
An integrated study investigating masticated fuels:
Developing sampling methods, Describing fire behavior, and Evaluating fire effects
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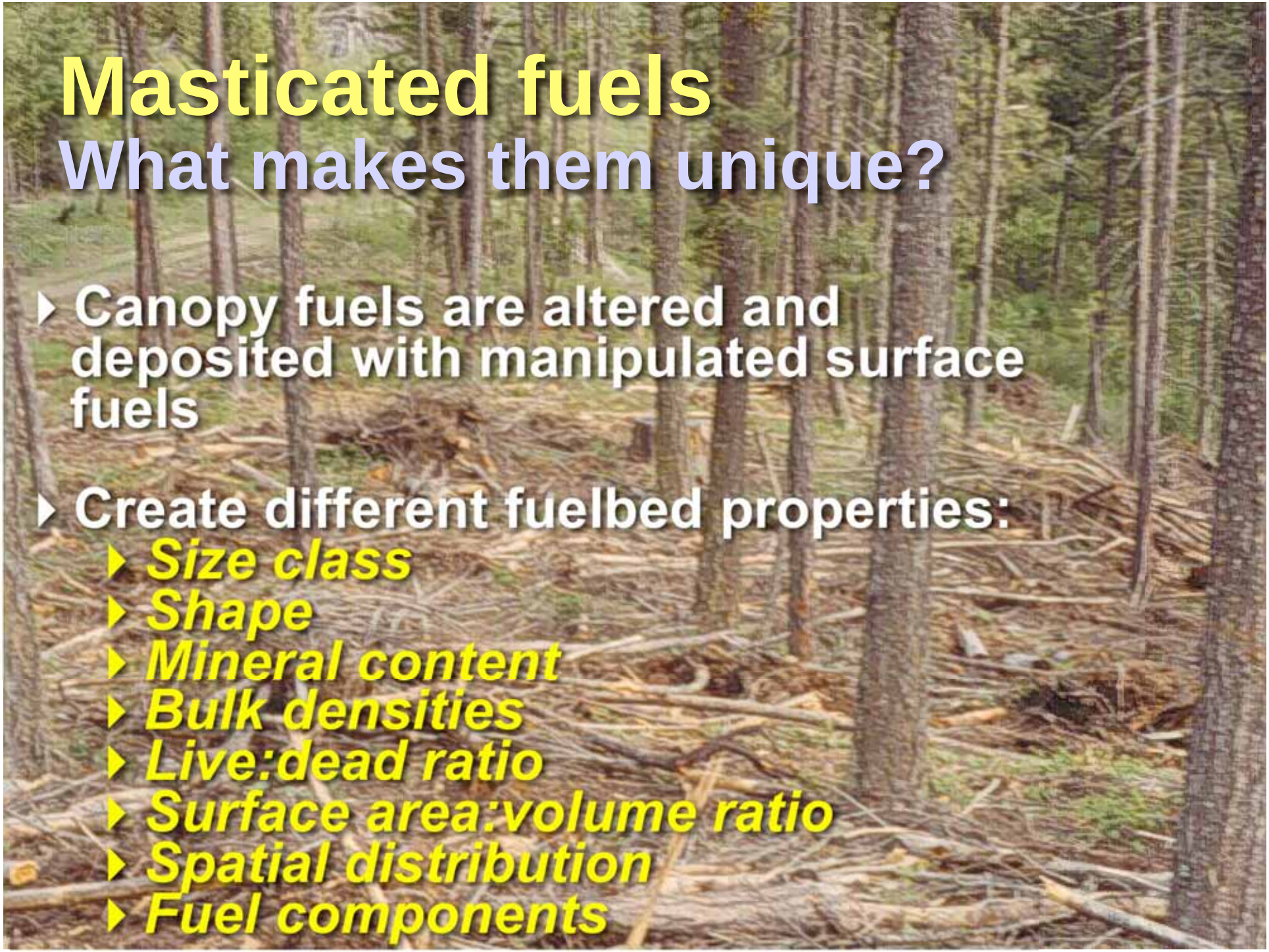
Masticated Fuels

Mechanically altered fuelbeds:

- **A less risky, cost-effective method of reducing fire hazard**
- **Mechanically disintegrate canopy and surface fuels**
- **Wide variety of methods, techniques, machinery, and outcomes**

Disintegrate: to break or decompose into constituent elements, parts, or small particles


Masticated fuels
What makes them unique?
Canopy fuels are altered and deposited with manipulated surface fuels
Create different fuelbed properties:
Size class
Shape
Mineral content
Bulk densities
Live:dead ratio
Surface area:volume ratio
Spatial distribution
Fuel components

Masticated fuels

What are the implications?

Ecological impacts

- Weed invasions
- Nitrogen, nutrient cycling
- Native species response
- Water relations

Management impacts

- Sampling techniques
- Post-treatment fire behavior

This study

Integrated study exploring masticated fuels

iMAST

Objectives:

- **Develop sampling methods**
- **Describe fire behavior**
- **Build new fuel models**
- **Evaluate treatment effects**

Develop sampling methods

Three methods are being explored

Cover-depth-bulk density

- Measure percent cover and fuelbed depth then multiply by bulk density

Planar intercept sampling (Brown transects)

- Count intercepts along a sampling plane

Photoload

- Visually match fuelbeds to a photo of known loading

Describe fire behavior

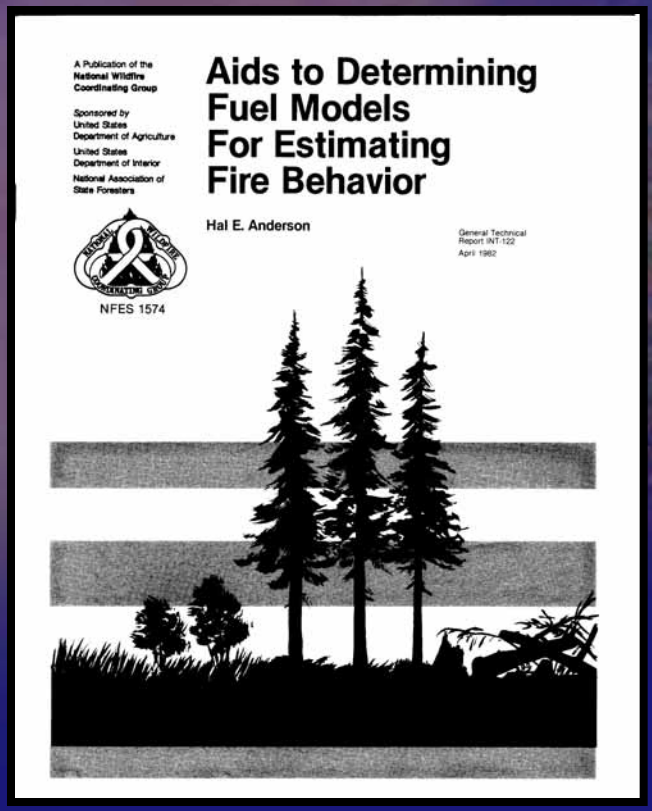
Record fire behavior characteristics

Use cameras, sensors, and field measurements

Build fuel models

Develop a series of fuel models for masticated fuels

Augment existing fuel model classifications



Evaluate treatment effects

Monitor treatments blocks for trends

Major Response Variables

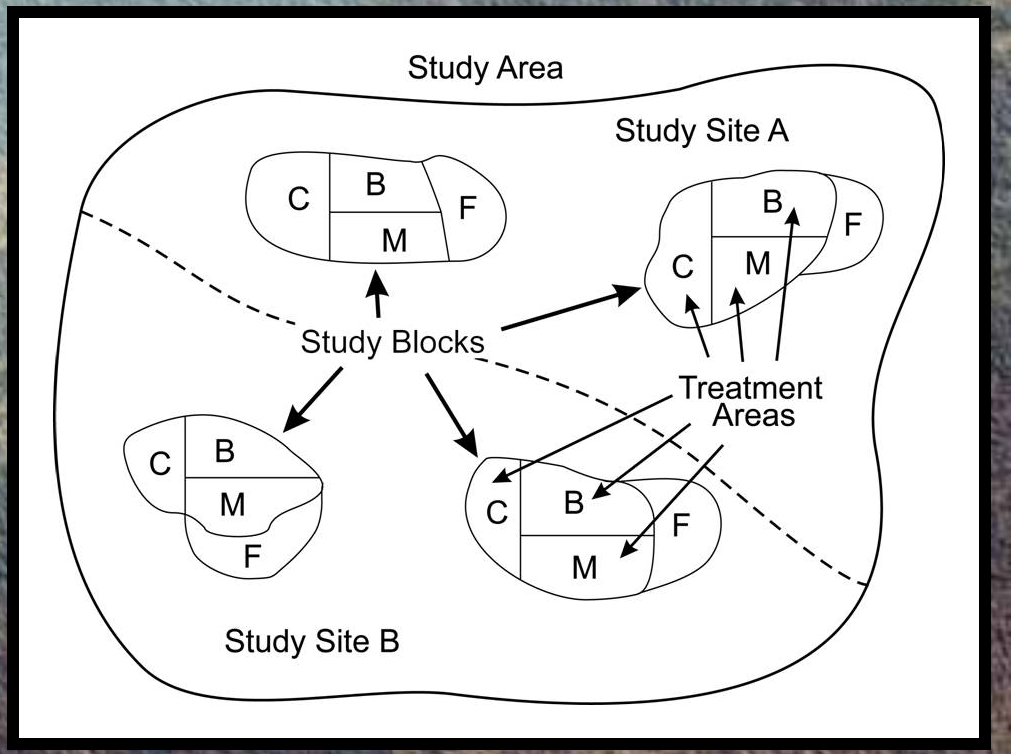
- Tree populations
- Fuel loadings
- Plant species cover
- Weed populations

Methods

Experimental design

Four Blocks

- Control (C)
- Masticate only (M)
- Burn only (B)
- Masticate & Burn (F)



Design

- 10 plots per unit
- Replicate if possible

Measurements:

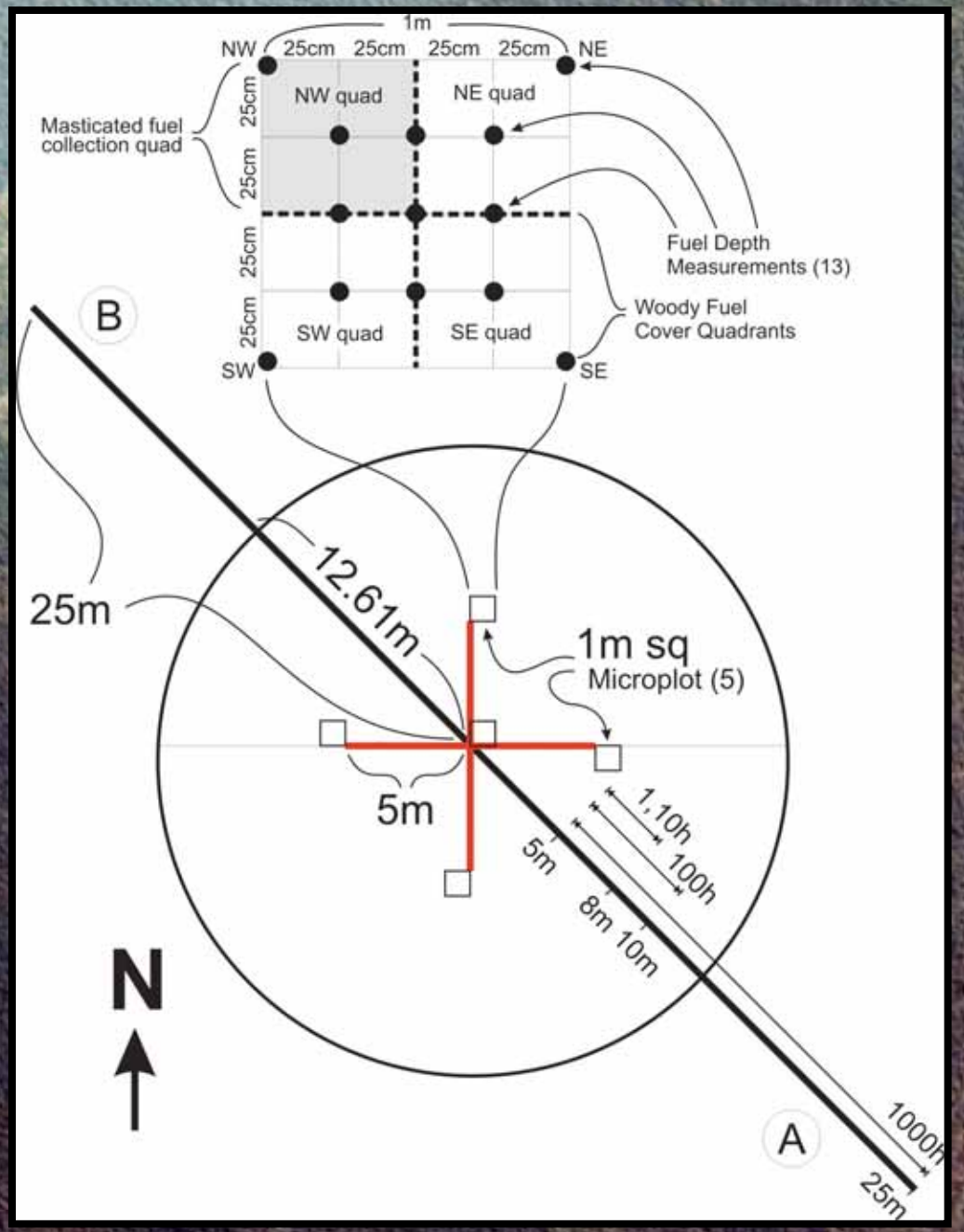
- Pre-treatment
- After each treatment
- 5 years
- 10 years

Methods

Plot sampling design

Sampling methods

- Trees (macroplot)
  - DBH, height, species
  - Allometric (FUELCALC)
- Logs (transects)
  - Dia, length, rot
- Fine woody, shrub, herbs (microplot)
  - Collection by class
  - Transect
  - PHOTOLOAD
- Duff, litter (nanoplot)
  - Collection
  - Depth
- Plants
  - Cover, height on microplots
  - Weed population surveys



Methods

Synthetic masticated fuelbeds

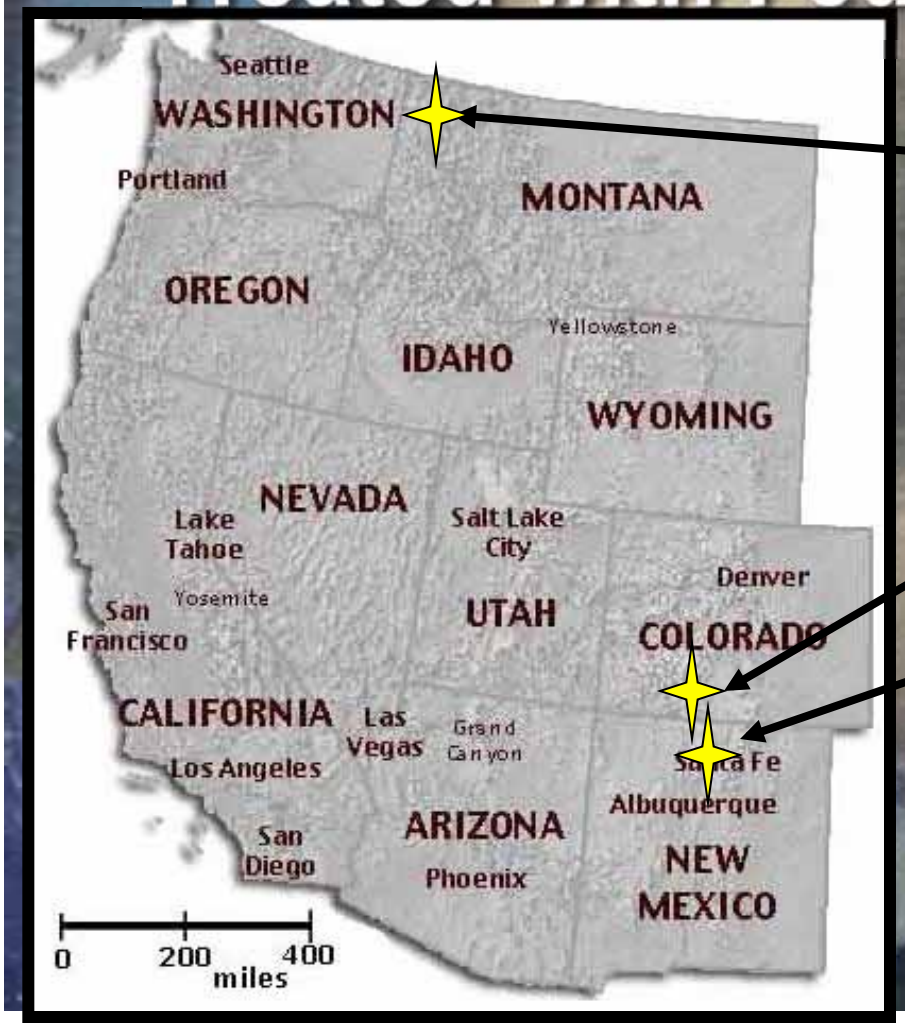
Created a set of fuelbeds with graduated fuel loadings

- **Measure:**
  - Consumption
  - Soil heating
  - Plant response

Methods

Study areas

All ponderosa pine sites
Treated with Fedco flailer



Sample sites

- **Libby**
  - Kootenai NF
  - 20 acres
- **Brockover Mesa**
  - San Juan NF
- **Banco Bonito**
  - Valles Caldera NP

Results

Before and after photo-pairs

Banco Bonito Site

Pre-treatment

Post-mastication

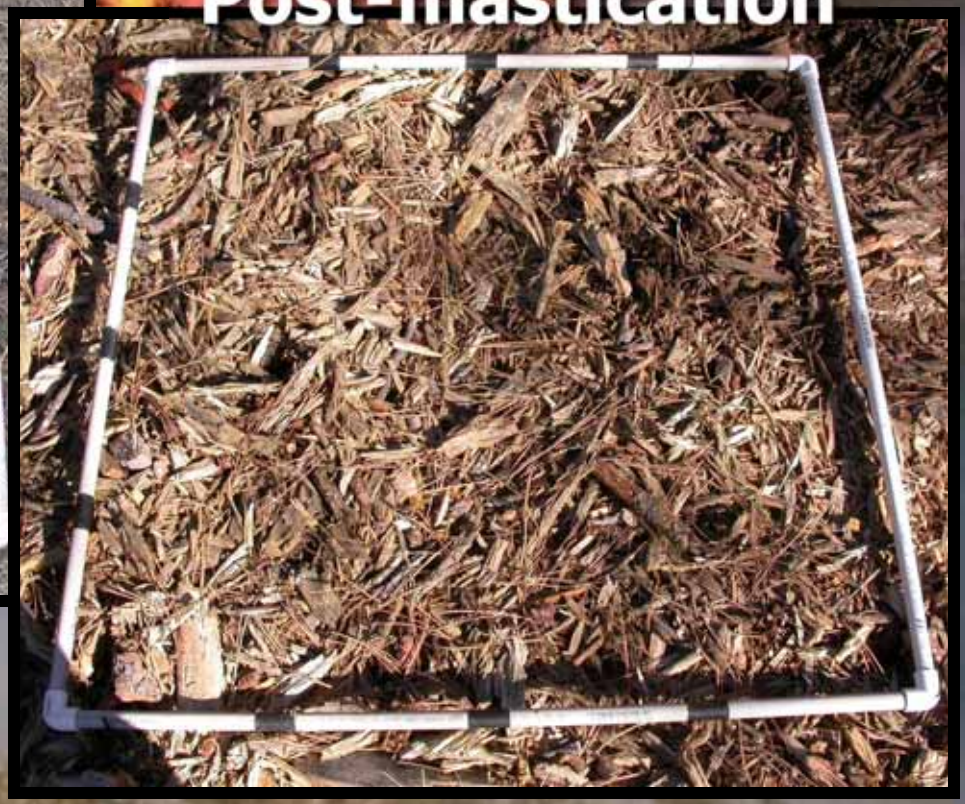
Results

Before and after photo-pairs

Banco Bonito Site

Pre-treatment

Post-mastication



Results

Before and after photo-pairs

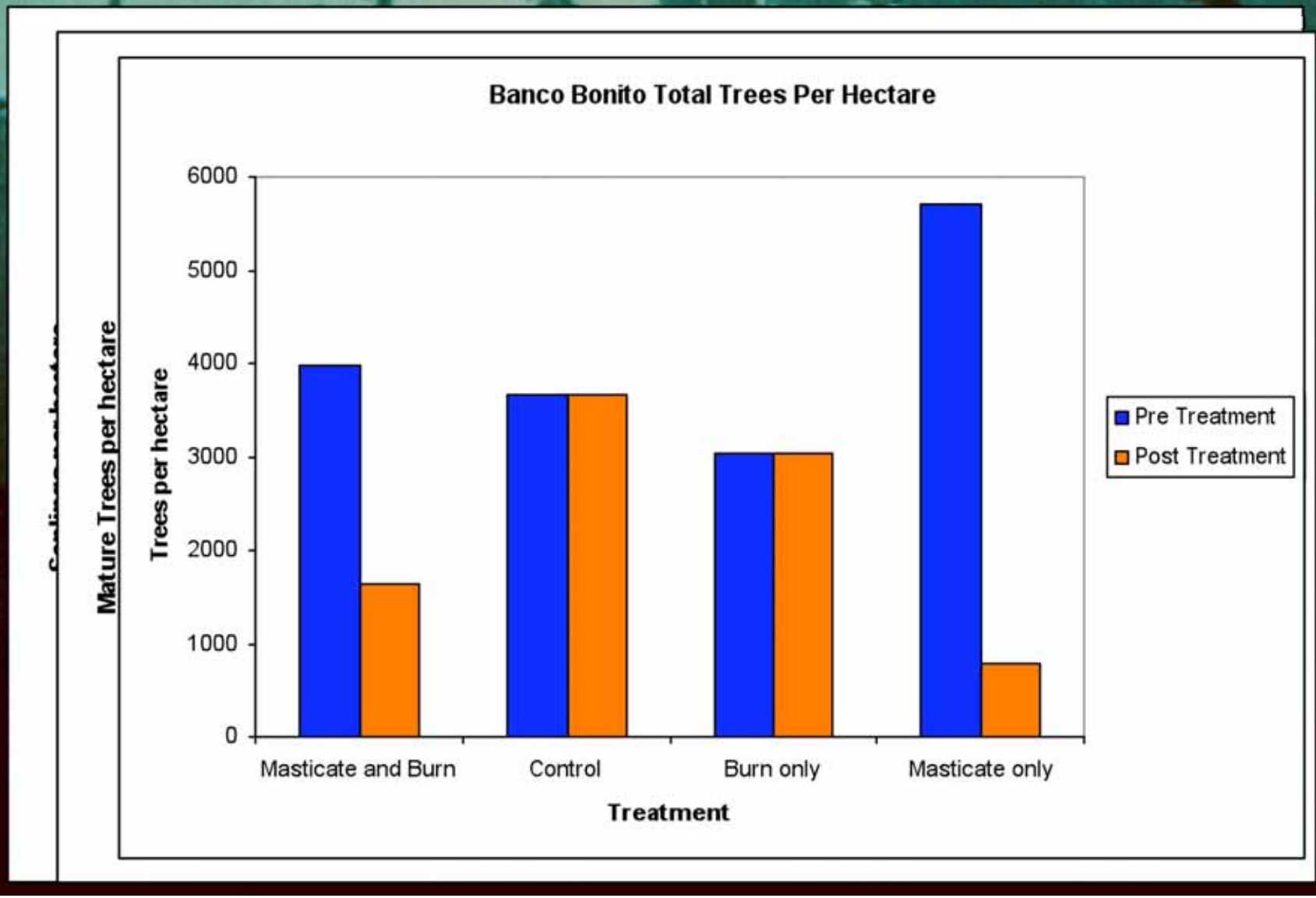
Banco Bonito Site

Pre-treatment

Post-mastication

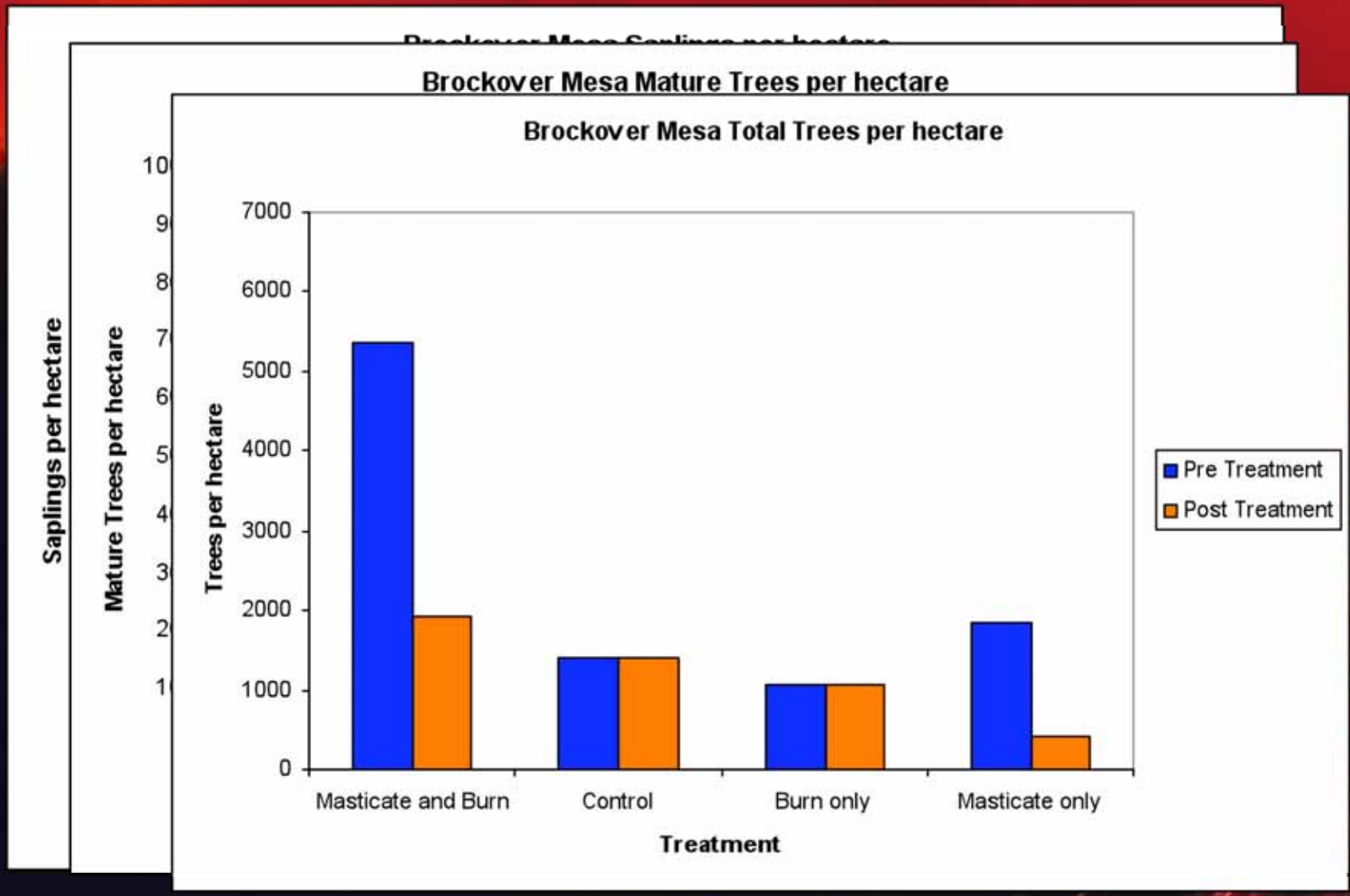
Results

Banco Bonito – Tree populations

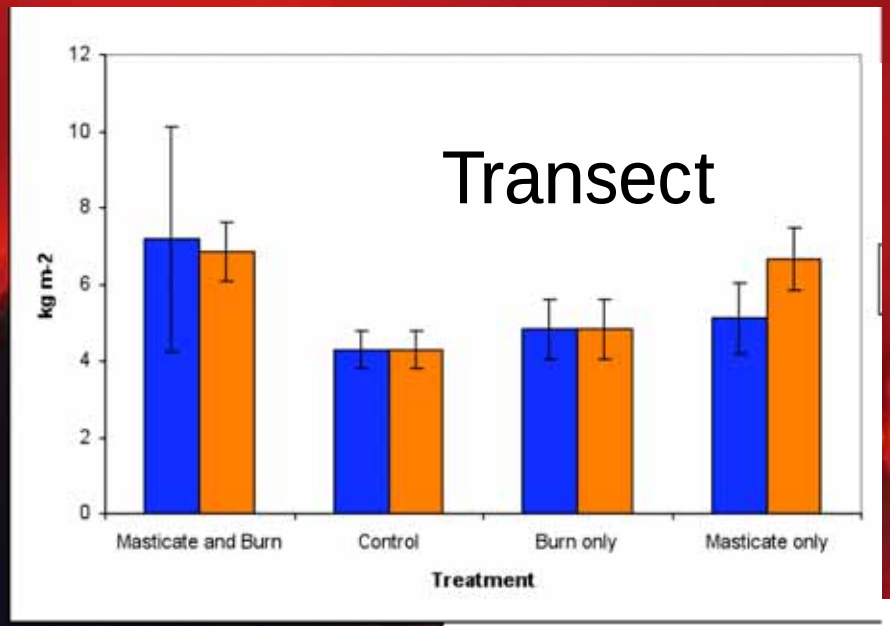


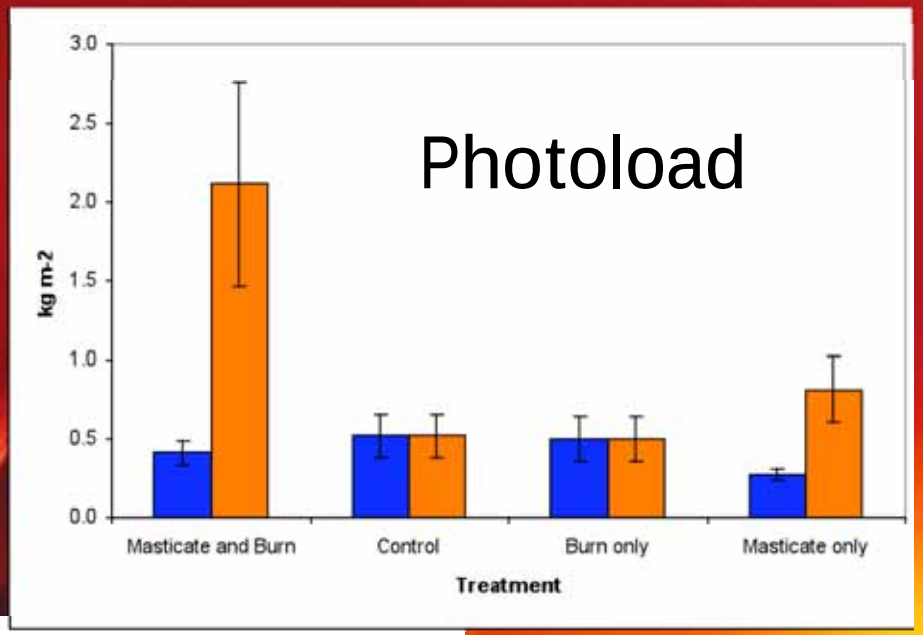
Results

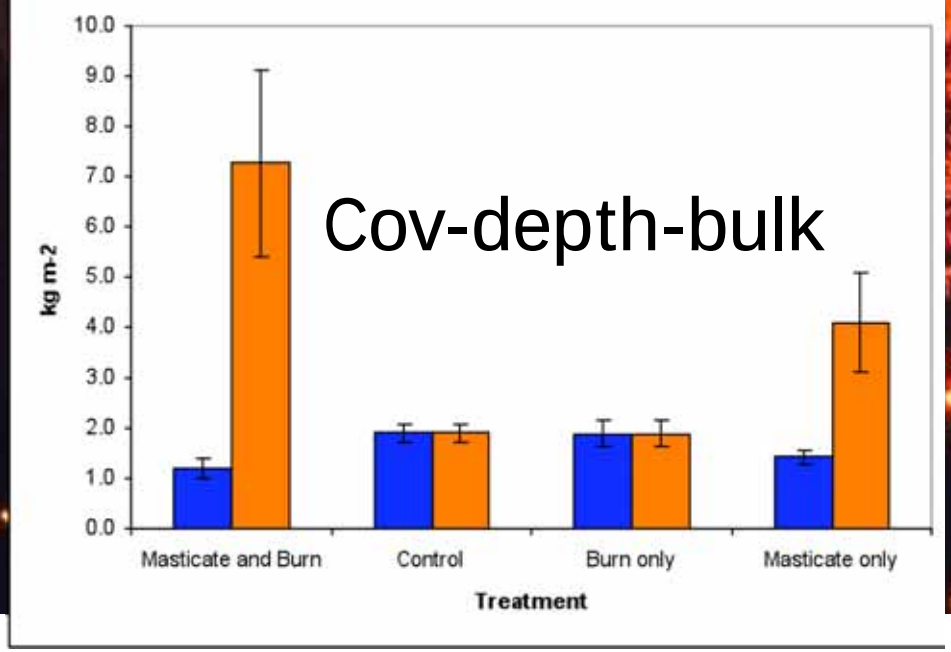
Brockover Mesa – Tree populations



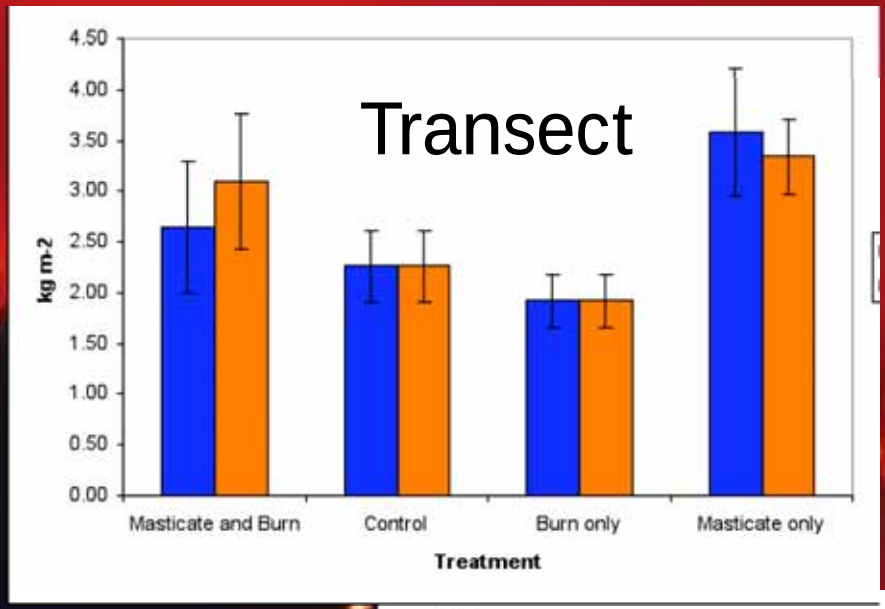
Results- *Banco Bonito – Fuel loadings*

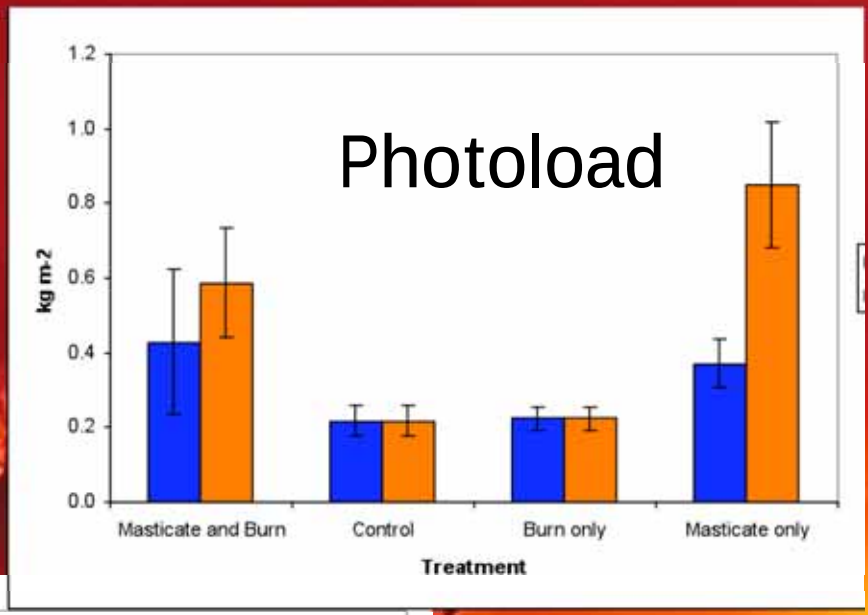


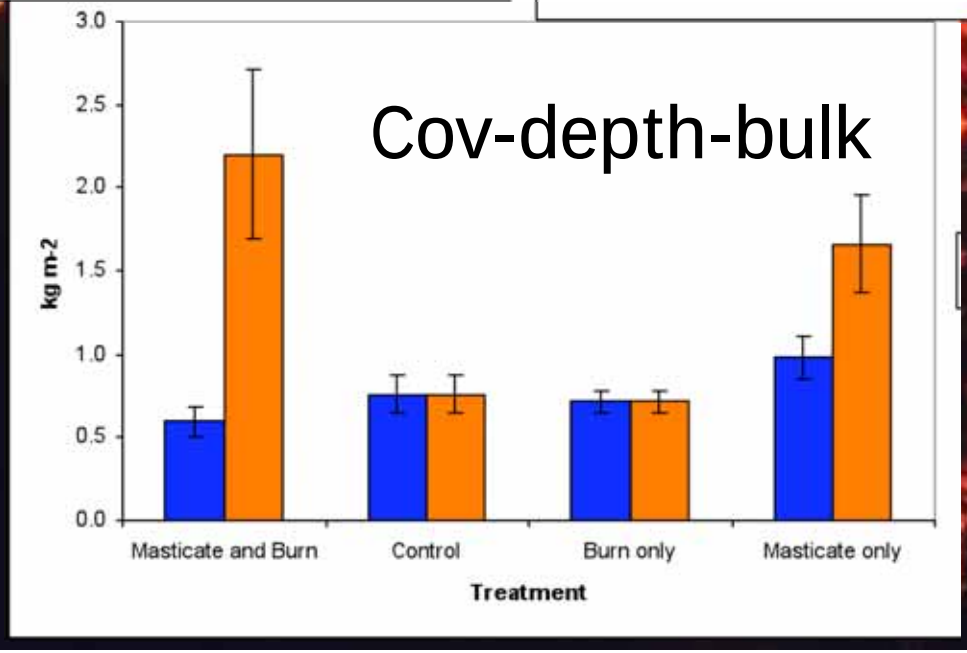




Results- *Brockover Mesa – Fuel loadings*







Discussion

What have we learned so far?

- **Masticated fuelbeds are unique and diverse**
  - *No "one-size-fits-all"*
  - *Tailor sampling, fuel model to fit area and treatment*

Cover-depth-bulk density method best

- *Transects performed well*
- *Photoloads need masticated photoset*

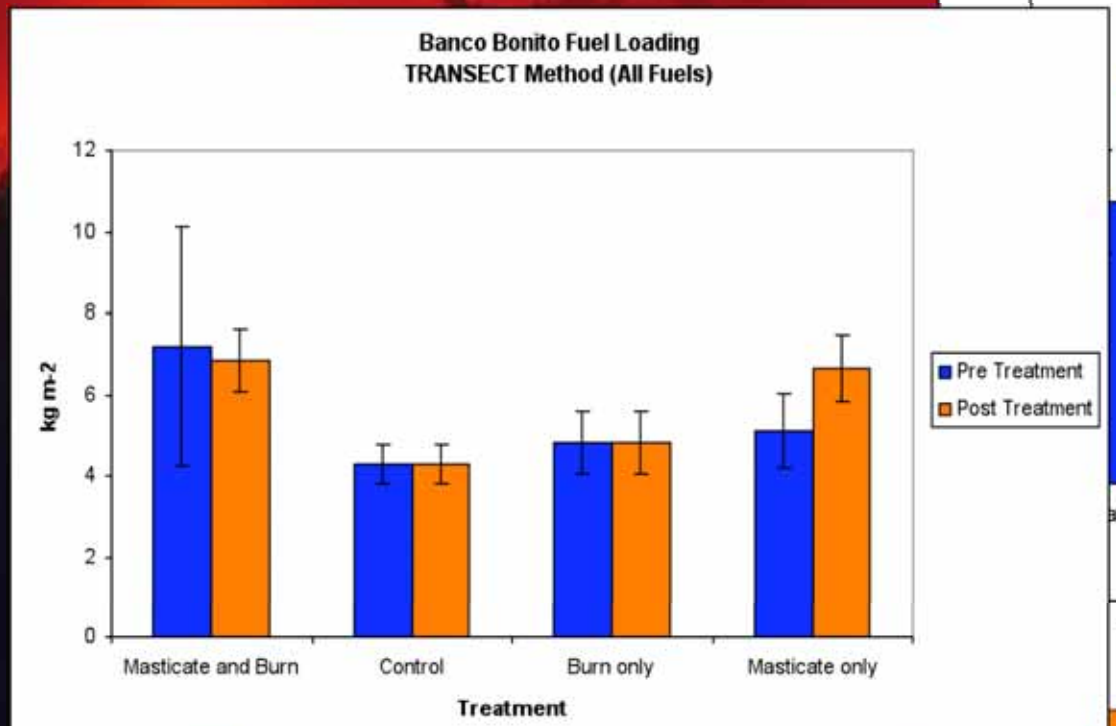
Summary

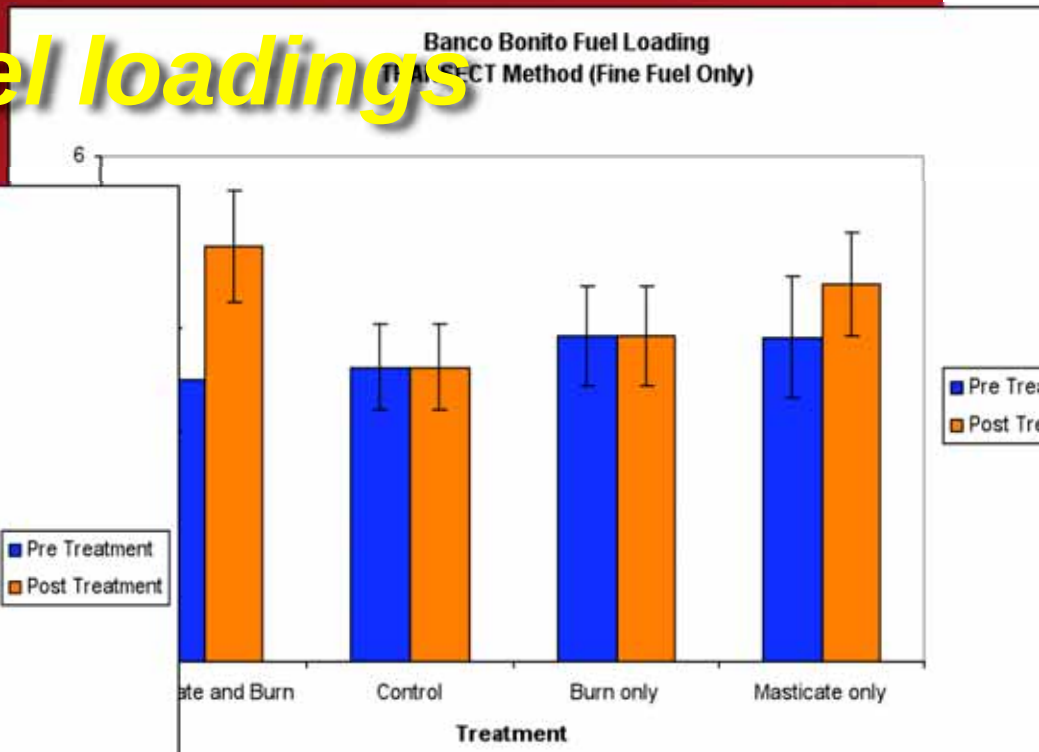
Study is only half finished
Still waiting for all sites to be burned
10 year measurements need to be taken

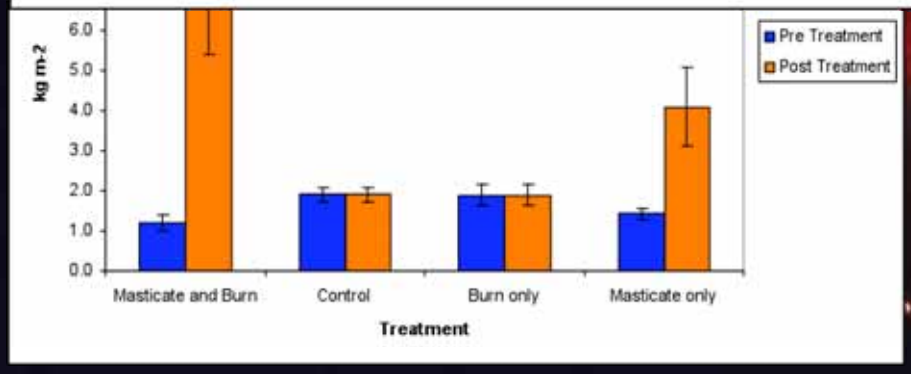
Thanks

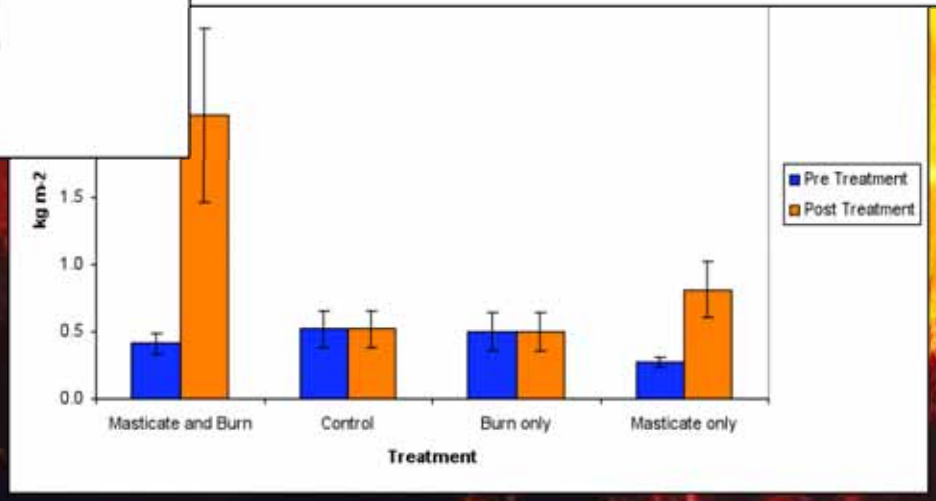
Results

Banco Bonito – Fuel loadings

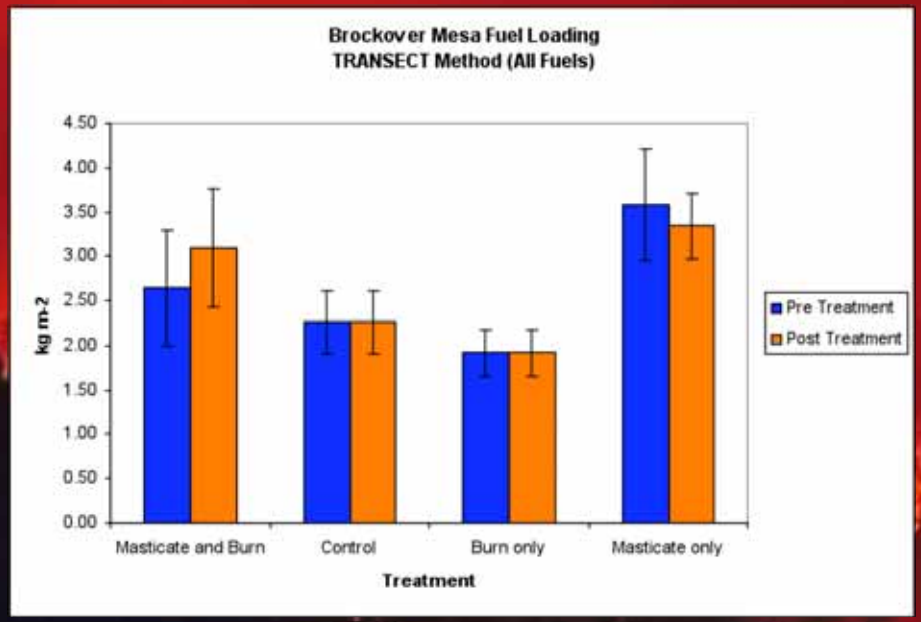


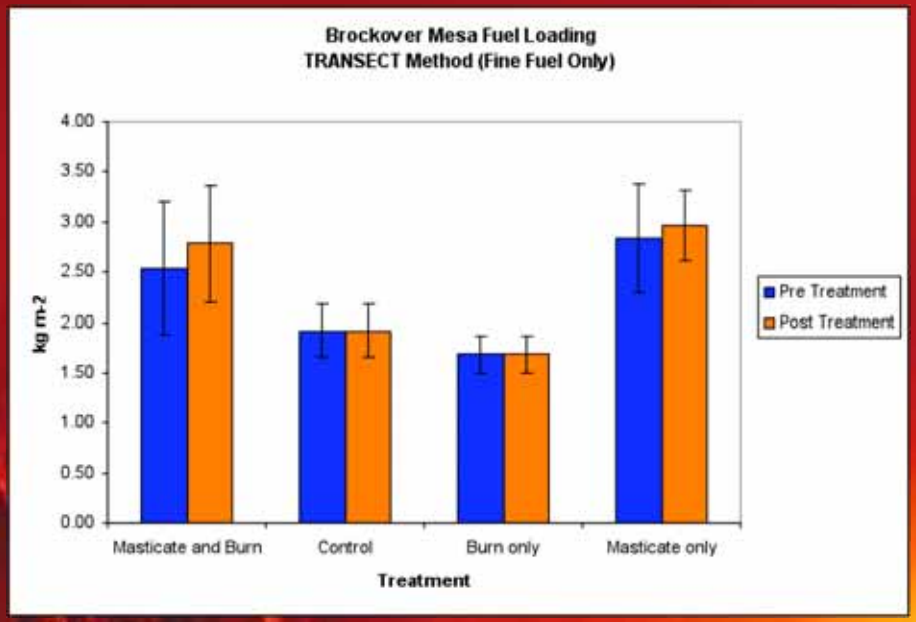


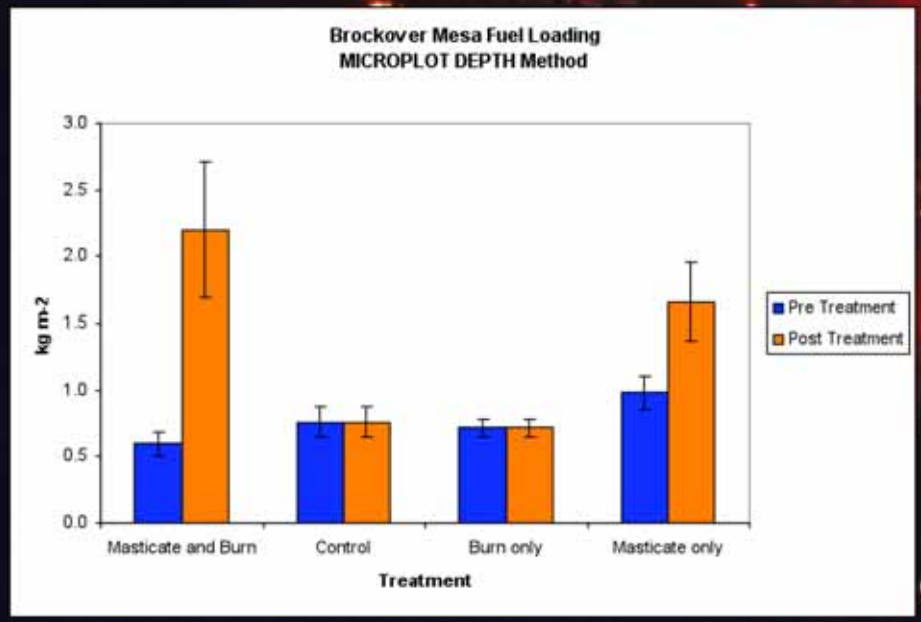


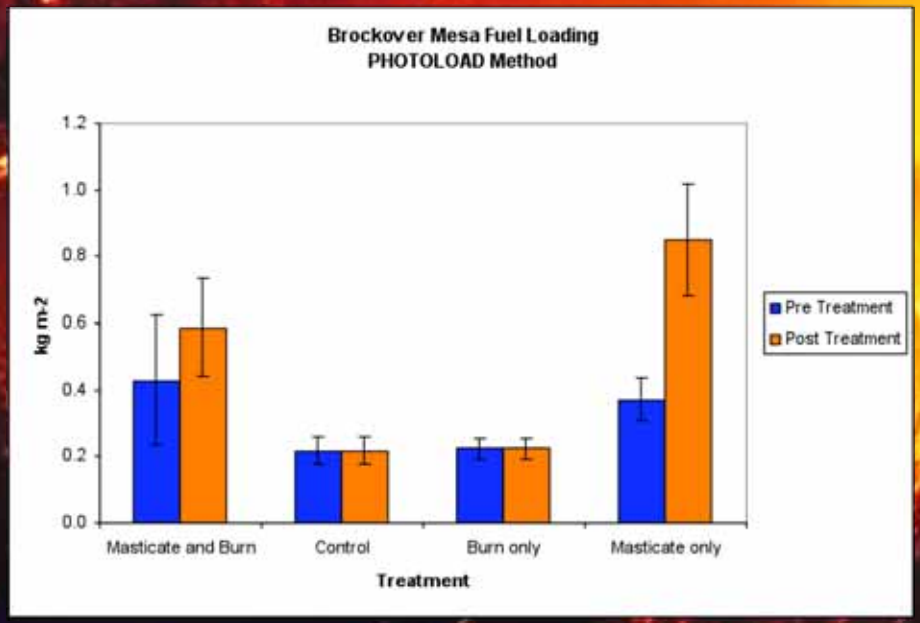


Brockover Mesa Fuels

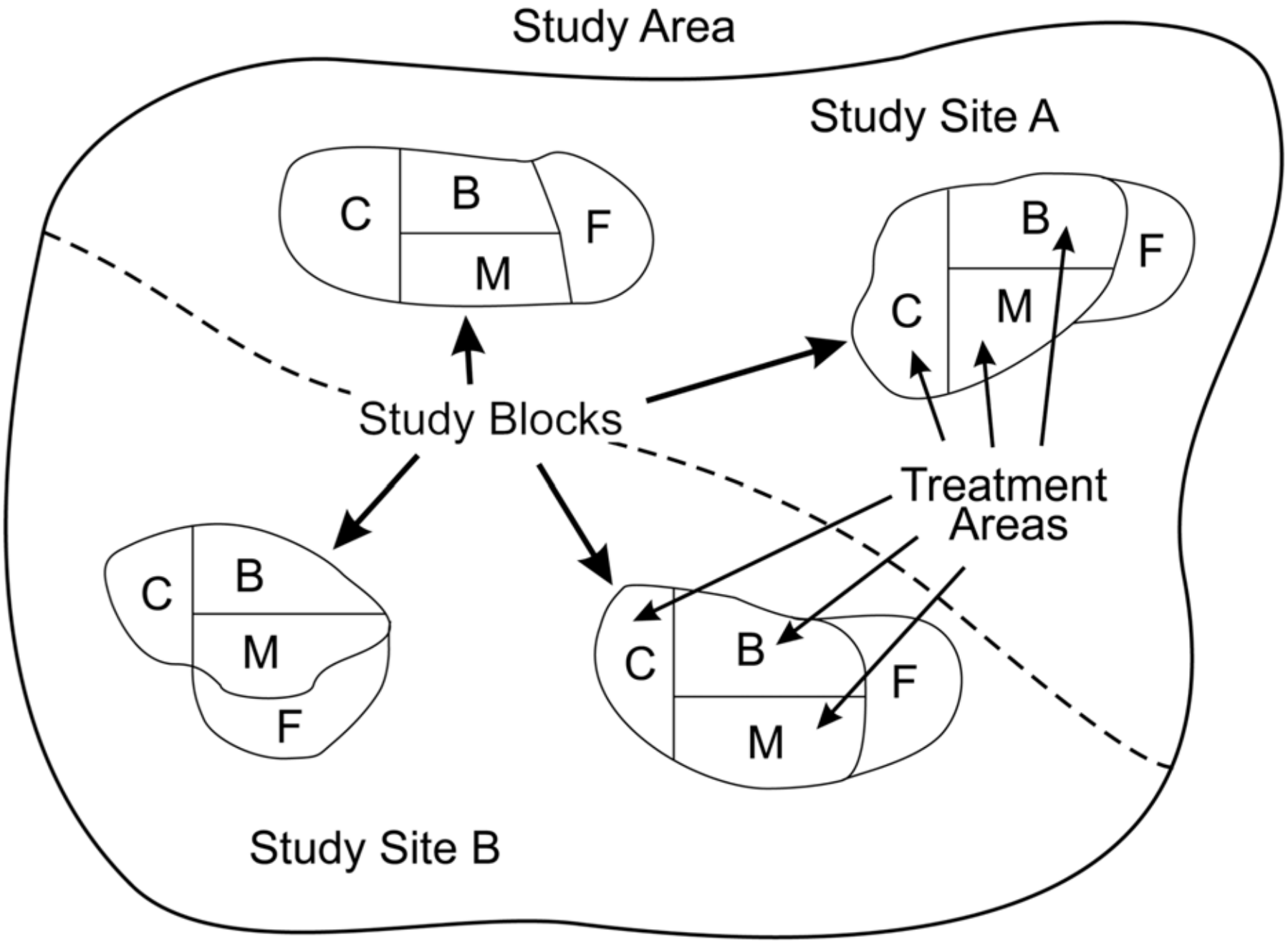








Results
Tenderfoot
Canopy fuel Variability Summary


Study Area
Study Site A
C
B
F
M
Study Blocks
Treatment
Areas
Study Site B