

Resource availability response to pre-commercial thinning, site productivity, and density

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Introduction

- Pre-commercial thinning is a common forest management practice
- Reduces stand density at a relatively young age
- Provides multiple benefits to the residual trees:
 - Decreased competition
 - Increased growth rates
 - Increased resistance to insects and disease
 - Reduced mortality related to density
- Douglas-fir (*Pseudotsuga menziesii*) is a major commercial species in the inland northwest

Control (no thin)



Light thin (14'x14')



Heavy thin (18'x18')



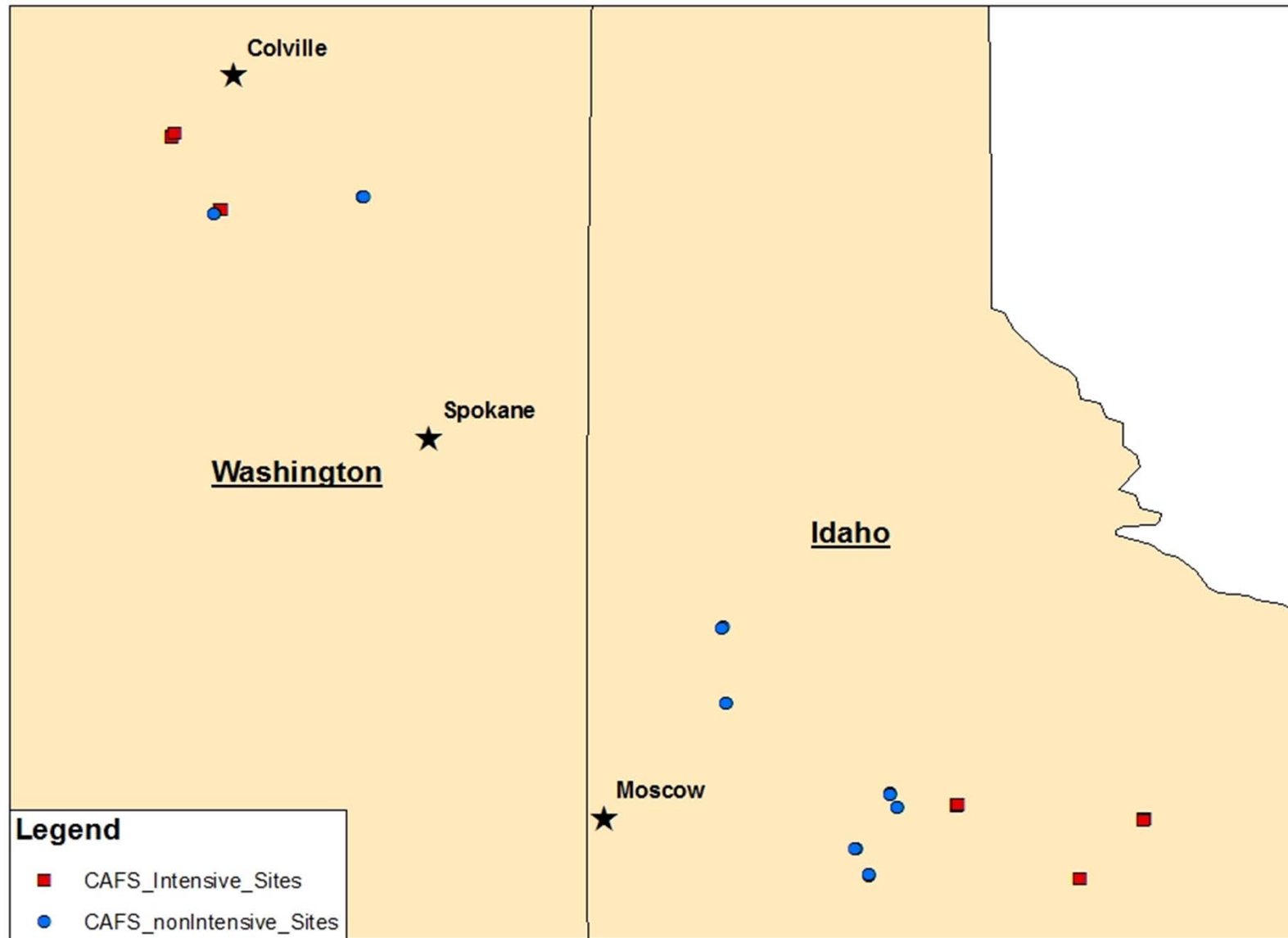
Introduction

- Pre-commercial thinning has demonstrated several benefits for forest resources:
 - Increased soil nutrients from foliage and slash of felled trees
 - Biomass left on site acts as insulation; reducing soil water evaporation
 - Soil warming (higher N mineralization)
 - Higher nutrient content and concentration in plant foliage
 - Increased light availability

Objectives

- Determine how thinning treatment, site productivity, and density impact:
 - Intercepted photosynthetically active radiation (iPAR)
 - Soil temperature and moisture
 - Soil nutrients
 - Foliar nutrients
 - Tree growth
- **Productivity**: dominant tree height growth / time
- **Density**: function of # trees / area, and tree size

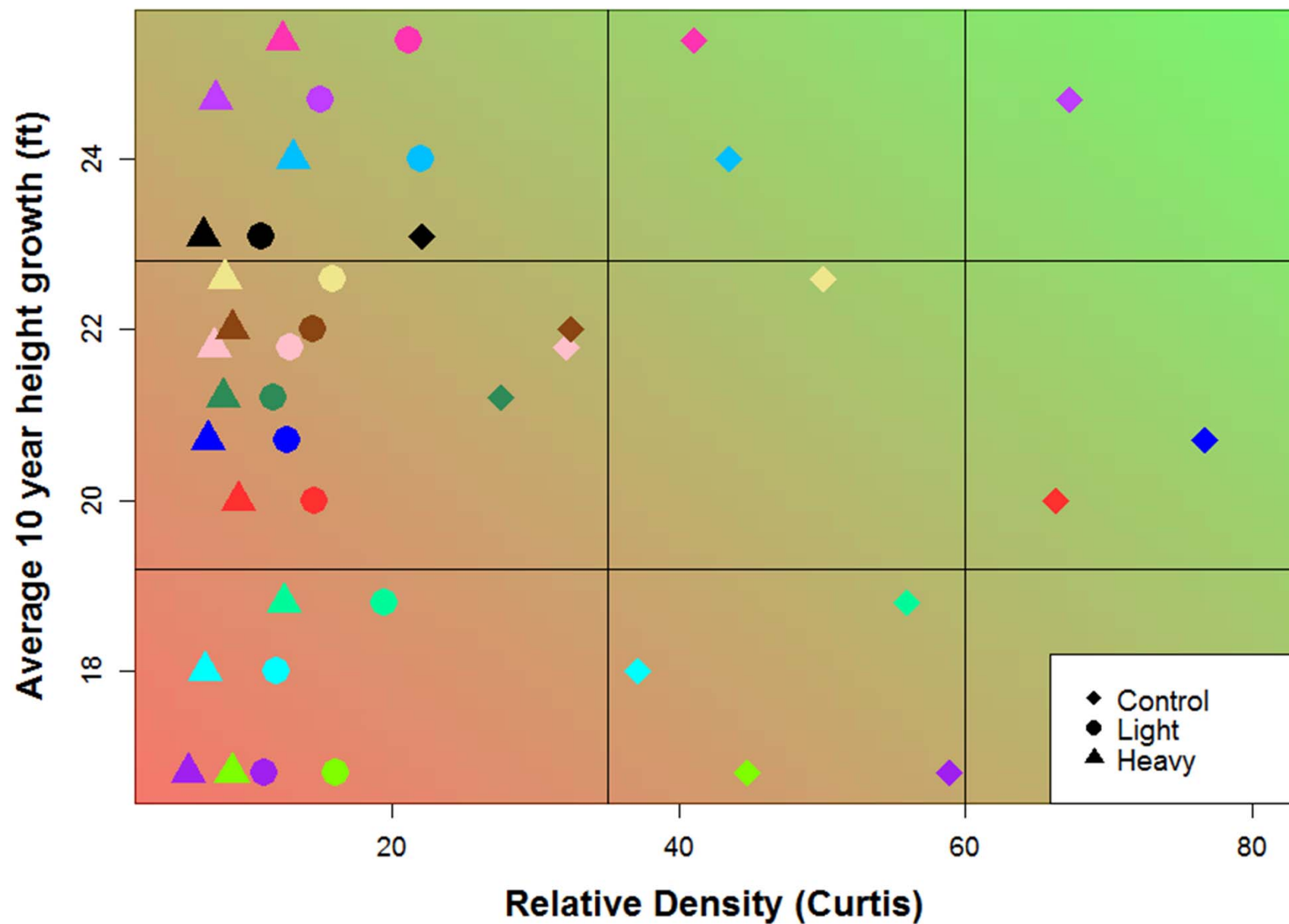
CAFS resource availability sites



0 10 20 40 60 80 Miles

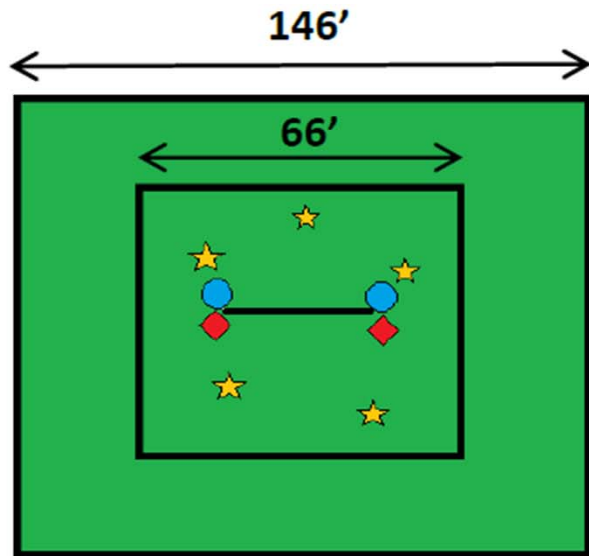
NAD1983 UTM: 11N
Christopher Chase
3/6/2014

Relative density and productivity for all CAFS study sites

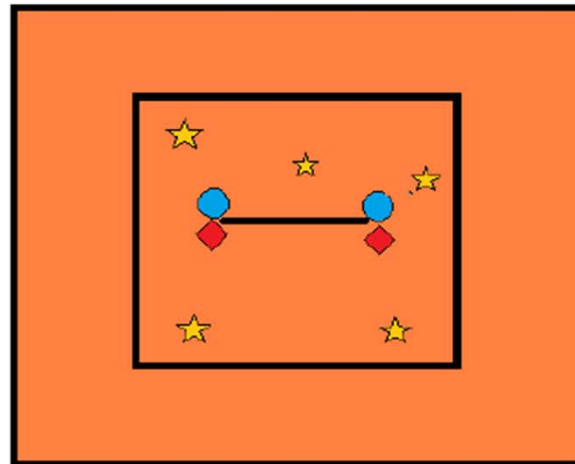


Methods

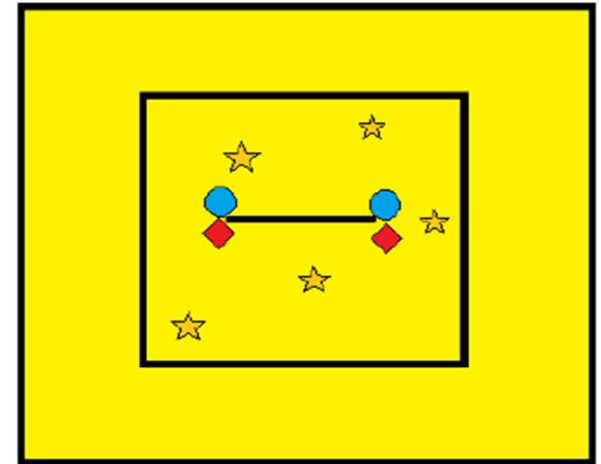
Intensive sites:



Control



Light Thin



Heavy Thin



• Ion exchange resins



• Soil moisture sensors



• Soil temperature sensors

Methods

- Data loggers with temperature and moisture sensors



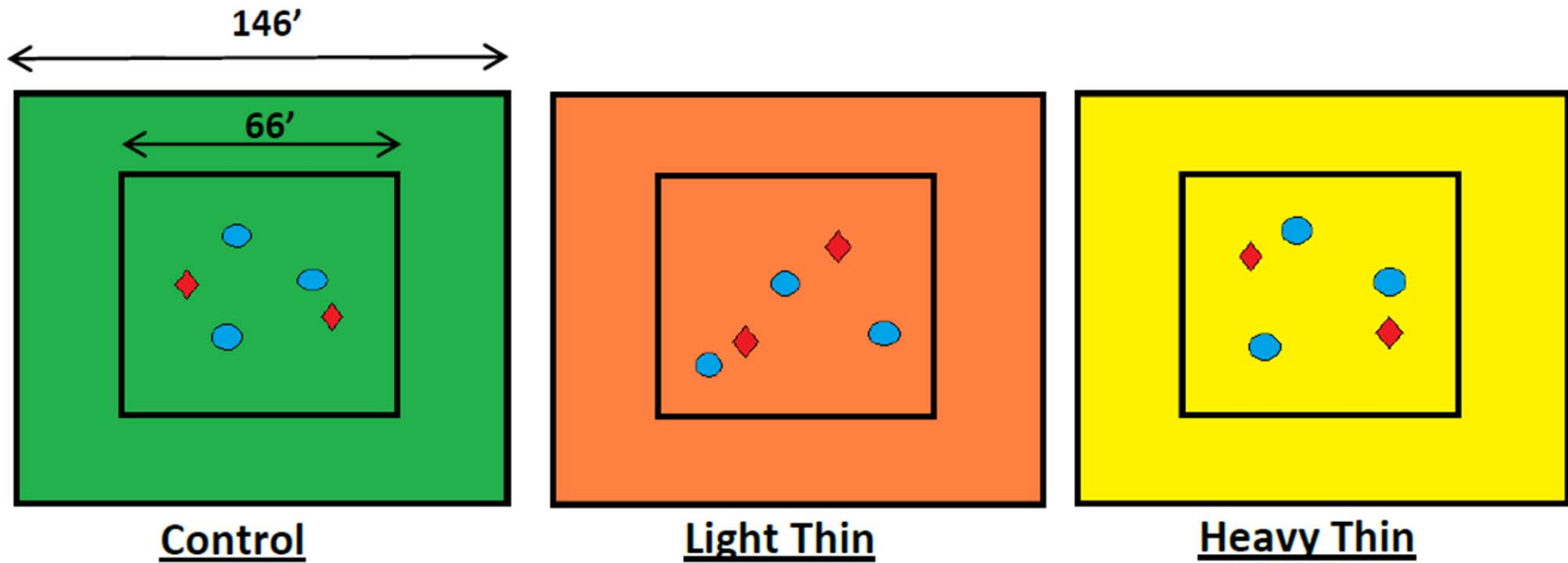
Methods

- Ion exchange resins



Methods

Non-intensive sites:



• Soil moisture measurements (spot)



• Soil temperature sensors

Methods

- Ceptometer measurements of iPAR and PAR

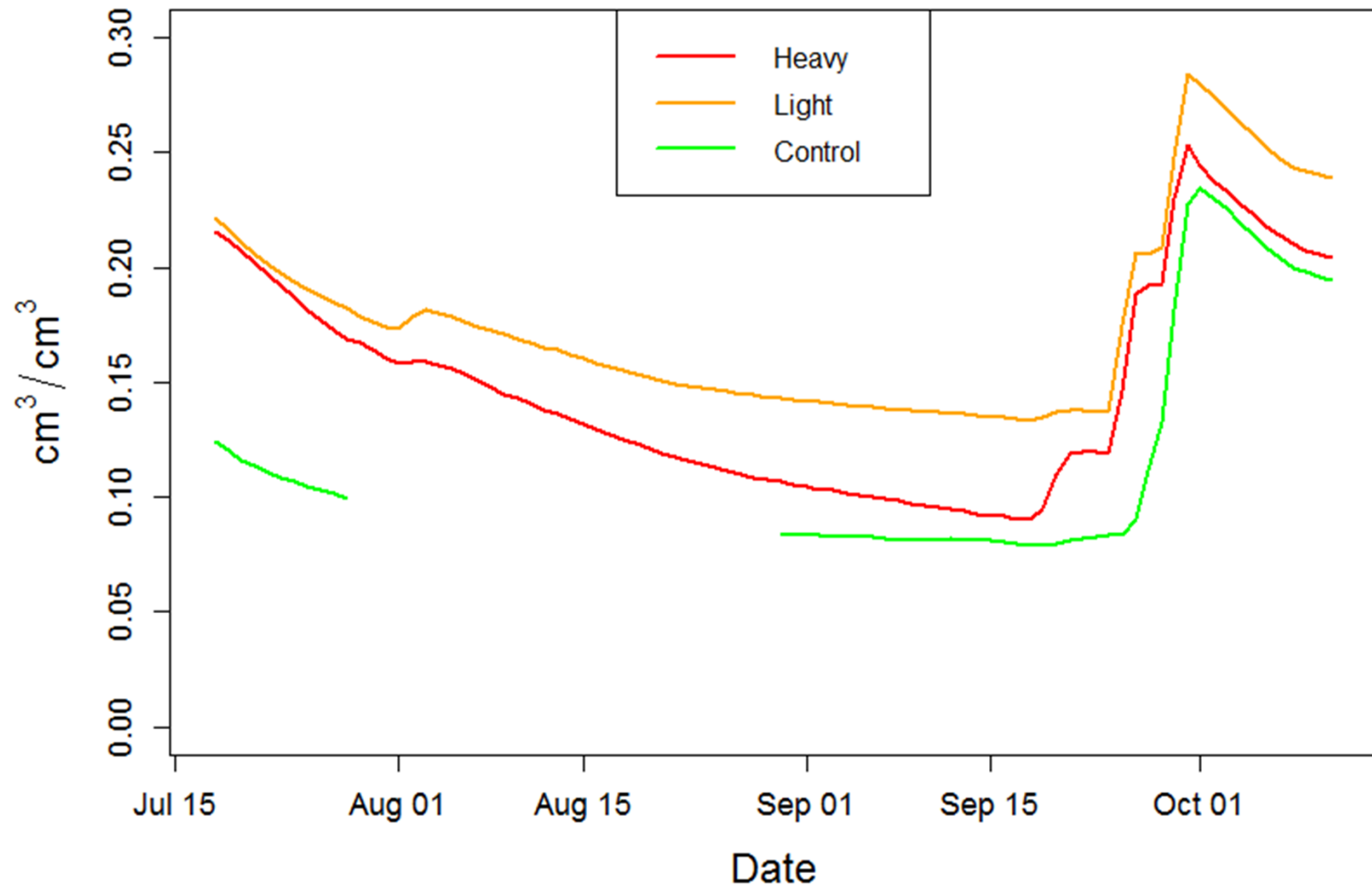


Methods

- Slash measurements (spring 2014)
- Soil samples and IER analysis (summer 2014)
- Fall 2014 after bud set:
 - Foliage collection and analysis from current year growth
 - Tree growth measurements
 - Diameter growth (DBH, cores)
 - Height growth
 - Canopy characteristics (crown ratio, height to base of crown)
 - Water use efficiency (cores)

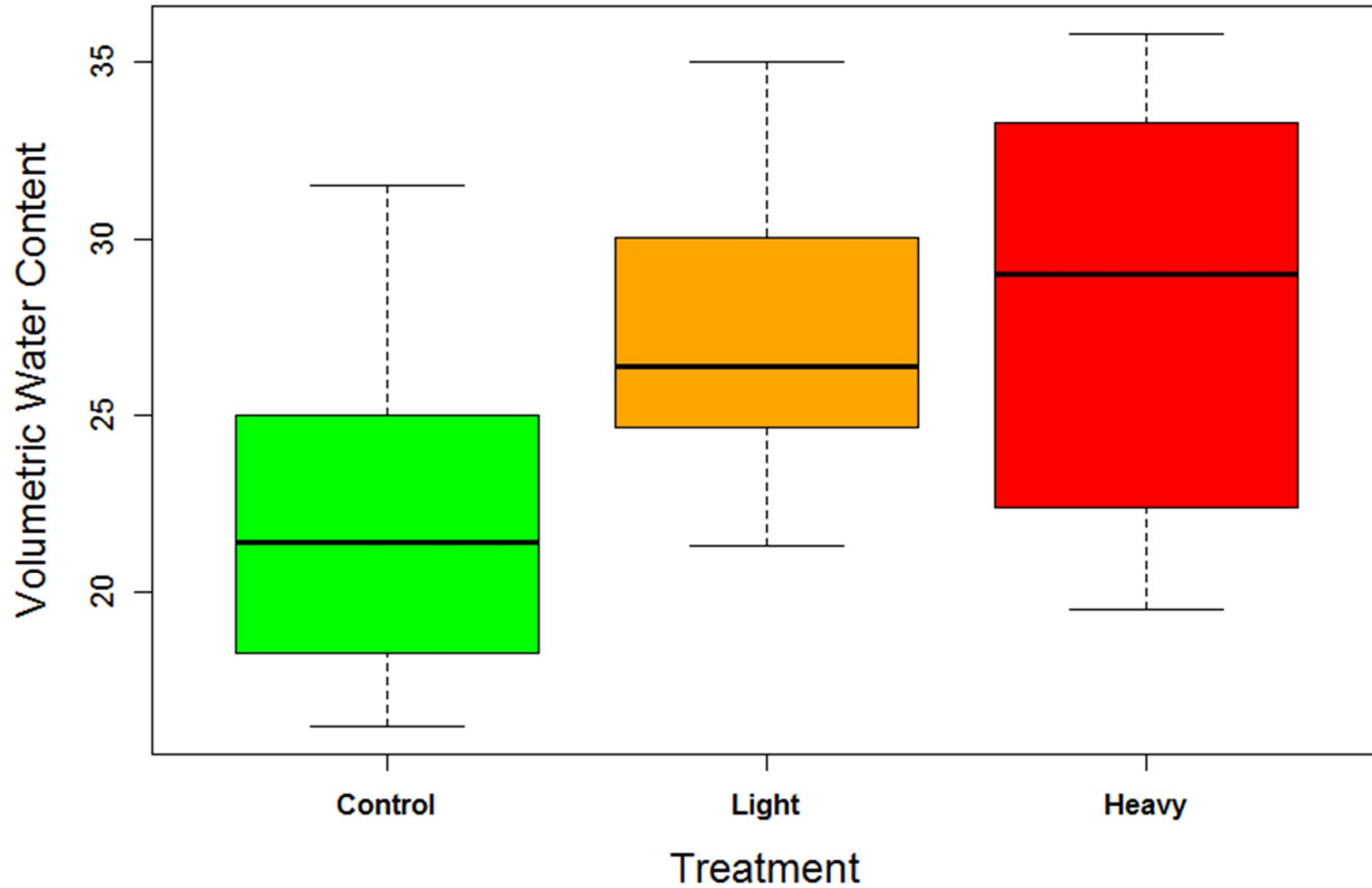
Preliminary Results (intensive)

Daily average moisture by plot



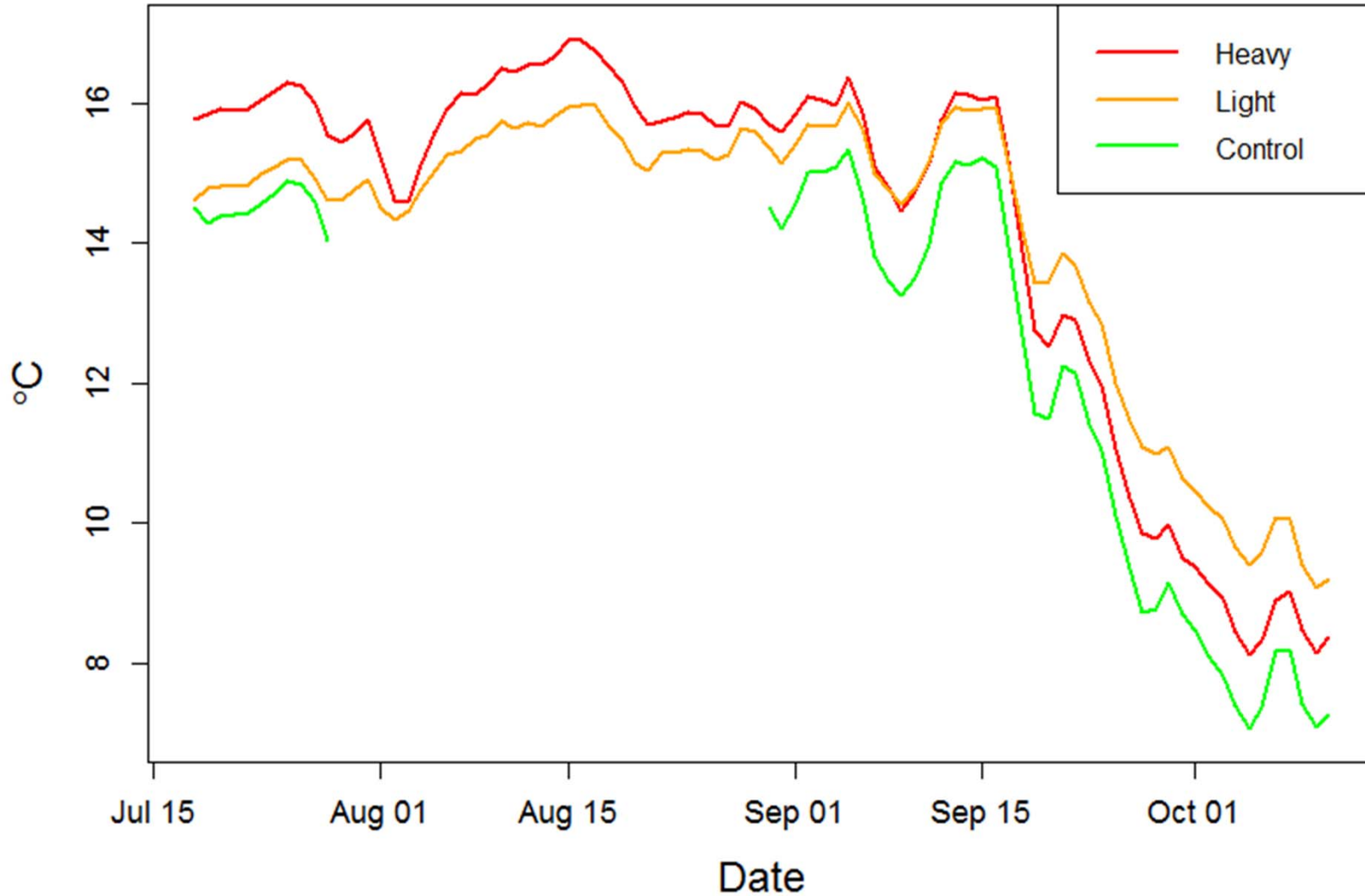
Preliminary Results (non-intensive)

Spot moisture measurements by treatment



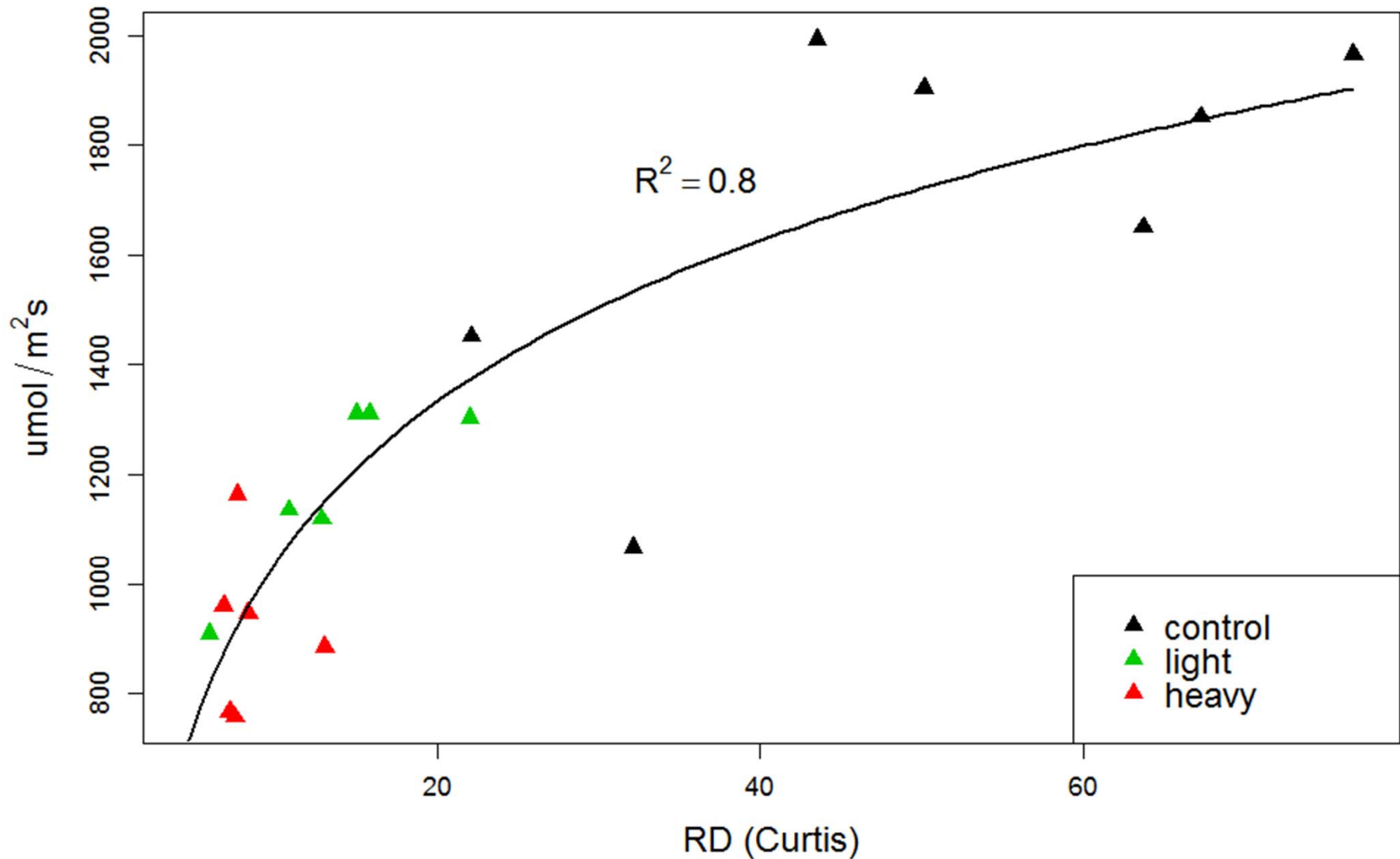
Preliminary Results (Intensive)

Daily average temperature by plot



Preliminary Results

Relative density and iPAR for sites measured summer 2013



Conclusions

- Interesting preliminary results
- How do different densities and productivities fit into results?
- Do nutrients show similar separation?
- 2014 field season!

Questions?

