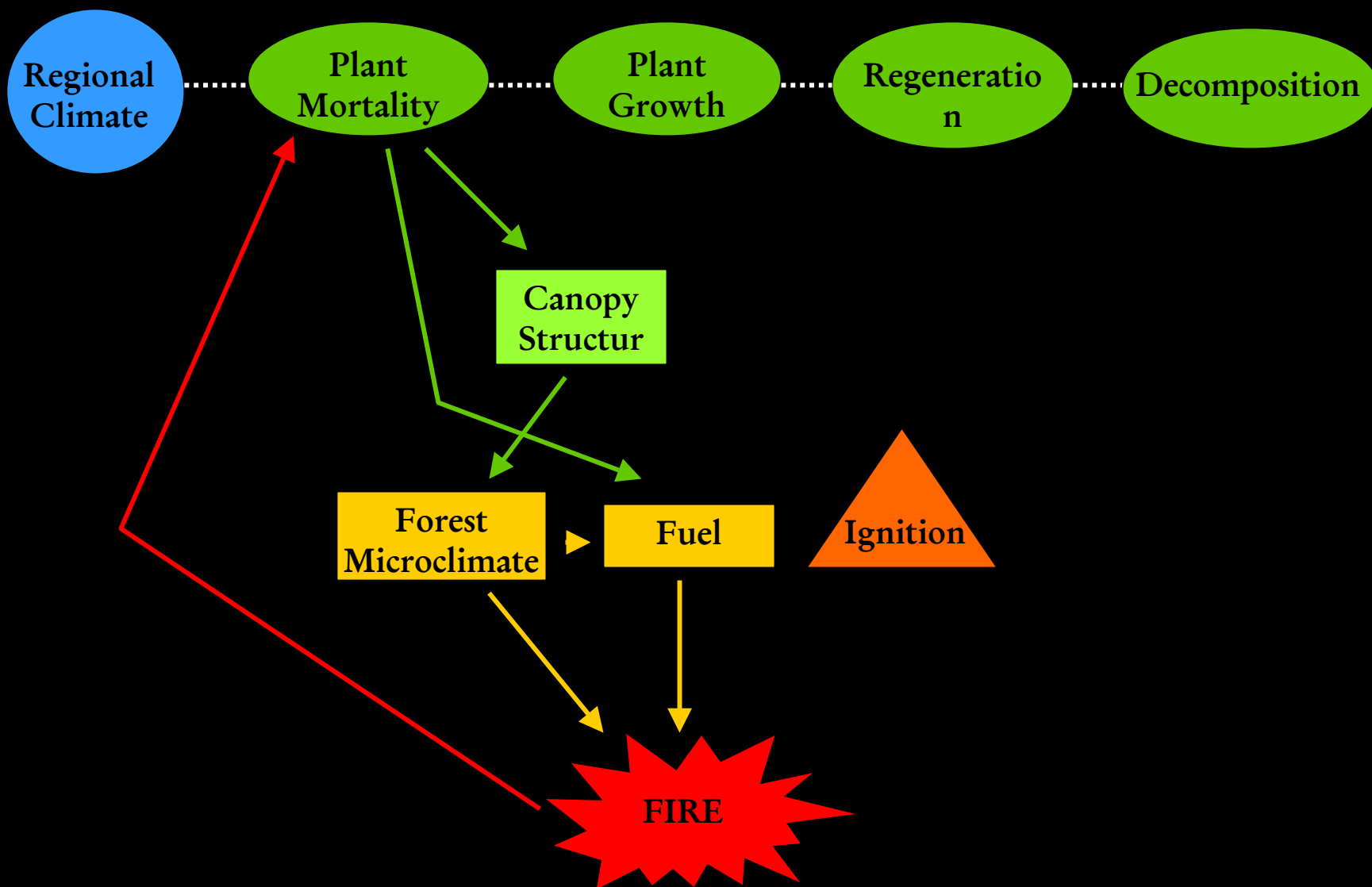




# Objectives

- Assess the fuel and microclimate determinants of fire spread and intensity
- Monitor how recurrent fires may promote a fire-dependent system and potentially lead to savannization
- Quantify carbon emissions from understory fires
- Predict transitional forest flammability on temporal/spatial scales





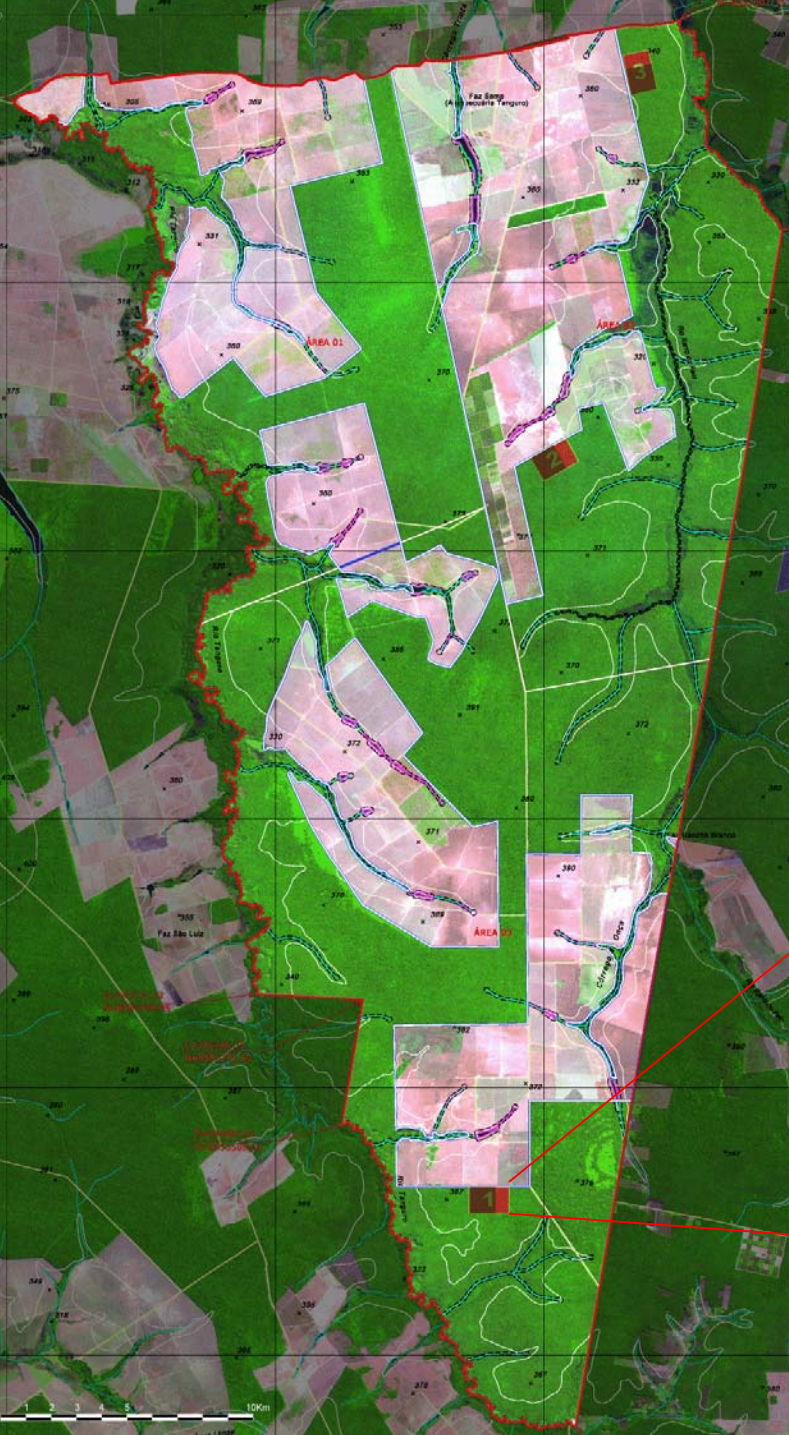












# Experimental Design

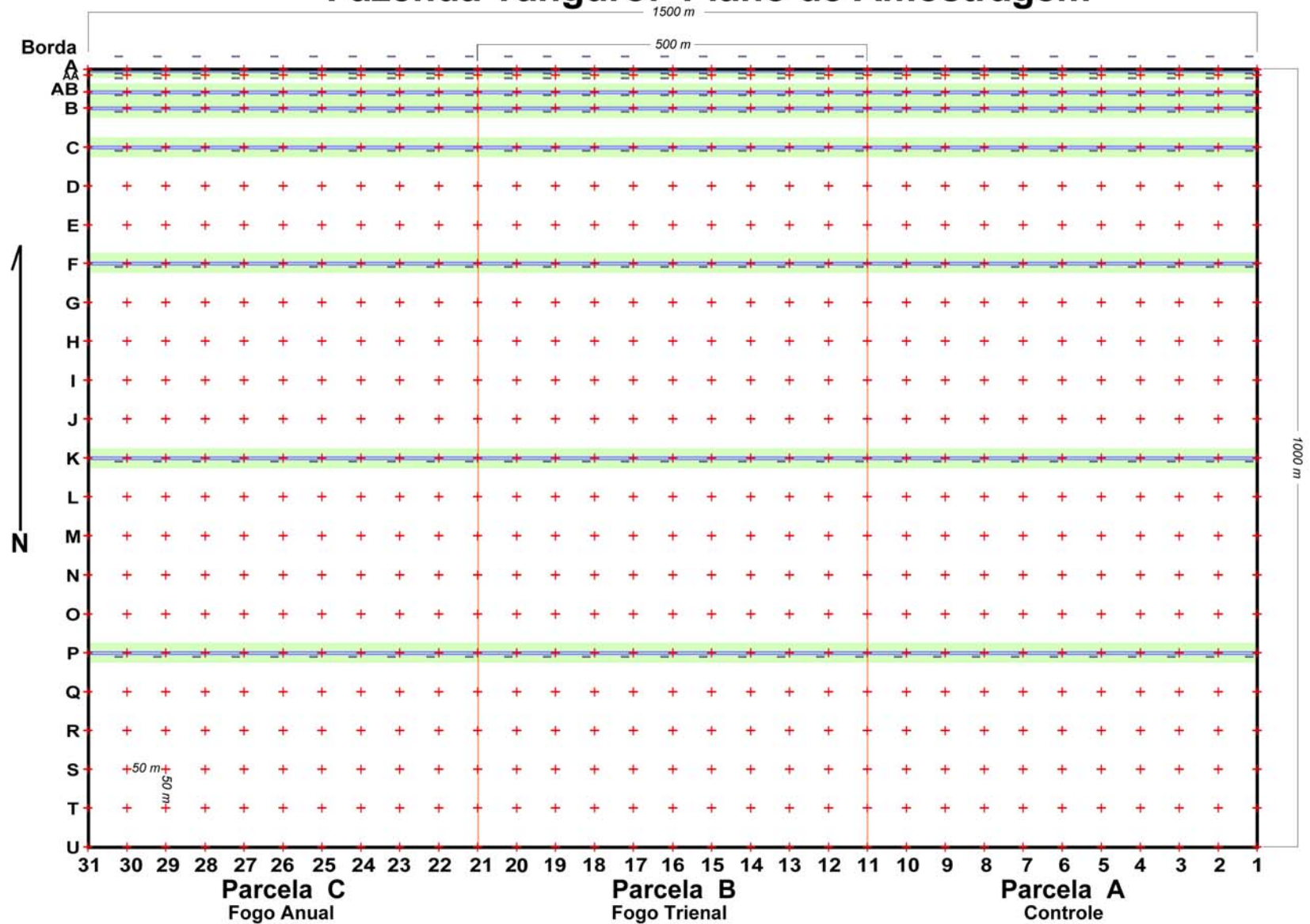
- Three 100 ha burns
- Two fire regimes
- 1<sup>st</sup> 100-ha burn August 2004
- 2<sup>nd</sup> 100-ha burn August 2006
- 3<sup>rd</sup> 100-ha burn August 2007

**Burn  
every  
year**

**Burn  
every  
3 years**

**Contro  
l**

# Fazenda Tanguro: Plano de Amostragem



**Inventários:**

**Area Total**

**> 40cm DAP**

**> 20cm DAP**

**>10cm DAP**

**Sub-Parcelas:**

**10 m**

**2 m**

**< 10 cm DAP**

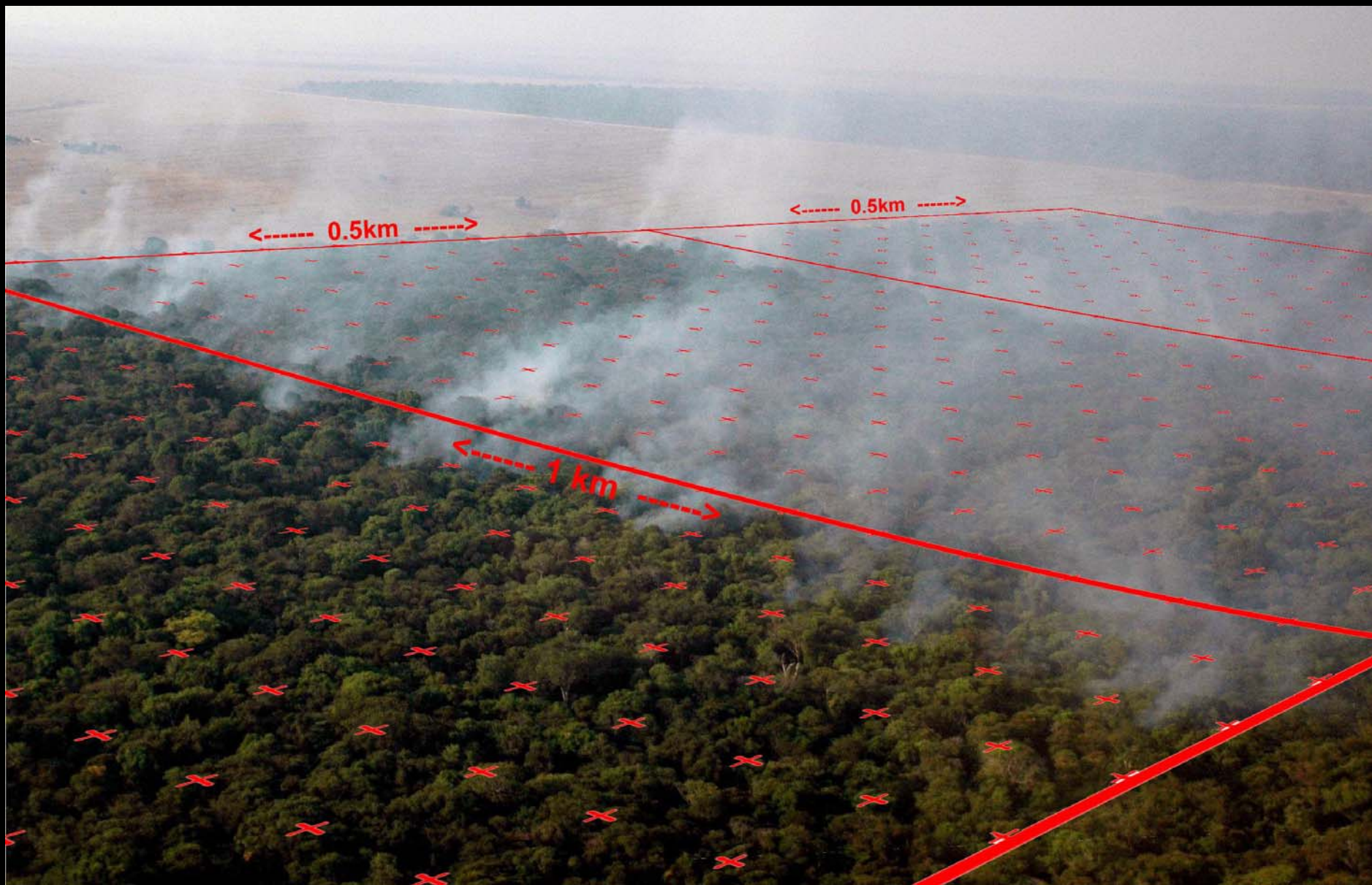
**< 5 cm DAP**

**< 1 cm DAP**











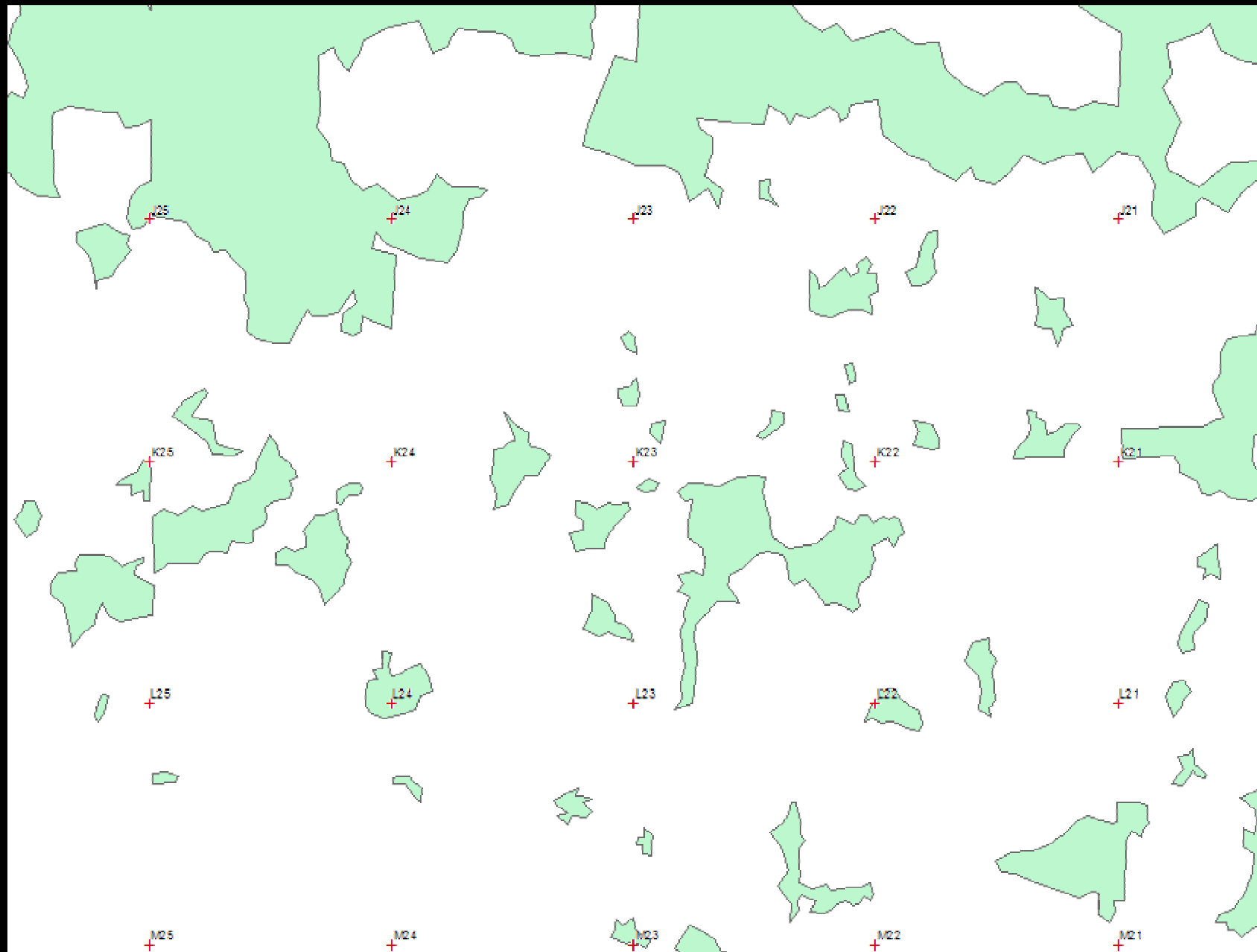
# Fire Behavior

- Average Ground Temperature – 250 to 300°C
- Heat column hot enough to scorch up to 5m
- Average Flame Height – 30 cm
- Average Rate of Spread – 14 m/hr



200 m

300 m

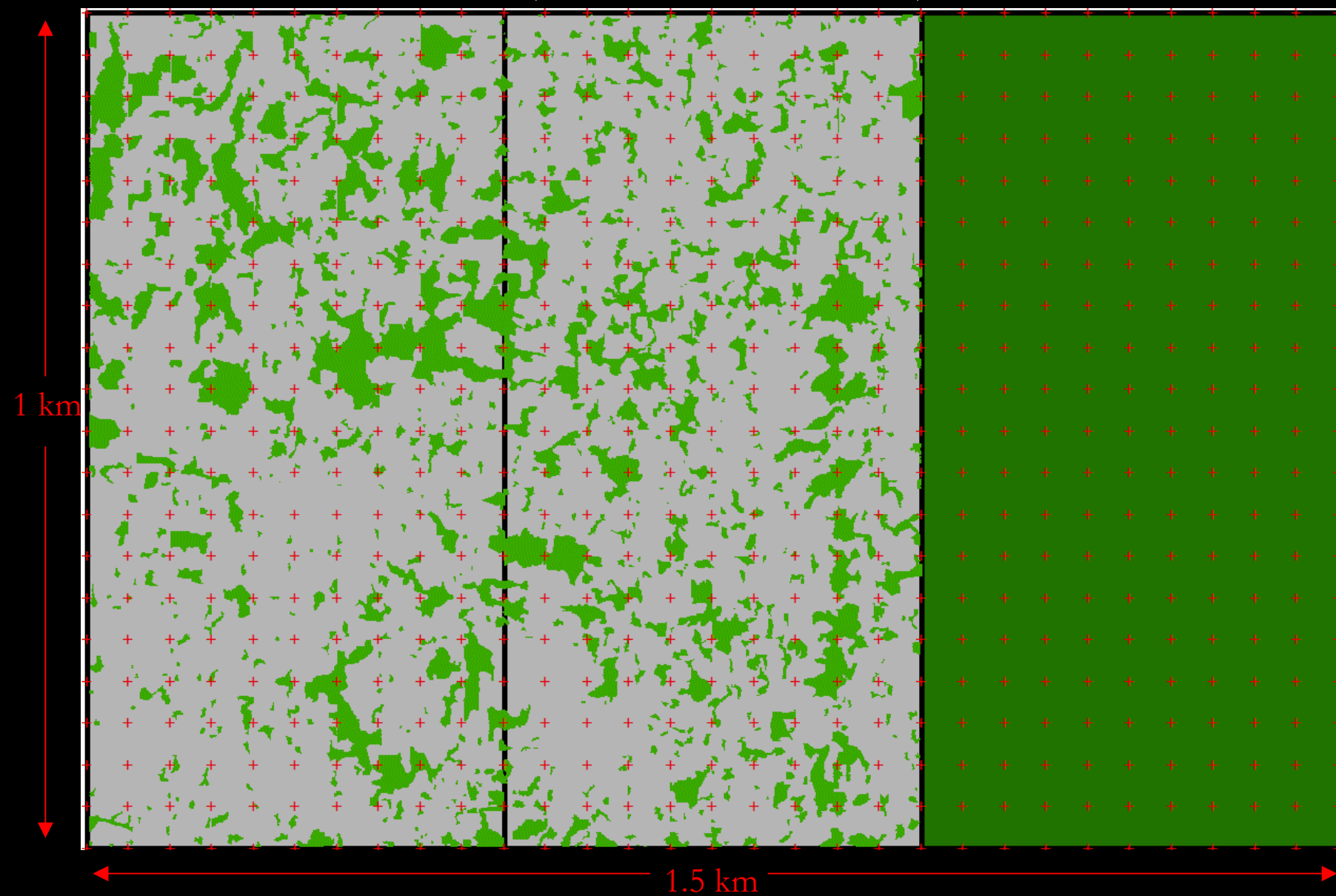




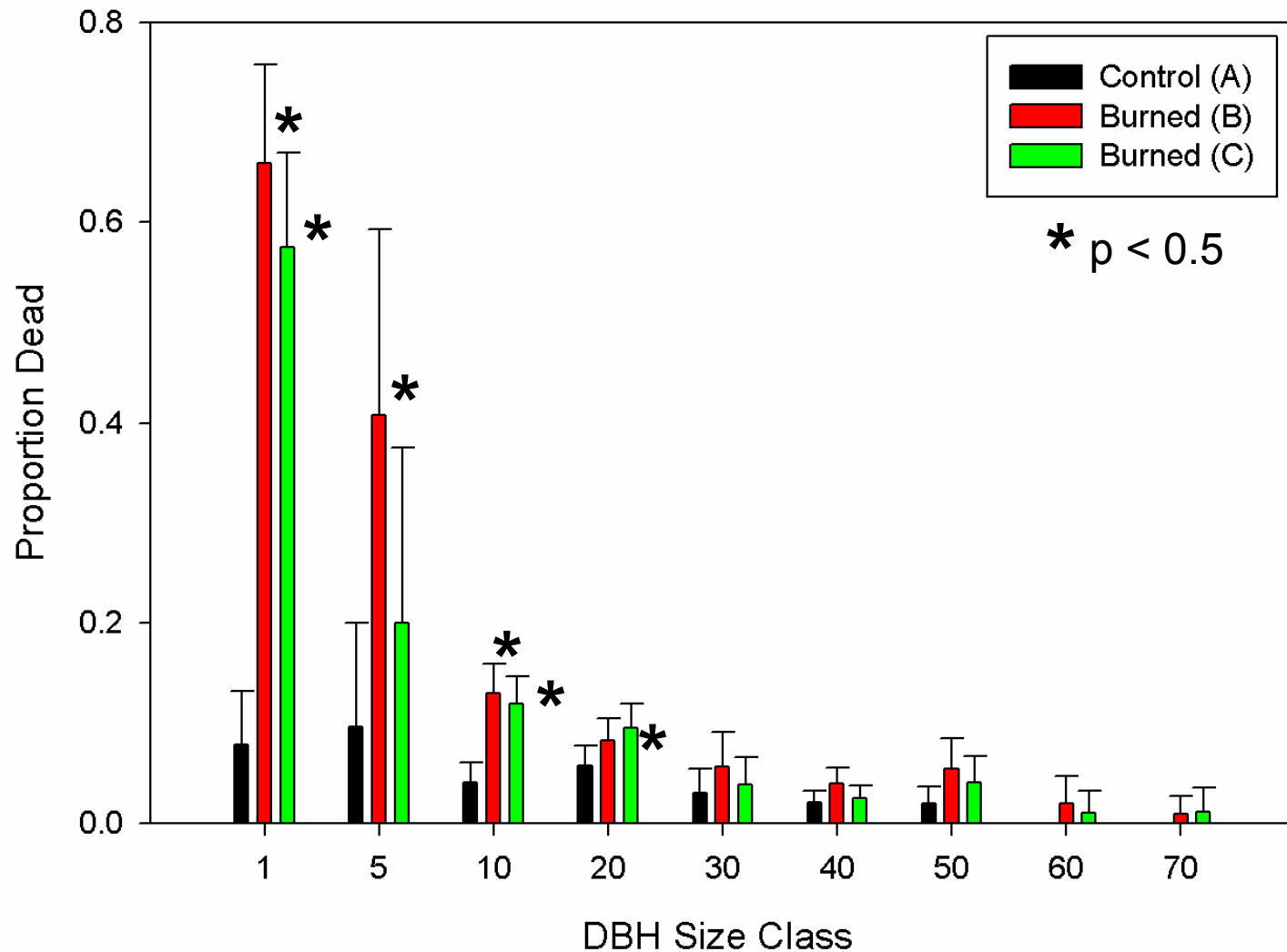
# Preliminary Results

# Burned Area – August 2004

(5 x 5 m resolution)

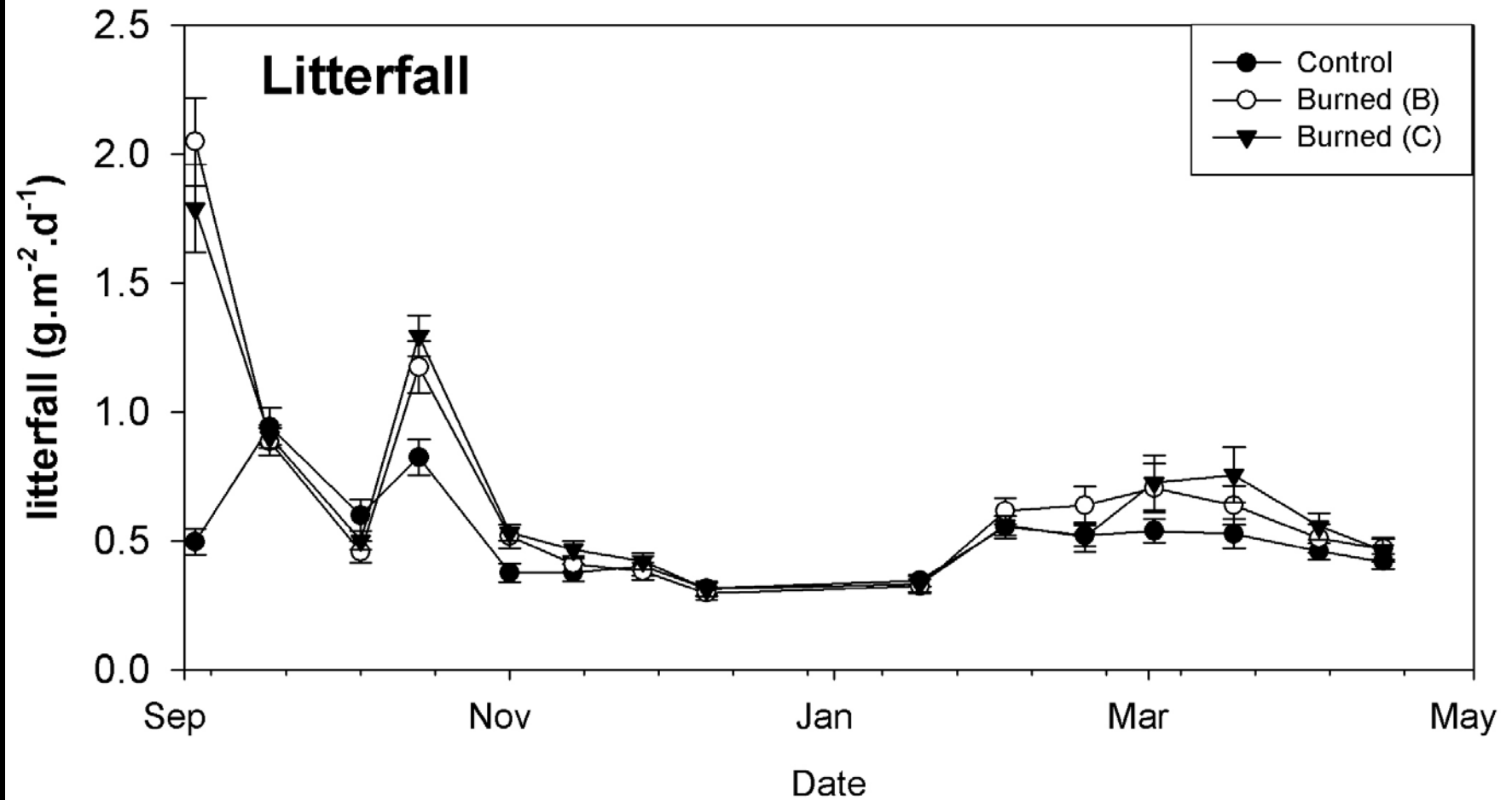


# Stem Mortality 1 year post-fire

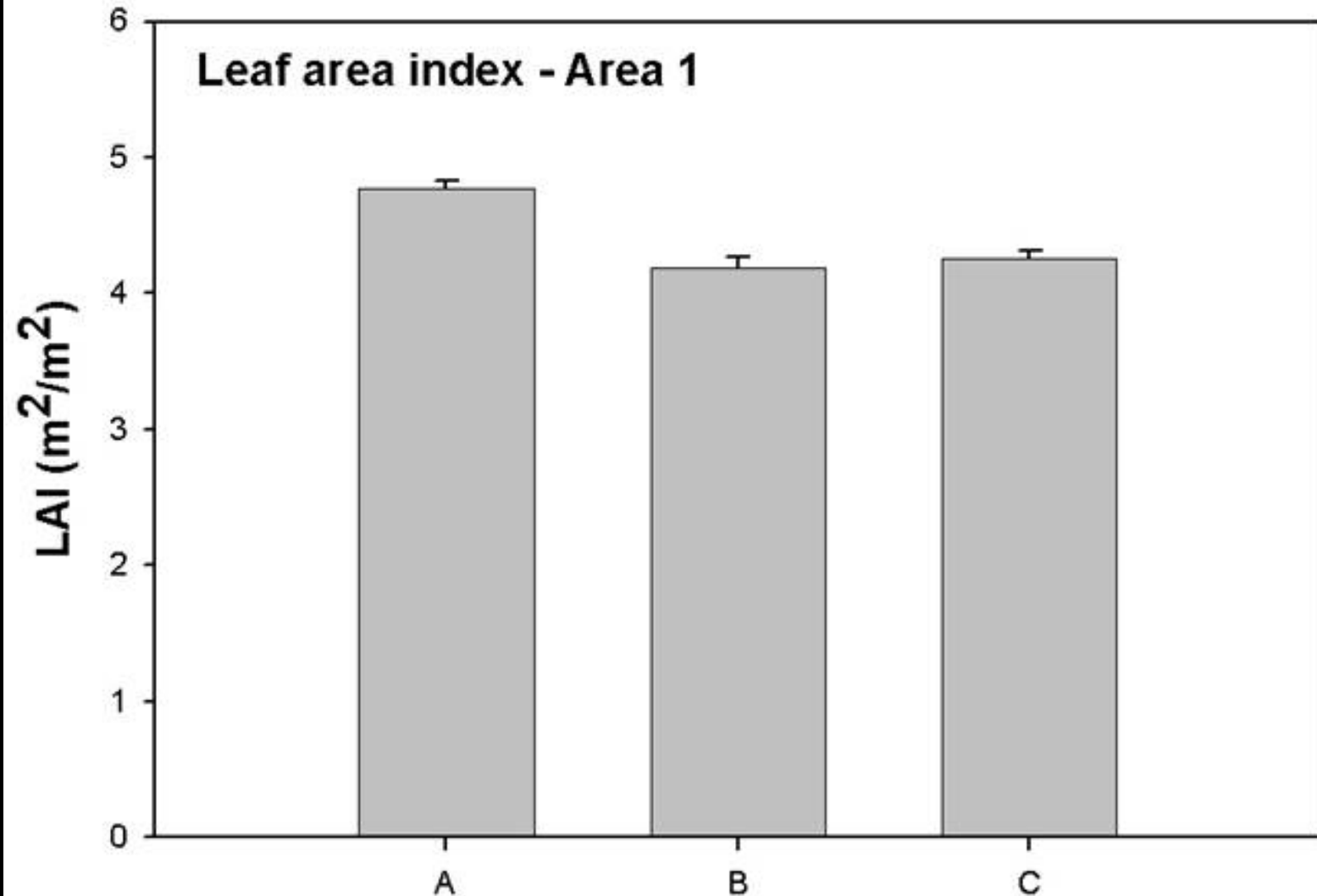




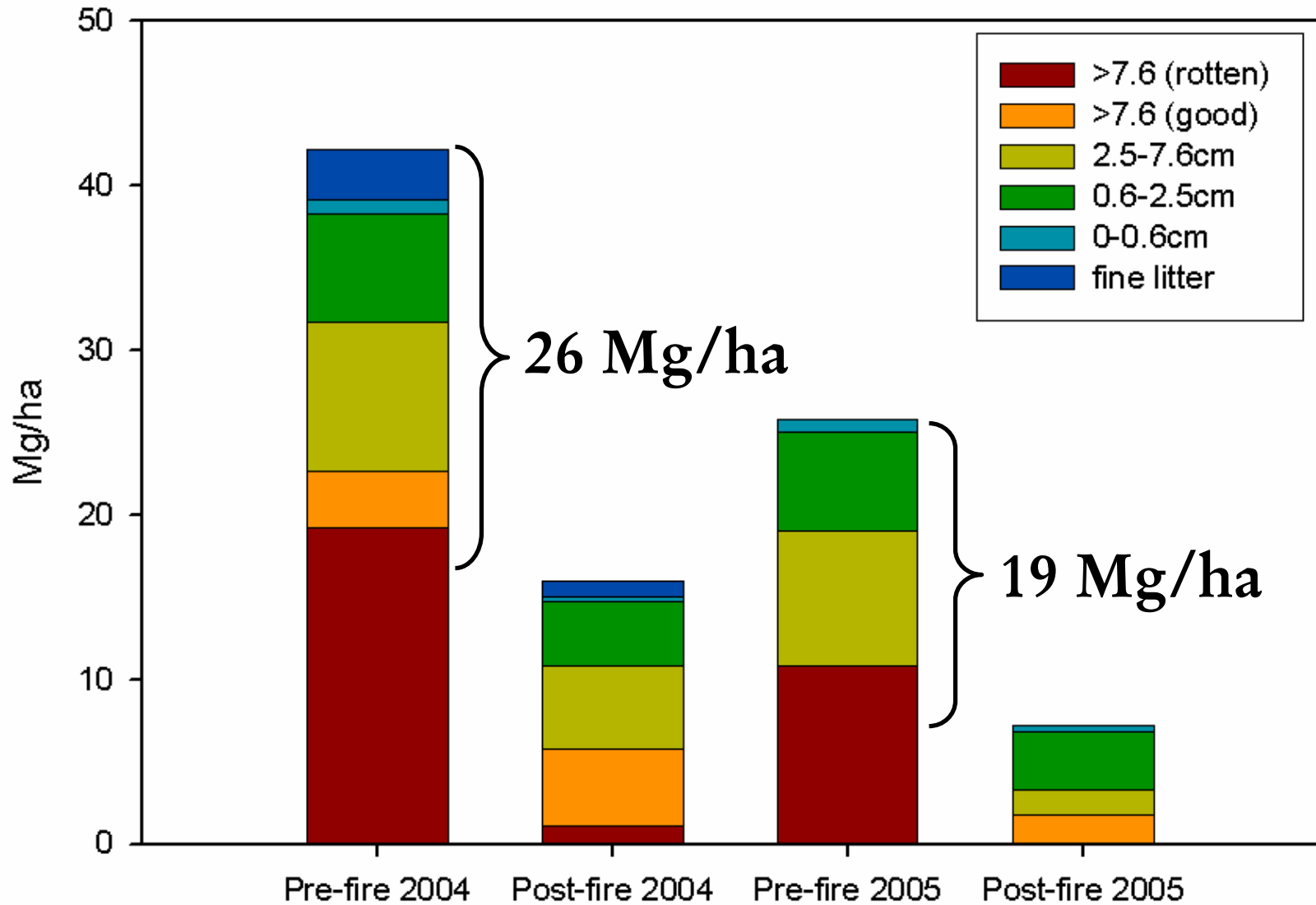
# Litterfall Post-fire



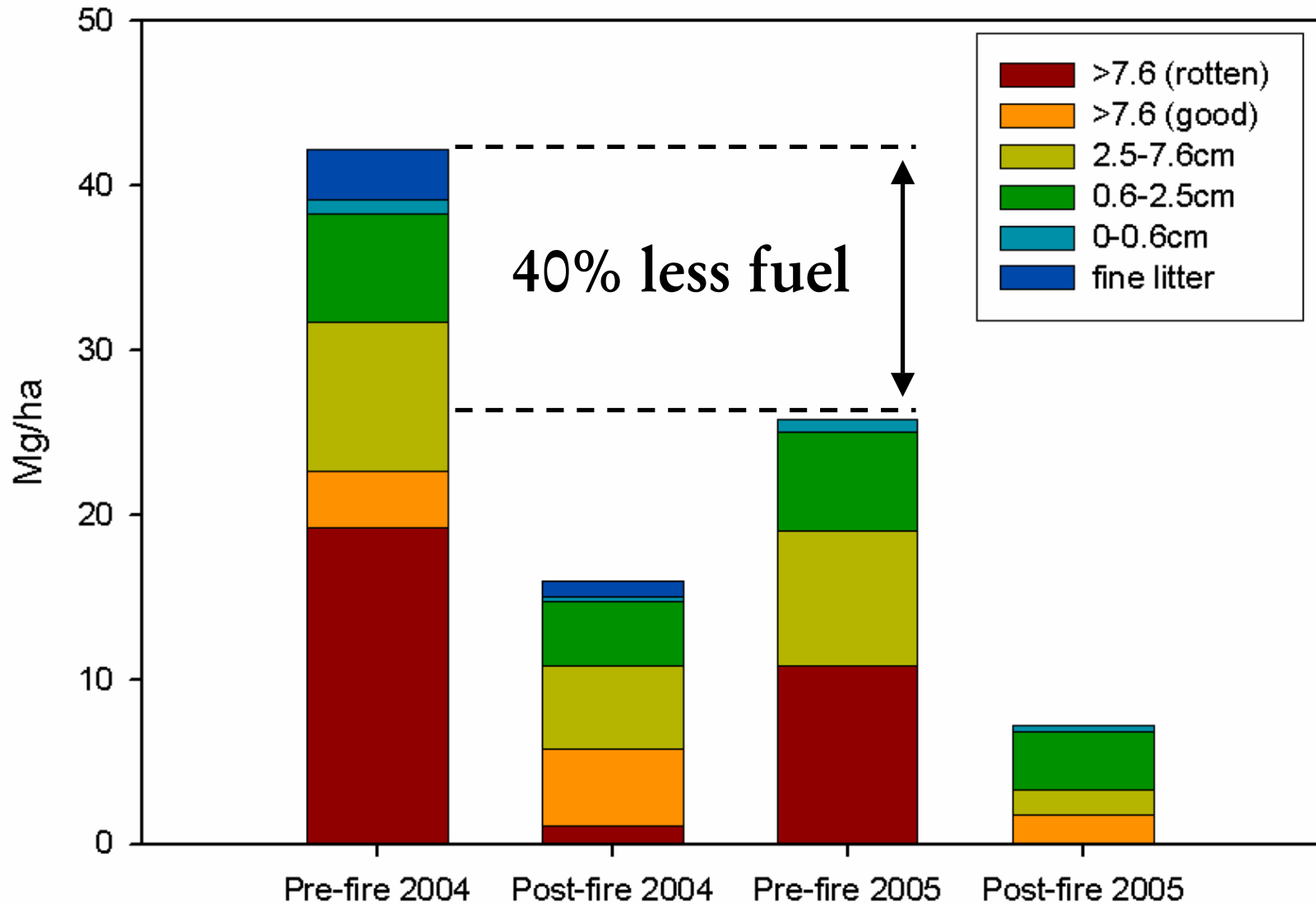
# Leaf Area Index – May 2005



# Fuel load combustion – 2004 & 2005

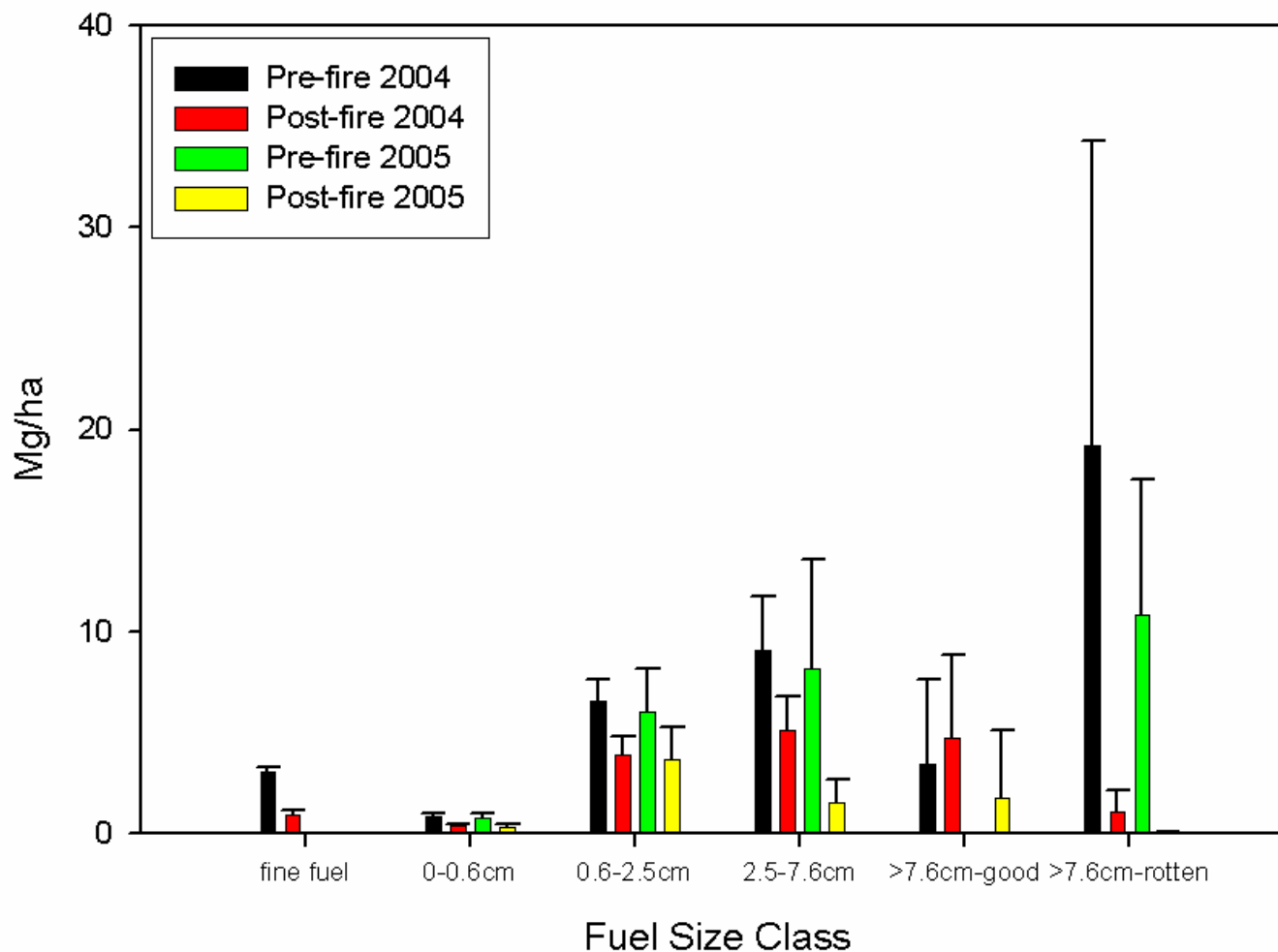


# Fuel accumulation



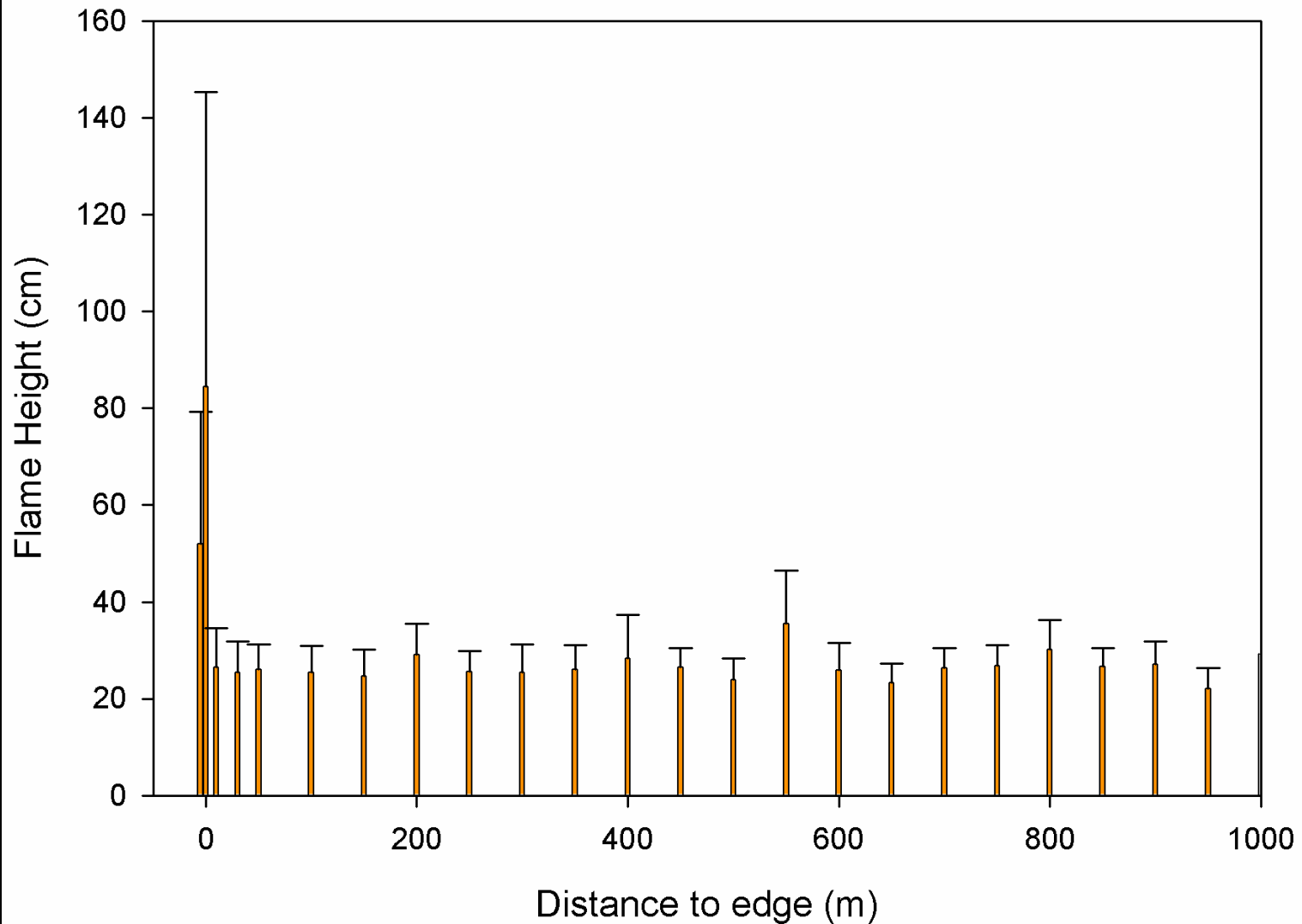


# Brown fuel loads by size class

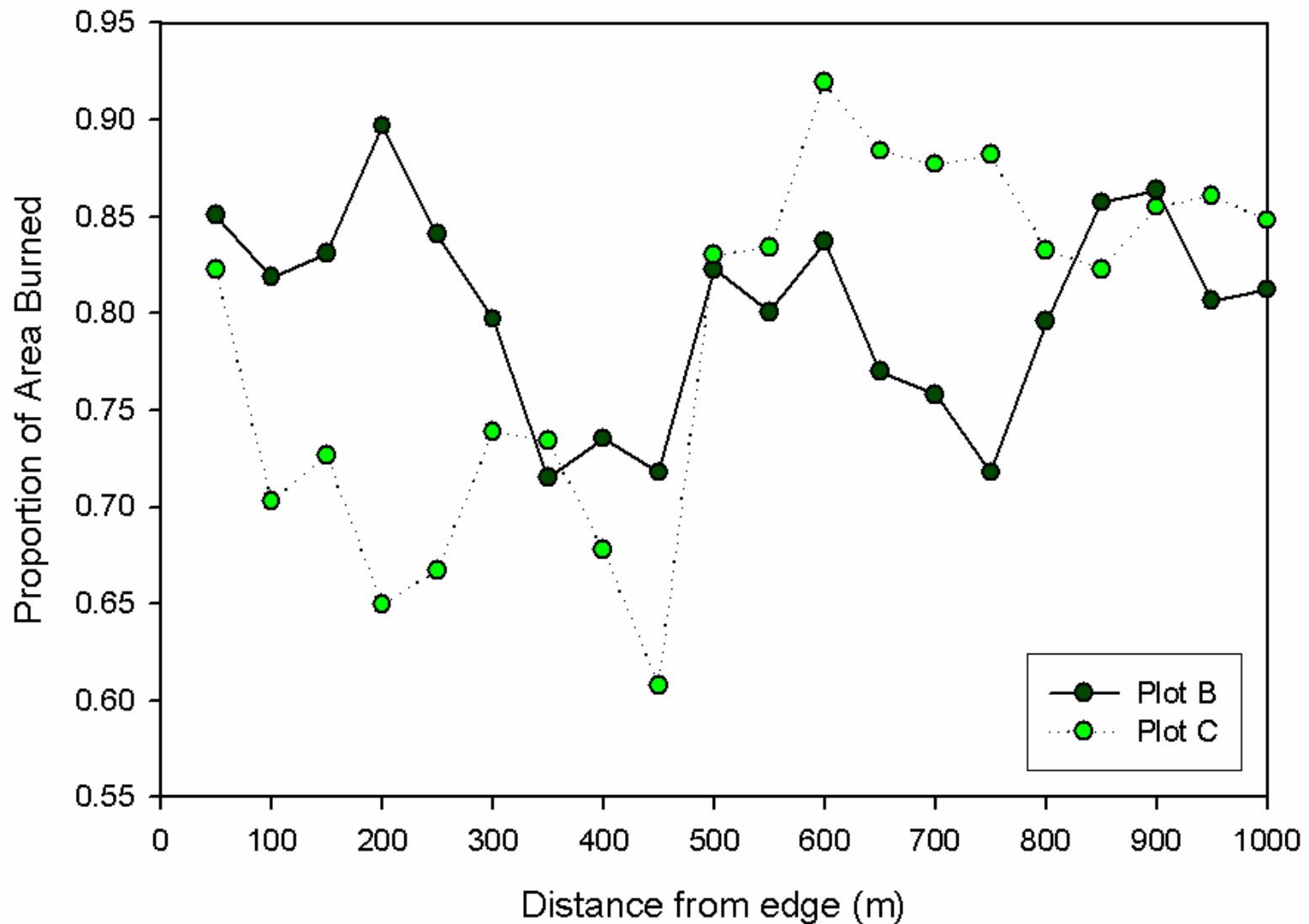


Edge effects?

# Flame height

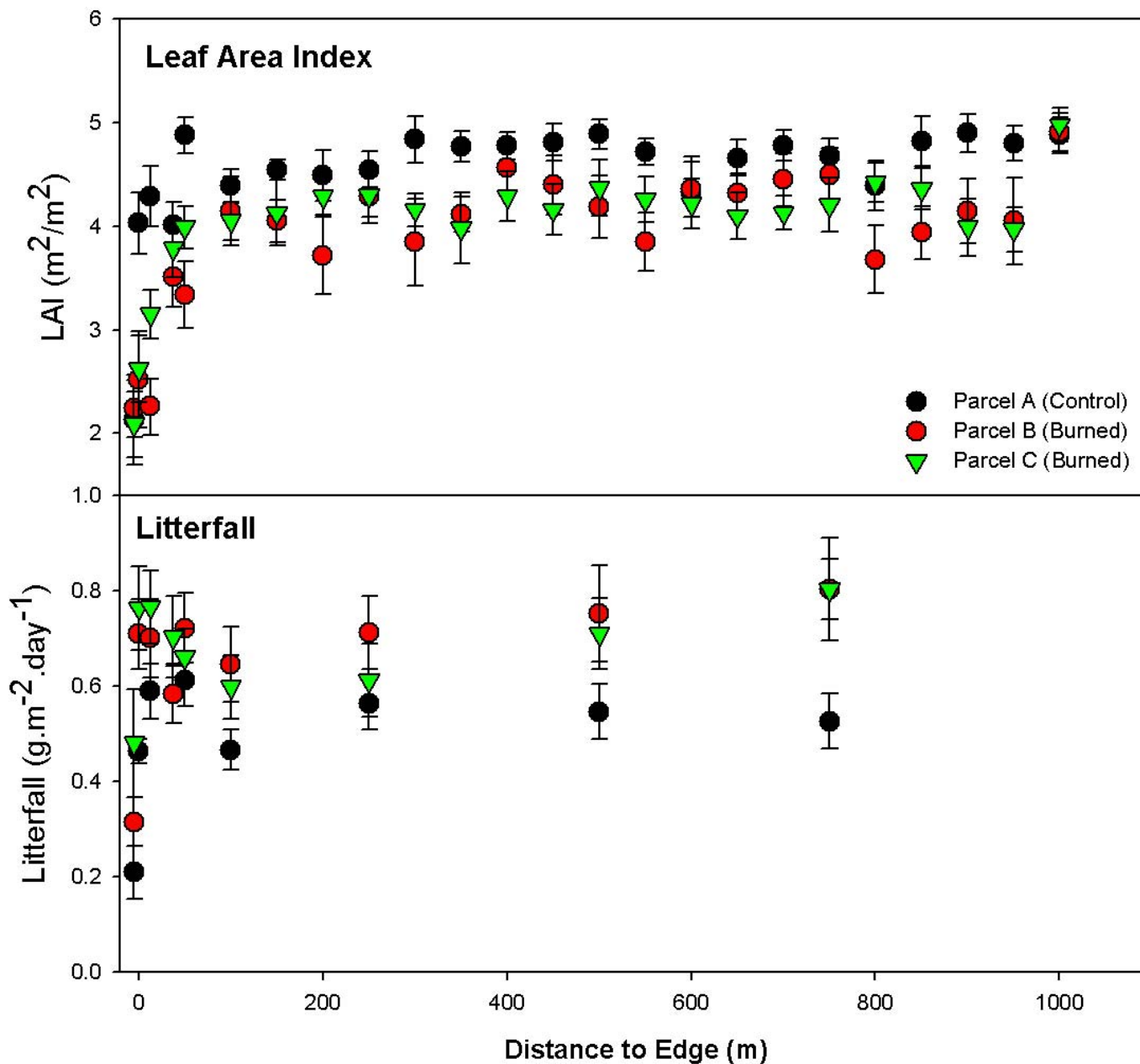


# Proportion burned 2004

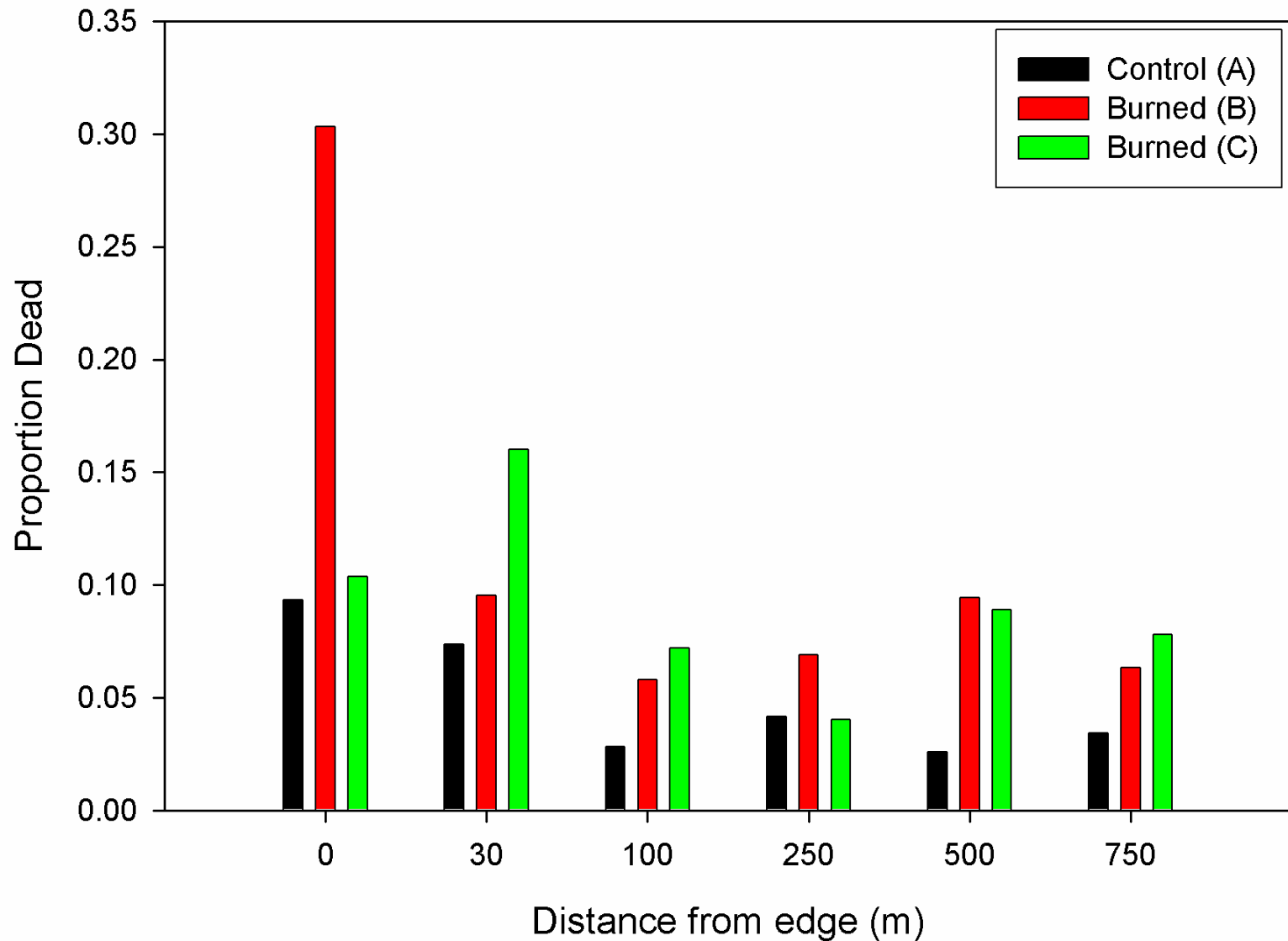


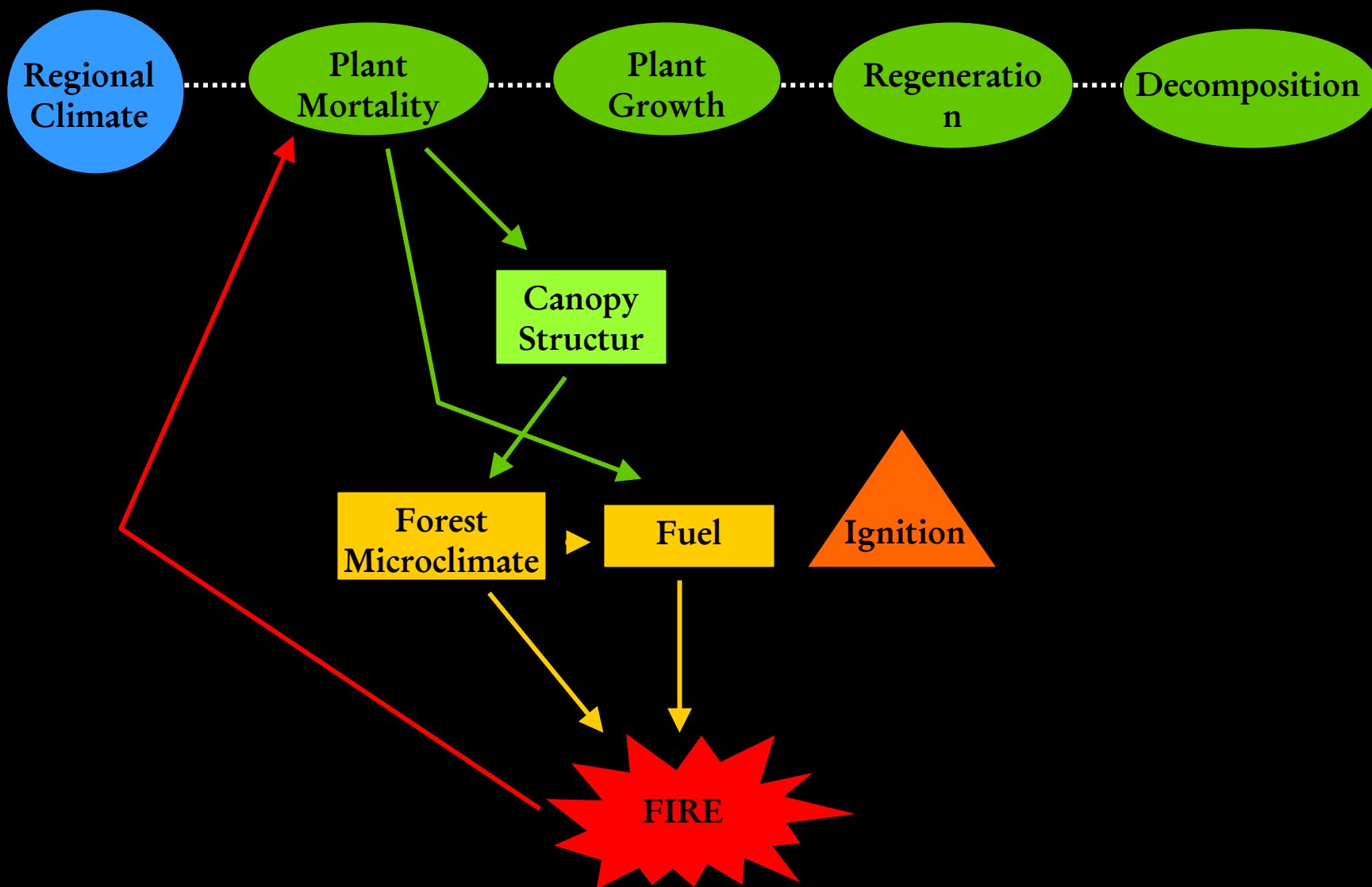


# LAI & Litterfall



# $\geq 10$ cm DBH stem mortality





# Future directions

- Replicate large-scale 100 ha burns
- Test Ray et al. 2005/Blate 2005 models – VPD and LMC as predictors of fire spread
- Couple results with Asner's Hyperion data
- Investigate forest flammability on temporal/spatial scales
- Species specific responses to recurrent burns, potential transition to savanna?



# Thanks!

