

Forest Floor Consumption During the Nenana Ridge Prescribed Fire in Alaska

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Why are we concerned about the consumption of the Boreal forest floor?

- Deep layers
- Large pool of biomass (+100 tons/acre)
- Often drives fire behavior
- Potential for large fire effects
 - Smoke emissions (1 ton of PM_{2.5}/acre)
 - Regional haze
 - Permafrost melting
 - Erosion
 - Plant succession



Pre-burn

Forest Floor Consumption and Smoke Characterization Project

Objectives

- Quantify fuel consumption of the forest floor in the treated and control plots
- Compare forest floor consumption within the treated versus non-treated plot sites.
- Use fuel consumption data to validate current forest floor consumption model in Consume.

Review—Forest Floor Reduction

- Sandberg, 1980, woody diameter reduction (slash)
- Ottmar, 1985, large woody fuel consumption and diameter reduction (slash)
- Brown, 1991, preburn duff depth, duff moisture (slash/natural)
- Lawson, 1999, duff moisture, bulk density (boreal)
- Ottmar, 2000, forest floor moisture content (boreal-natural)
- Ottmar, 2003, 2005 (JFSP) forest floor moisture and pre-burn depth (boreal-natural)

Preparations



Bear Training



WORLD'S LARGEST
MOSQUITO



Methods

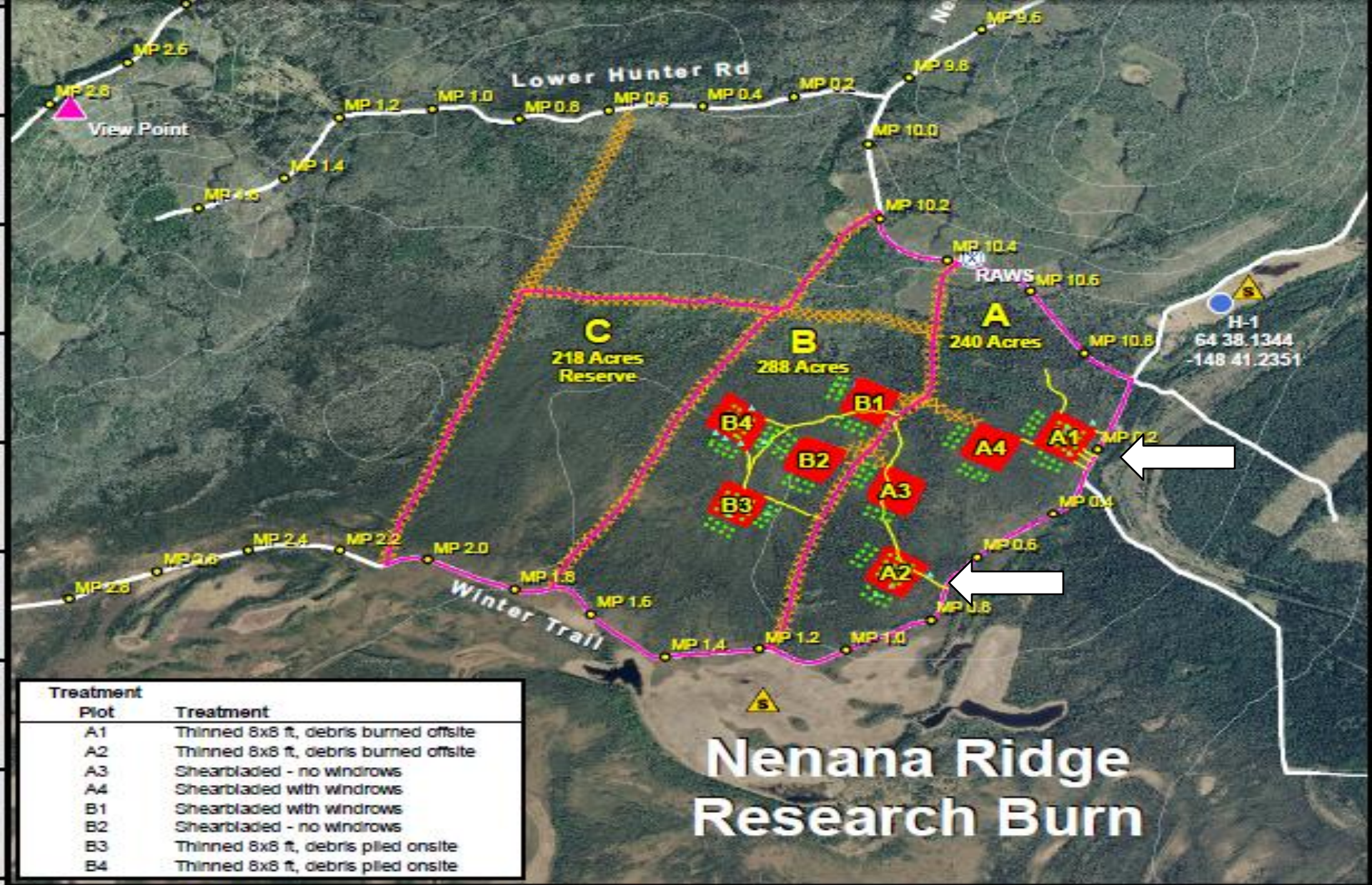
A photograph of two researchers in a forest. They are wearing yellow long-sleeved shirts, yellow hard hats, and dark pants. One researcher is in the foreground, kneeling and using a long, thin measuring tool to probe the forest floor. The other researcher is in the background, also kneeling and working. The forest floor is covered with dry leaves and twigs. The background shows a dense forest of trees.

- **Standard set of protocols to measure forest floor depth, reduction, and consumption.**
- **16 permanent plots for each of the control and treated sites**
- **16 forest floor pins per plot**
- **Independent variables measured including moisture content, weather, and density**

Pre-fire Inventory



06/09/2007

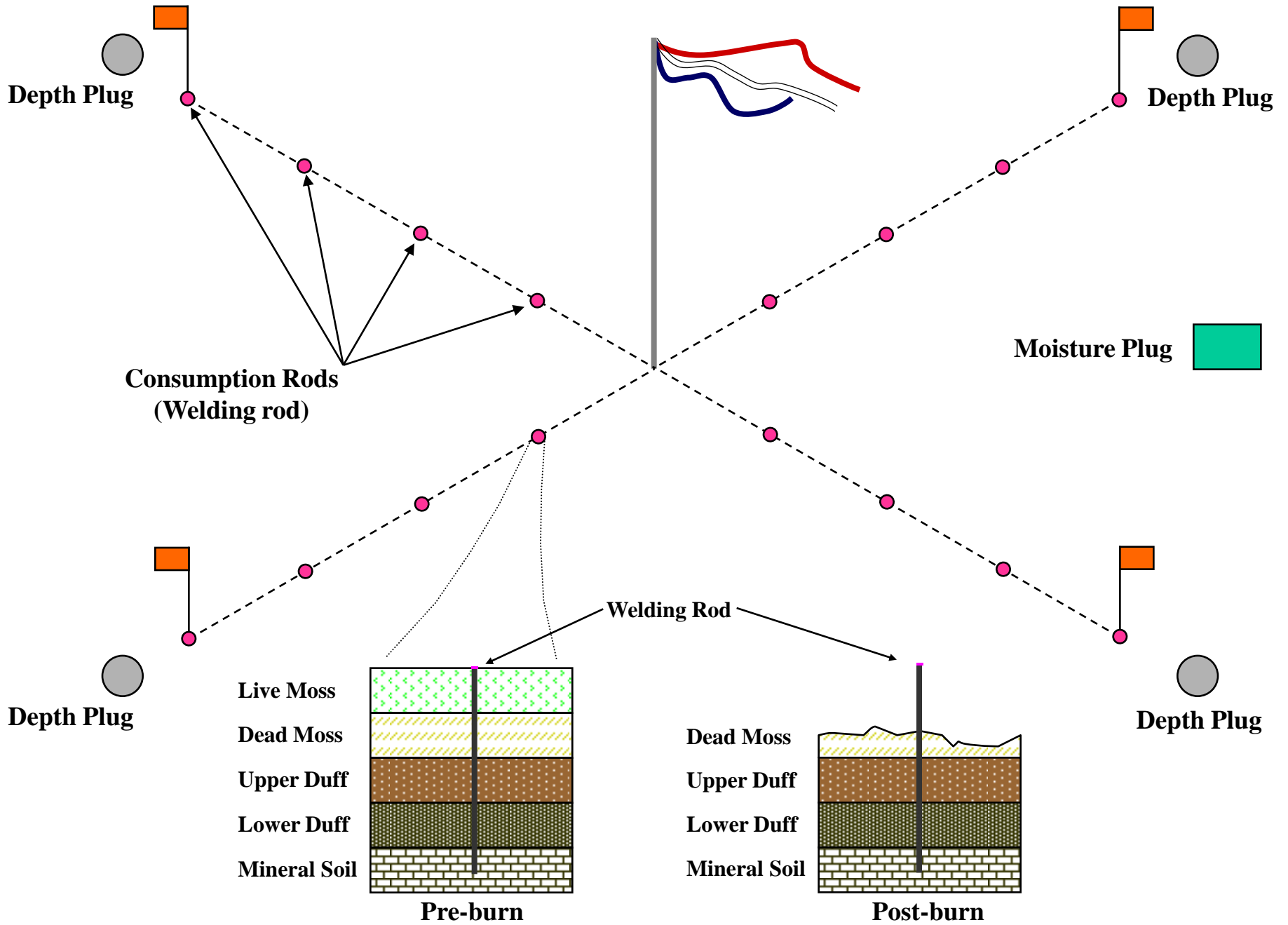


Treatment	
Plot	Treatment
A1	Thinned 8x8 ft, debris burned offsite
A2	Thinned 8x8 ft, debris burned offsite
A3	Shearbladed - no windrows
A4	Shearbladed with windrows
B1	Shearbladed with windrows
B2	Shearbladed - no windrows
B3	Thinned 8x8 ft, debris piled onsite
B4	Thinned 8x8 ft, debris piled onsite

XXXXXX Dozerlines
--- Foot Trails
 Burn Units
 Treatment Units

Research Plots
● Veg/Consumption
● Browse





Forest Floor Moisture Content and Weather

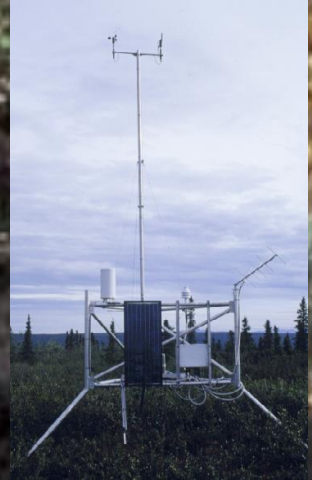
Live Moss

Dead Moss

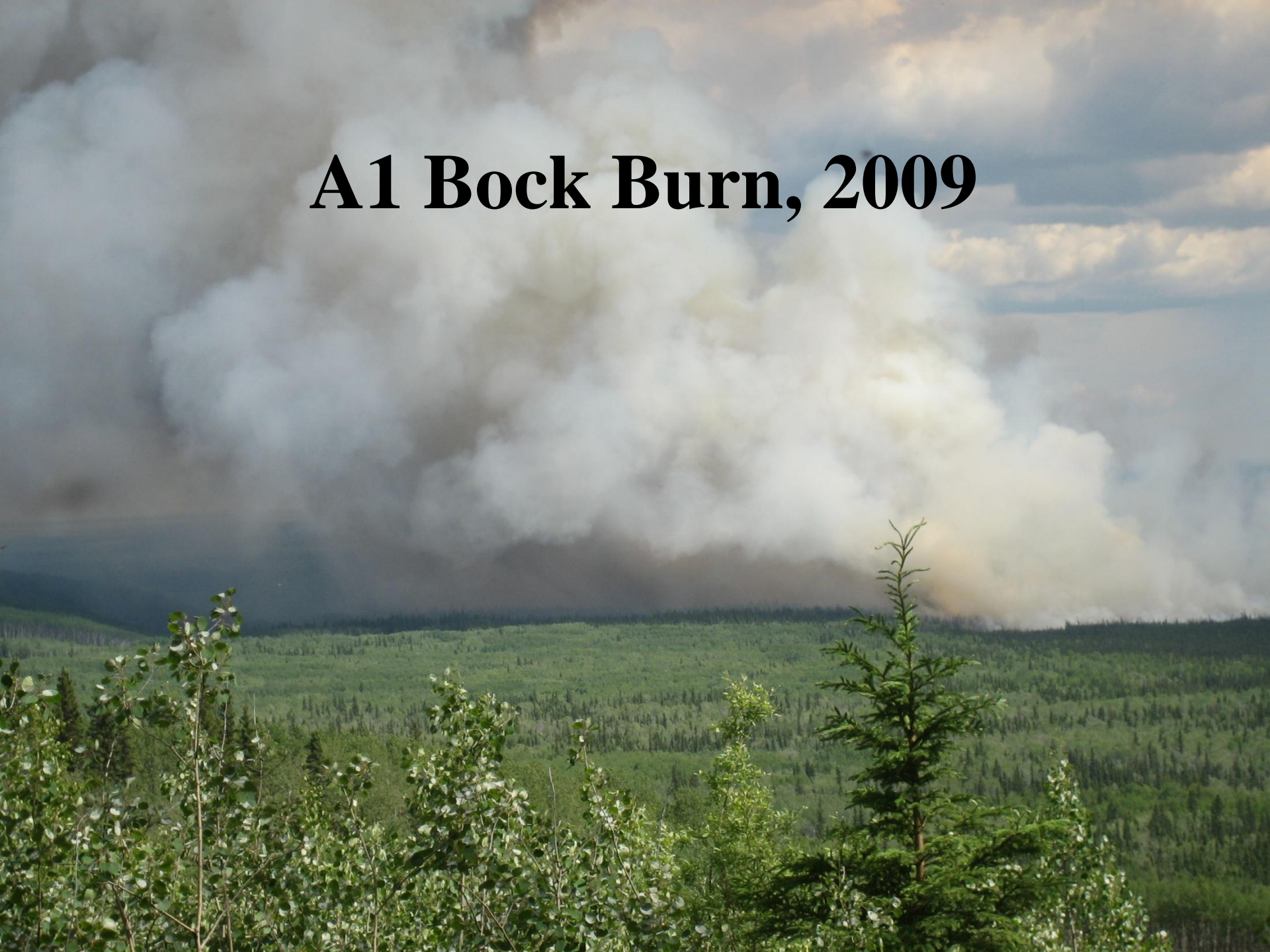
Upper Duff

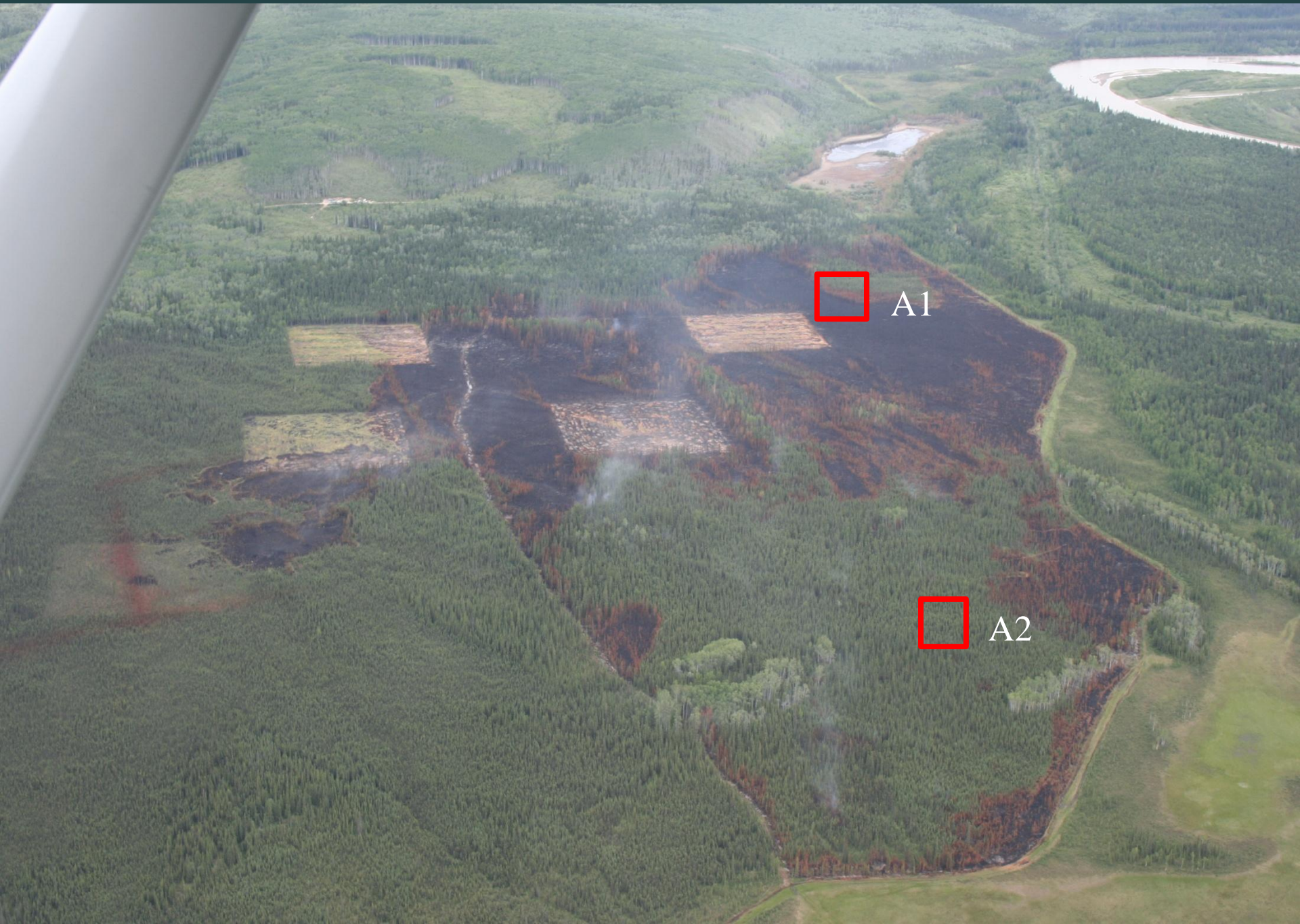
Lower Duff

Mineral Soil



A1 Bock Burn, 2009





A1



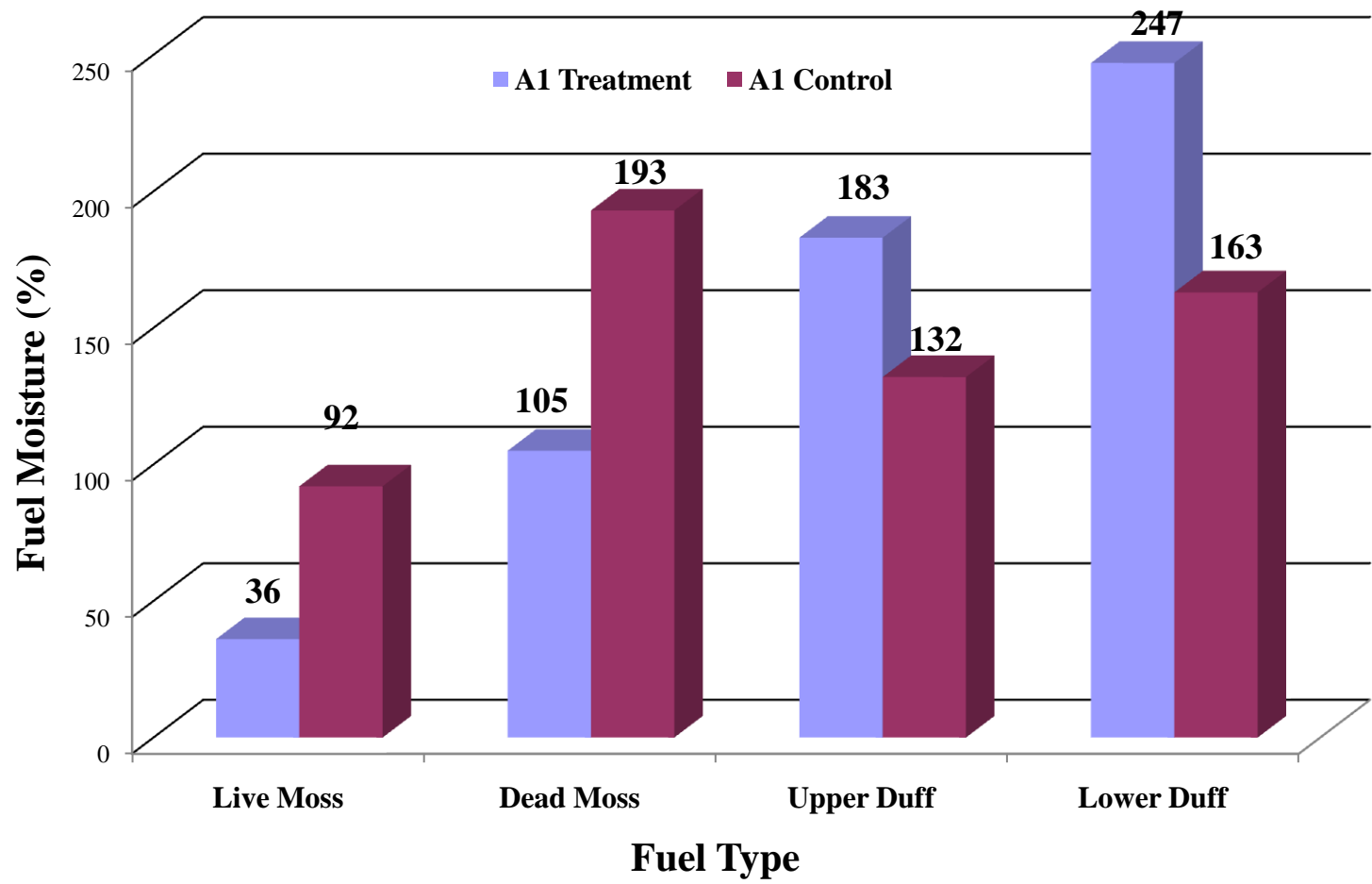
A2

Post Fire Inventory

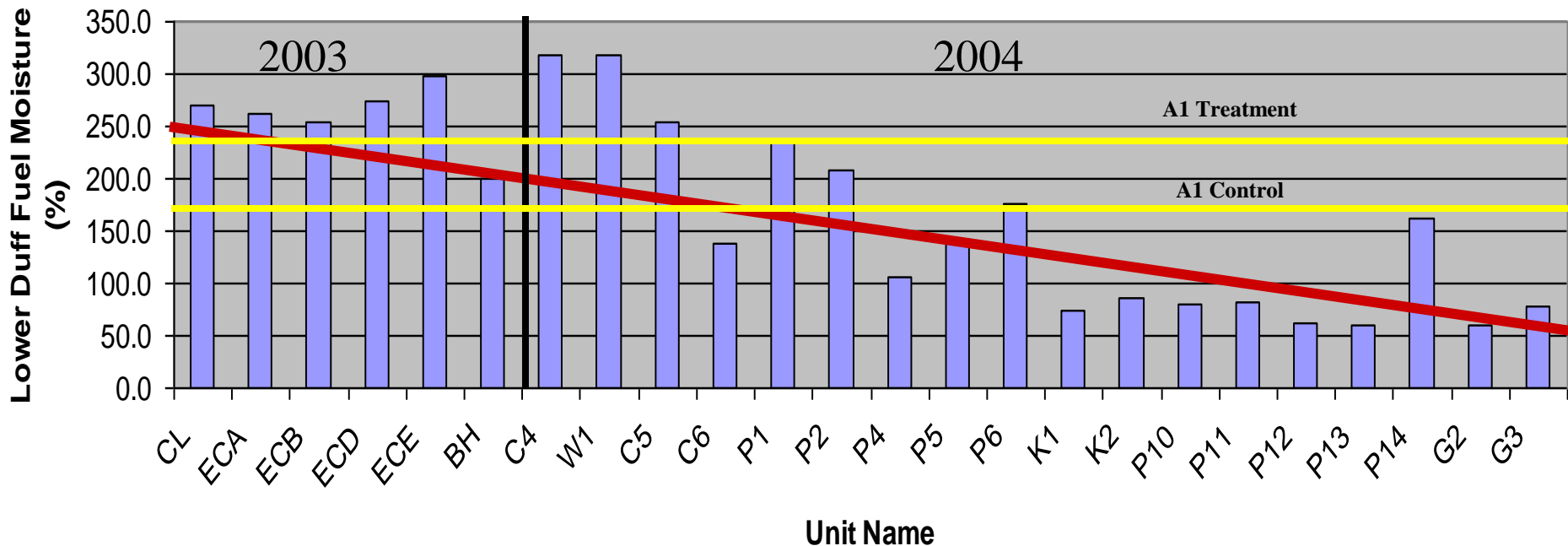


Results

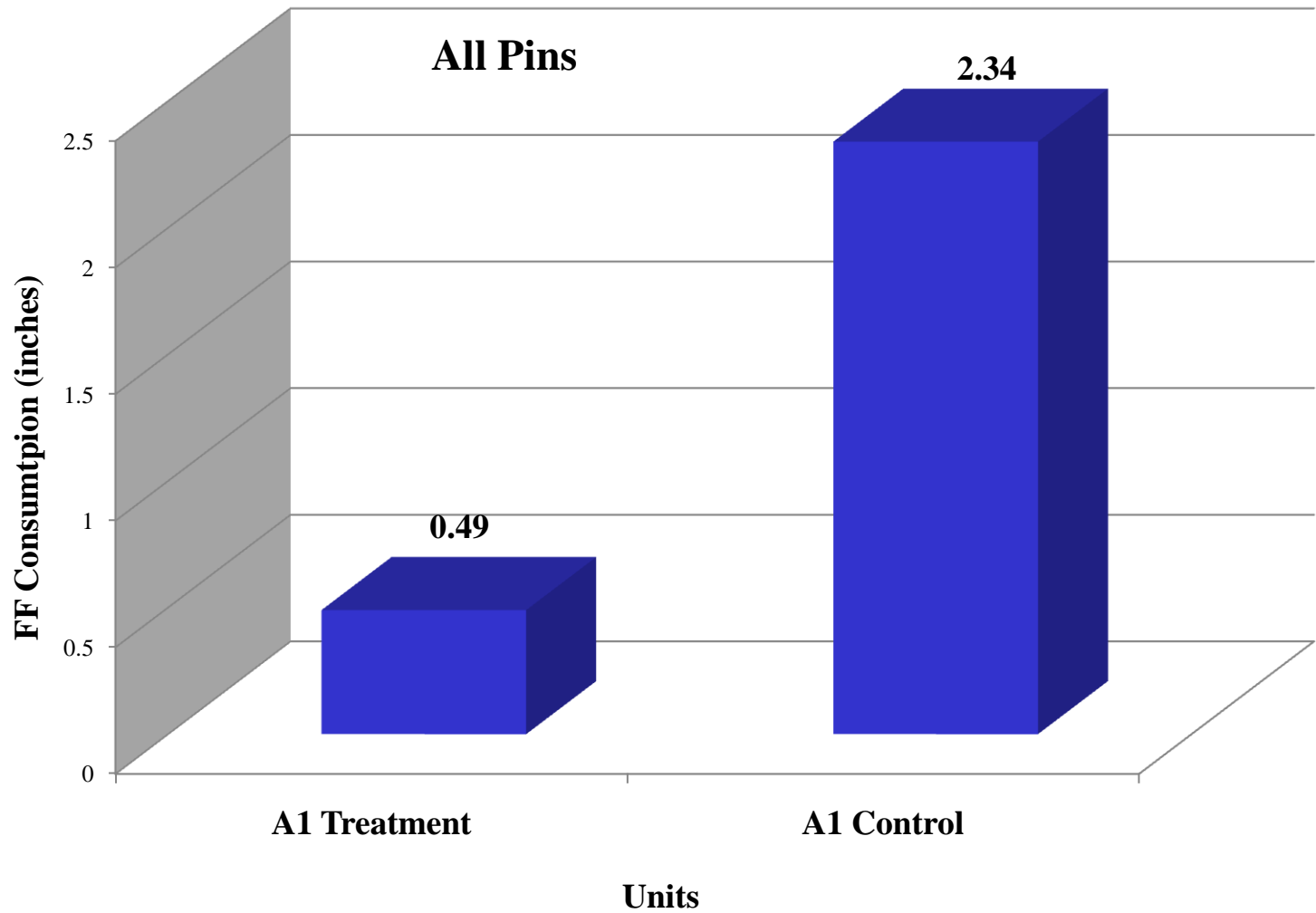




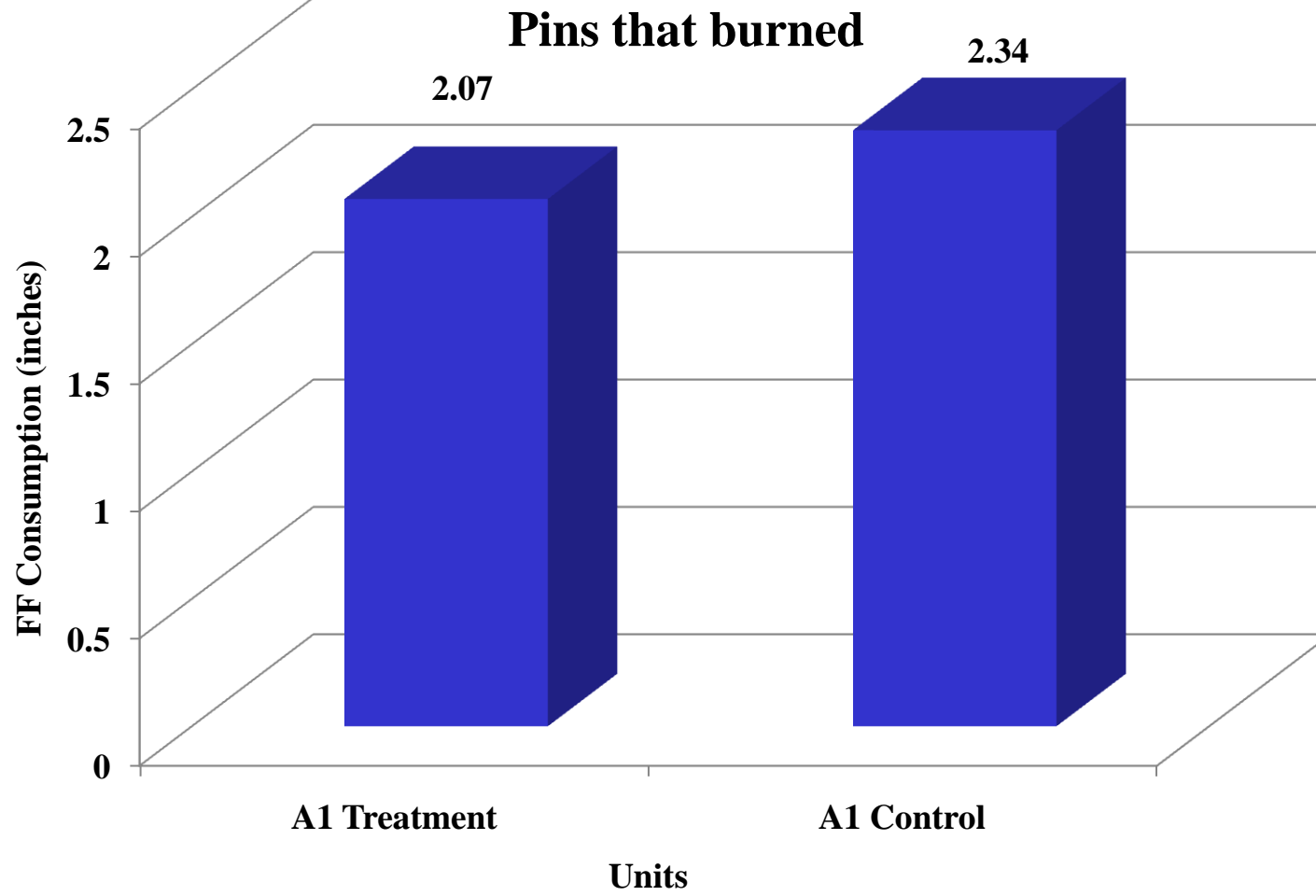
Lower Duff Fuel Moisture 2003, 2004, Nenana Ridge



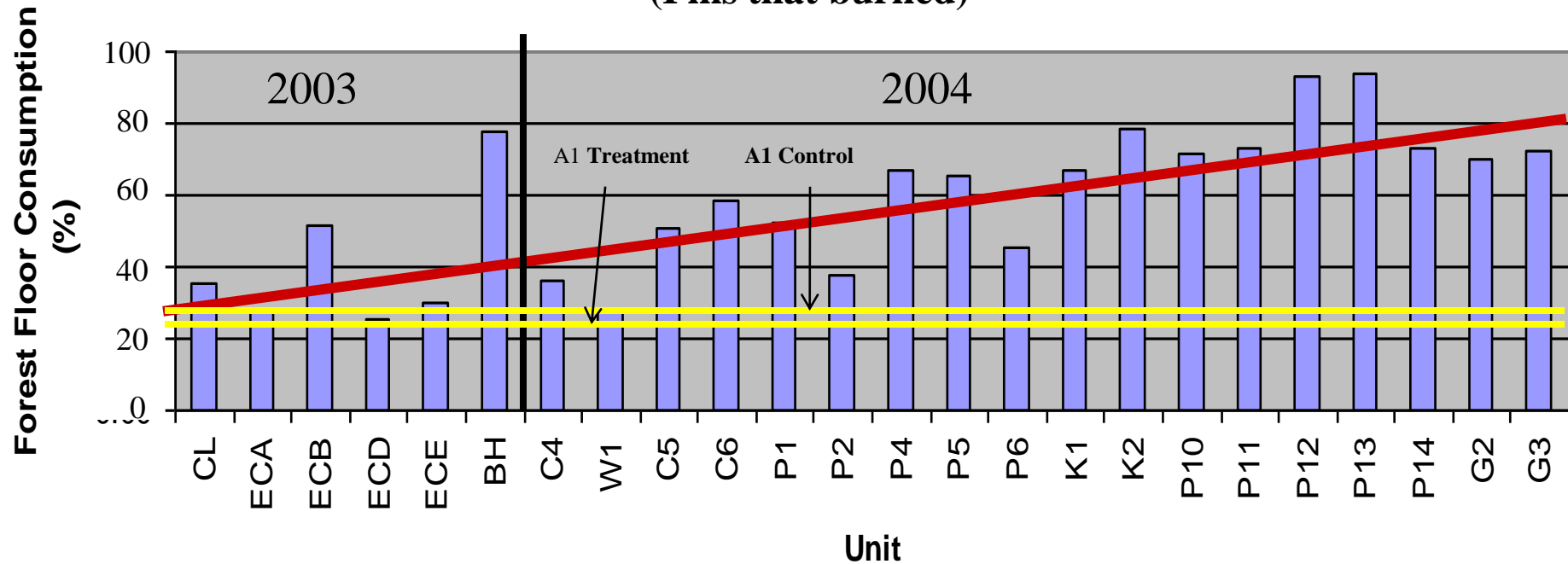
Forest Floor Reduction



Forest Floor Reduction

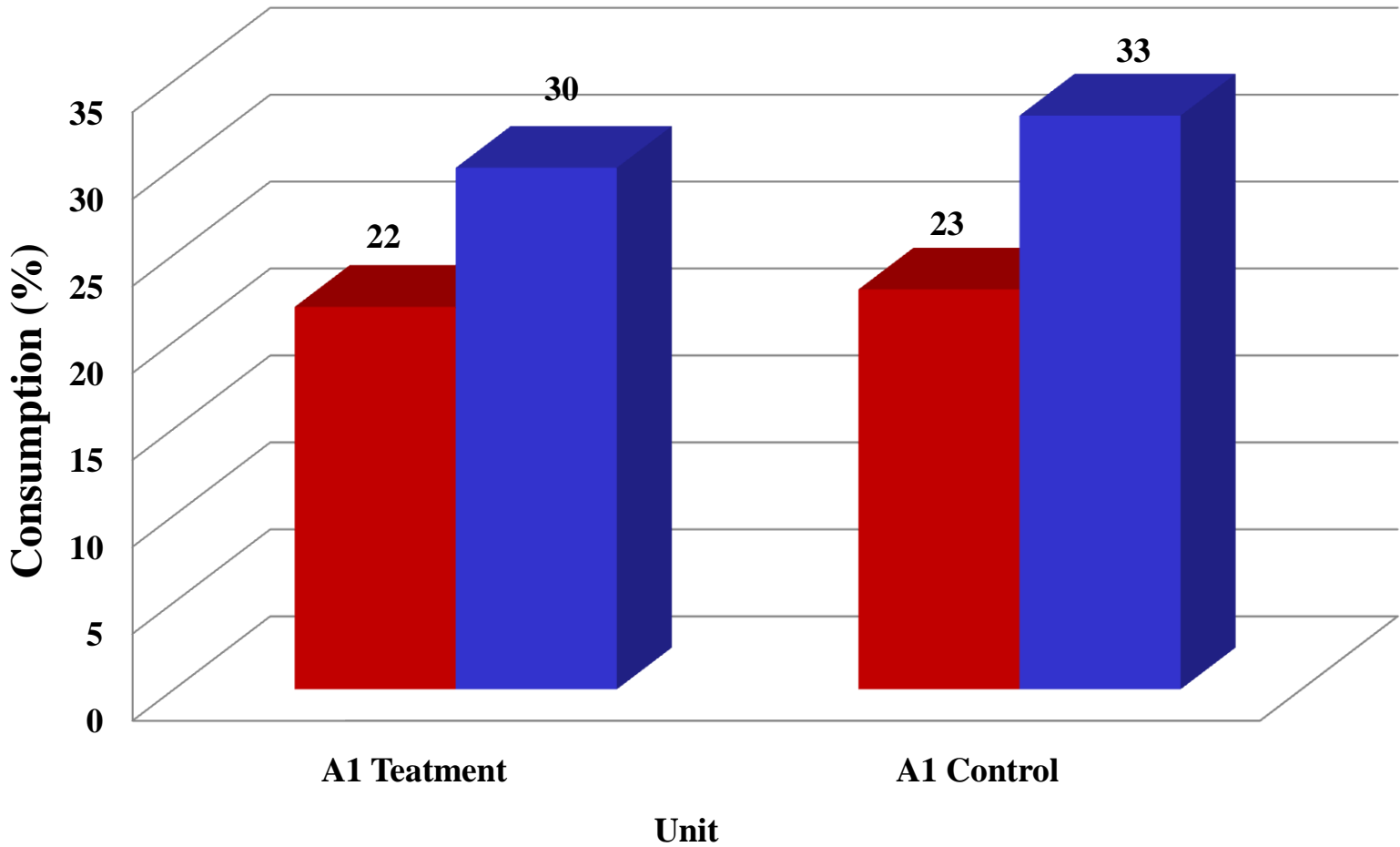


Forest Floor Percent Consumption (Pins that burned)



Pins that burned

■ Measured ■ Predicted



Management Implications

- **Lower fuel moistures noted in the upper moss layers of treated site due to increased solar radiation and wind.**
- **When all pins considered, less forest floor consumption noted in treated site versus control site due to mosaic burn.**
- **Forest floor consumption models predicted treated and control site consumption reasonably well. These models require forest floor depth and upper forest floor moisture as input variables.**
- **Forest floor moisture content will need to be measured until a moisture model or instrumentation is developed**

A landscape photograph showing a vast forest of evergreen trees. In the distance, a range of mountains is visible, partially obscured by a thick layer of white clouds that fills the valley. The sky is filled with large, dramatic clouds in shades of grey and white, with some light breaking through. The overall mood is somber and atmospheric.

The End

Questions??