

# Impacts of forest biomass removal on soil quality and forest productivity



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# Some Current Forestry Issues

- 73 million acres of Overstocked Forest in West (USFS, 2003)
- 40 million dead acres of beetle killed forest in BC/Alberta, 4 million CO/WY
- Longer fire season, increasing fire severity
- Increasing Cost of Transportation and biomass Removal
- Biomass removal can have negative impacts on future productivity



# Solutions to Current Situation

- Thin forest to increase resiliency from Insects/disease, fires
- Utilizing low-value biomass for energy production (boilers, gasification, pyrolysis, fermentation)
- Future carbon markets?





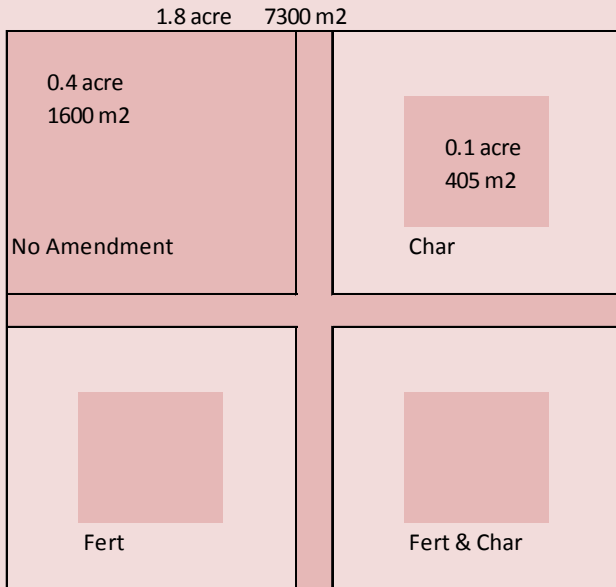


# Objectives

- Determine the effects of slash removal rates on site productivity
- Can soil amendments mitigate the effects of slash removal
- Response to thinning affected by slash removal and amendment treatments

# Experimental Design

Thinned and all slash retained (1x)



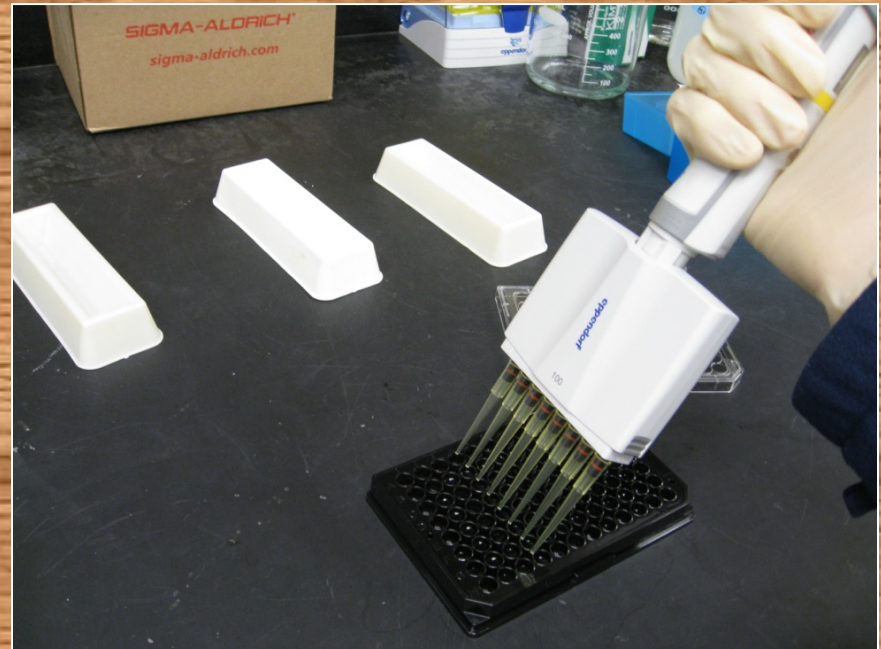
Unthinned control		Thinned and No slash retention (0)	
no amendment	fertilizer	no amendment	fertilizer
biochar	fertilizer & biochar	biochar	fertilizer & biochar
Thinned and All slash retained (1x)		Thinned and Double Slash retained (2x)	
no amendment	fertilizer	no amendment	fertilizer
biochar	fertilizer & biochar	biochar	fertilizer & biochar

Thinned to 40% of original volume  
 3 slash retention rates (none, All, or Double)  
 Biochar will be added at 17,851 lbs/ac  
 Fertilizer (N,P,K,S,B) at 562 lbs/ac



# Data Collection

- Tree growth responses: Crown response, B.A., volume
- Soil physical/chemical properties: Bulk density, Macro/Micro nutrients, Soil Organic Matter content, Soil Moisture/Temperature
- Soil biological activity: Soil respiration (CO<sub>2</sub> fluxes), Microbial Biomass, Enzyme activity





# Questions

- How will the soil physiochemical/biological properties change due to thinning and different rates of slash retention?
- How will the soil physiochemical/biological properties change due to the different soil amendments?
- How will subsequent tree growth respond to the different biomass removal rates and can soil amendments compensate for the removal?





# Expected Forestry results

- Thinning will increase growth of individual tree volume
- Fertilizer will have a short-term effect on growth
- Increasing amounts of slash retention will increase individual growth over the long-term



# Expected Soil Results

- Positive relationship with increasing slash retention rates and soil physiochemical/biological properties; however these will not be detectable in the short-term
- Fertilizer will have a short-term effect on soil properties, but will dissipate with time
- Biochar will have increasing positive effect on soil properties with time



Q/A

Thanks for your time!

