

# DENSITY CONTROL AND FERTILIZATION IN YOUNG WESTERN LARCH

PROJECT SPONSORED BY:

WASHINGTON DEPARTMENT OF NATURAL RESOURCES

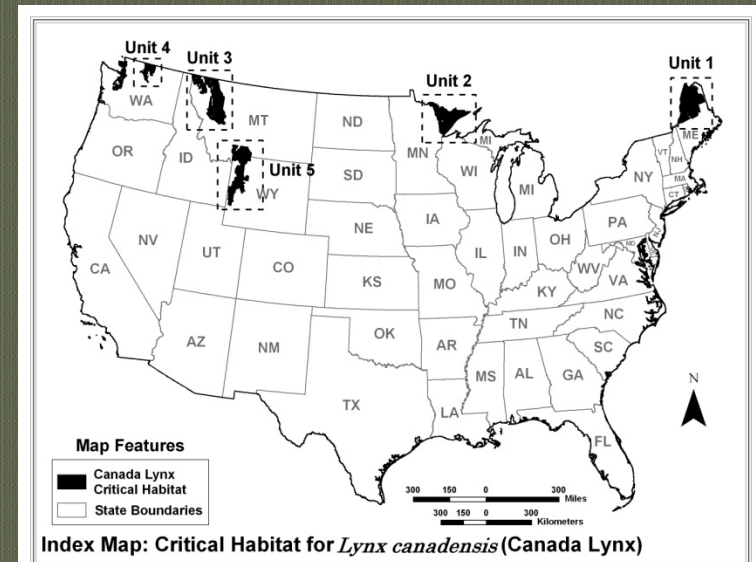
2010 IFTNC Annual Meeting – April 6<sup>th</sup>

Mark Kimsey

# PROJECT BACKGROUND



- Mandate:
  - Generate revenue from managed forestlands within the context of other commitments
- Wildlife habitat commitment:
  - Conservation of Canada lynx by maintaining snowshoe hare habitat
- Intersect:
  - Optimal revenue generating western larch stands often overlap with lynx/hare habitat



# QUESTION?

- How can WA DNR continue to create revenue streams from western larch stands, while providing optimal habitat for the hare and lynx?



# BIOLOGIST FINDINGS

- Hare habitat must provide:
  - Dense stands of conifers 8-16 ft in height for daytime sanctuary
  - Woody browse which is critical during the winter months
  - Conifers 16-50 ft in height that provide travel corridors between resting and feeding areas when these are separated



# PROJECT GOALS

- Develop non-lynx/hare habitat into desired lynx/hare habitat in a shorter period
- Accelerate young western larch forest stand productivity



Dave Powell, USDA Forest Service, Bugwood.org



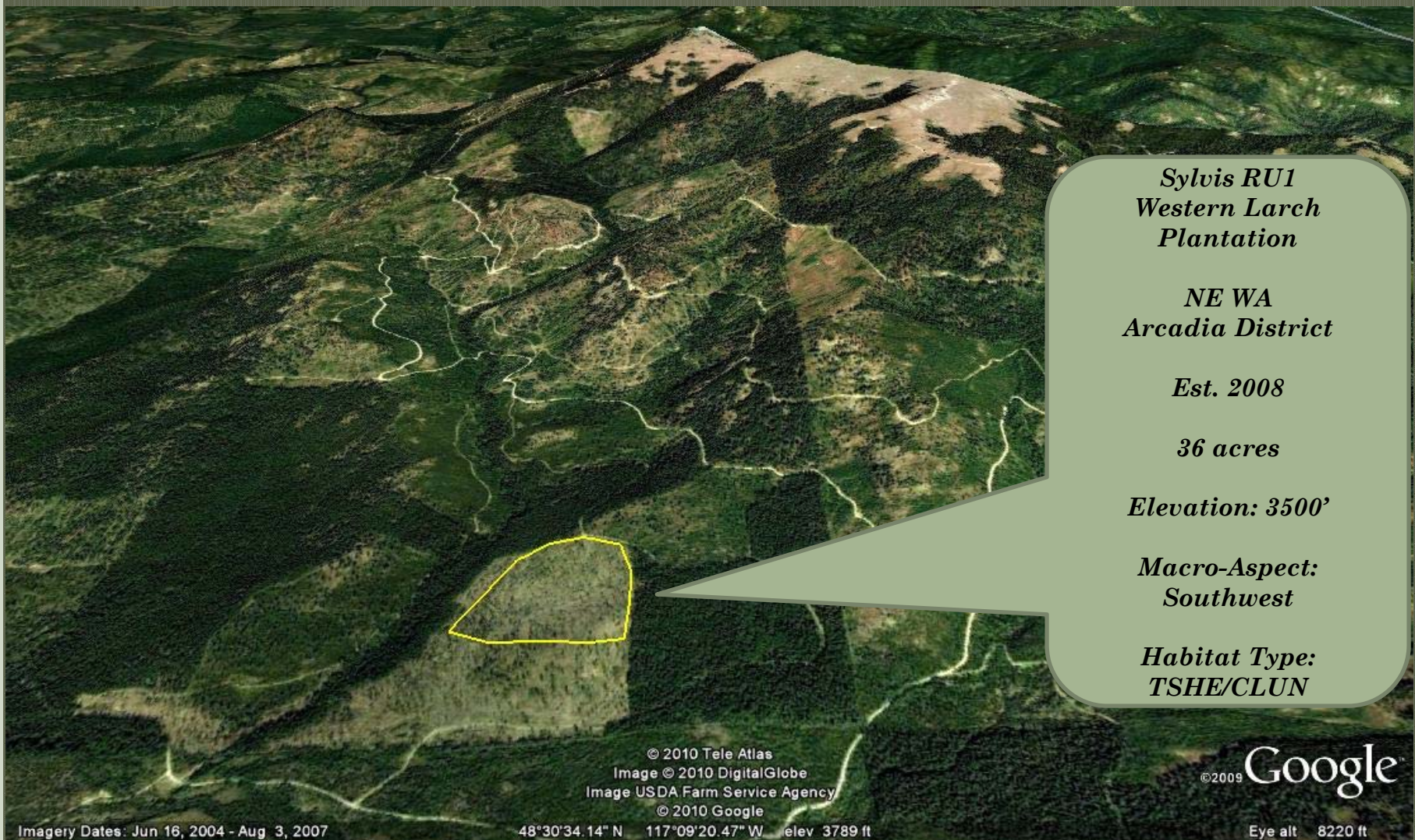


## OBJECTIVES

- Biology Track: Determine which stocking level and nutrition combinations will improve quality and longevity of hare habitat – WA DF&W
- Silviculture Track: Determine which stocking and nutrition combinations maximize western larch seedling productivity – WA DNR, IFTNC



# STUDY AREA



***Sylvia RU1  
Western Larch  
Plantation***

***NE WA  
Arcadia District***

***Est. 2008***

***36 acres***

***Elevation: 3500'***

***Macro-Aspect:  
Southwest***

***Habitat Type:  
TSHE/CLUN***

© 2010 Tele Atlas  
Image © 2010 DigitalGlobe  
Image USDA Farm Service Agency  
© 2010 Google

©2009 Google

# SITE CHARACTERISTICS

## Soil Type 1:

### Newbell Silt Loam

volcanic ash and loess over glacial till

## Soil Type 2:

### Orwig Sandy Loam

sandy glacial outwash mixed with volcanic ash and loess

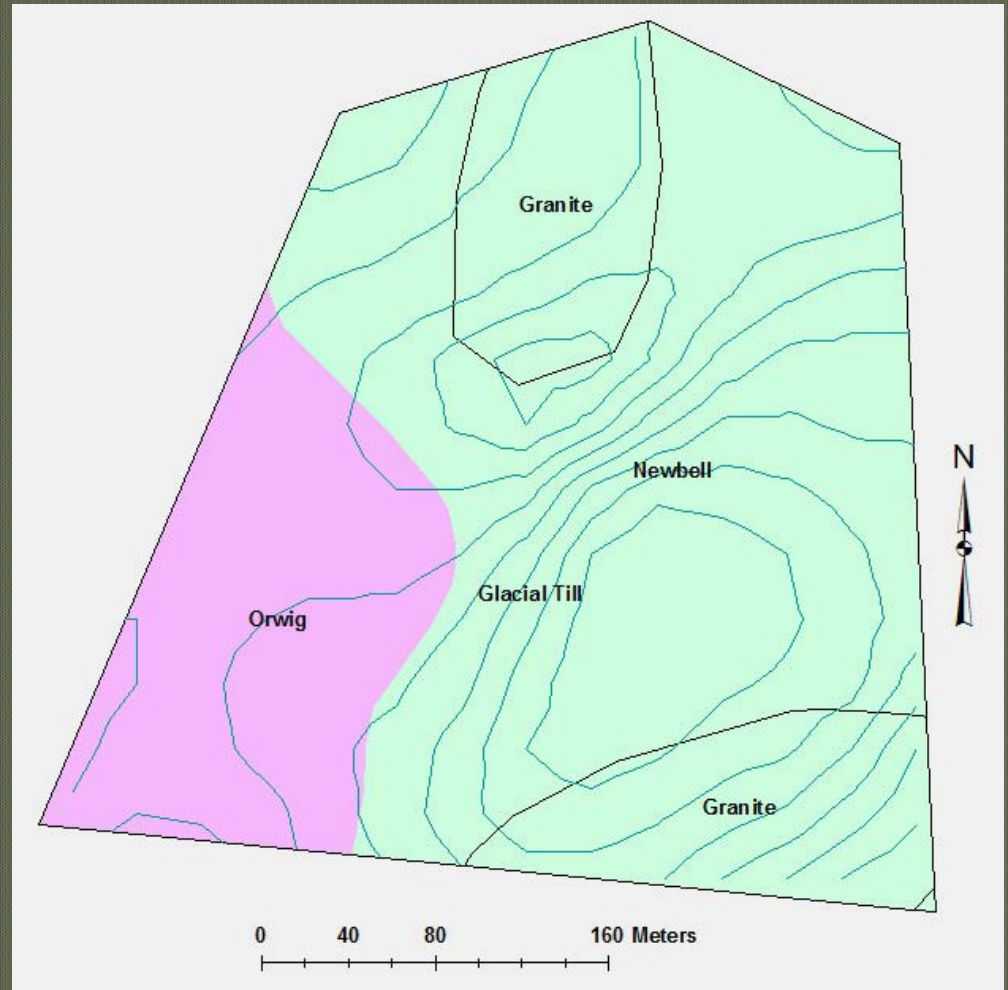
## Rock Type 1:

### Felsic Intrusive Bodies

granitic like

## Rock Type 2:

### Continental glacial till



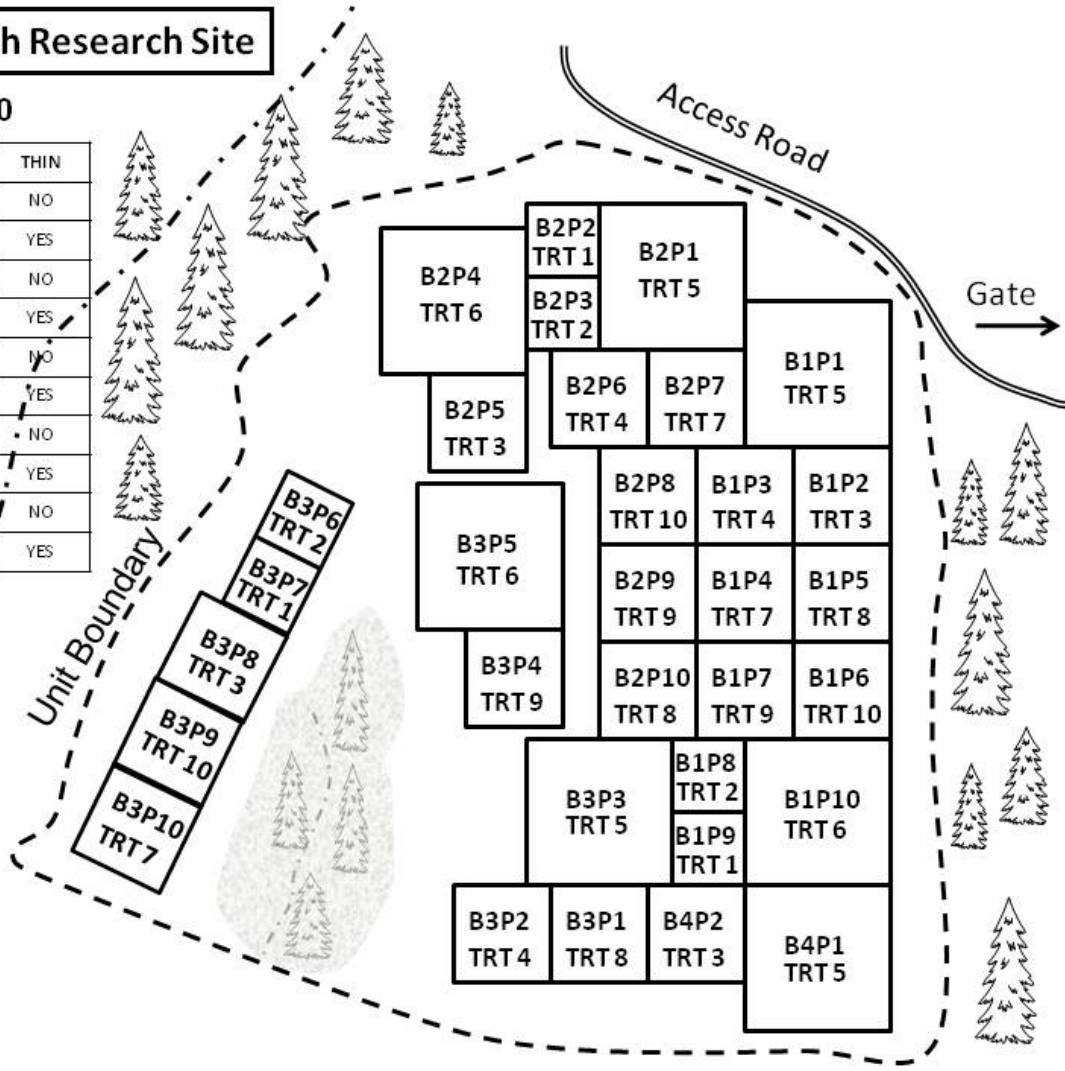
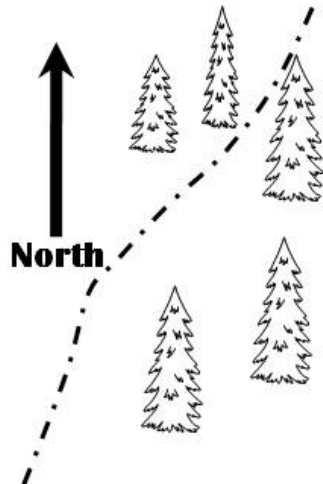


# STUDY DESIGN

## Sylvis Western Larch Research Site

T35N, R45E, Sec 30

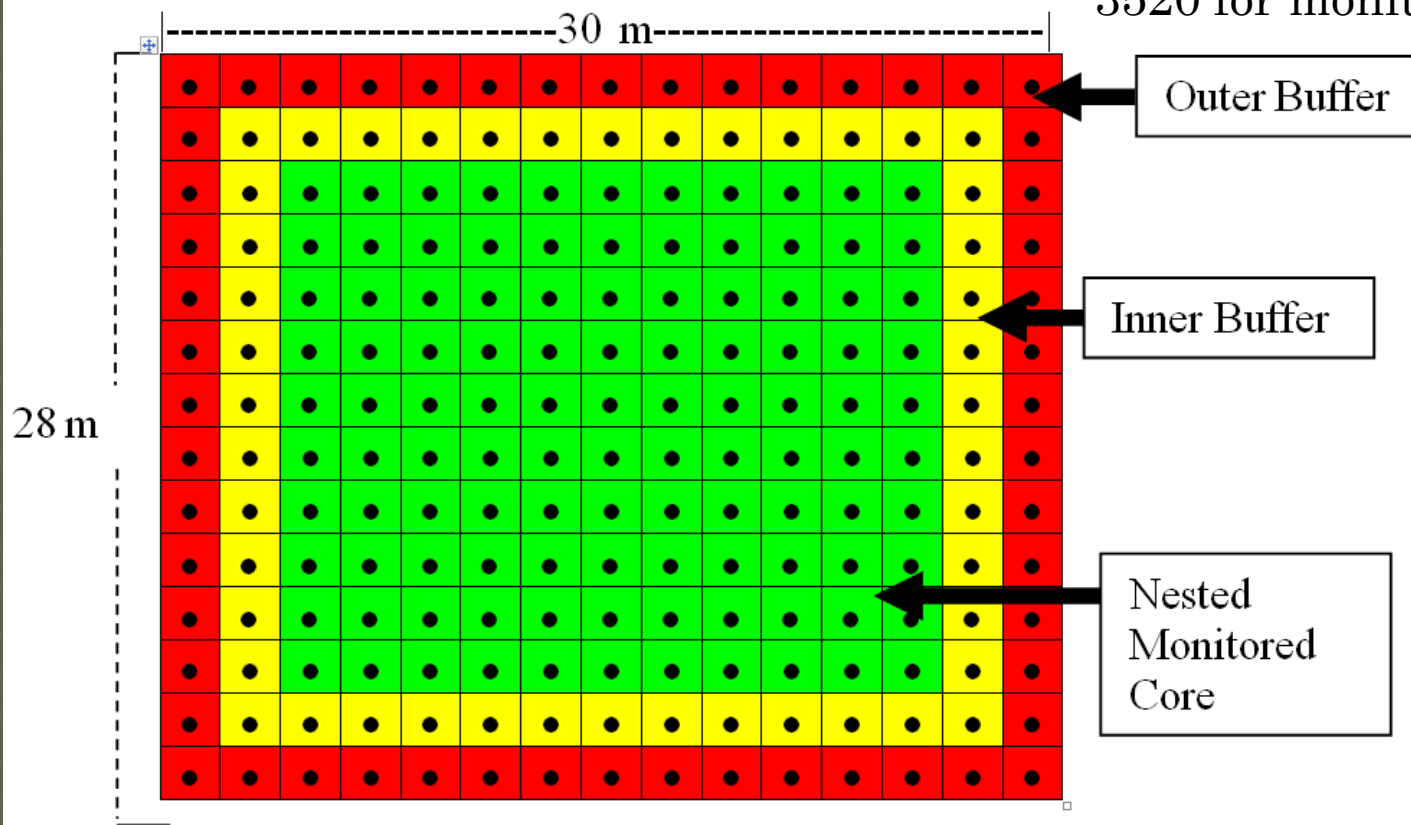
TRT	SPACING (m)	FERT	THIN
1	2X2	-	NO
2	2X2	-	YES
3	3X3	-	NO
4	3X3	-	YES
5	4X4	-	NO
6	4X4	-	YES
7	3X3	N-ONLY	NO
8	3X3	N-ONLY	YES
9	3X3	MULTI	NO
10	3X3	MULTI	YES



# PLOT LAYOUT

**2 m Spacing Plot Schematic – 2-Tree Buffer**  
210 Total Trees – 110 Interior Trees

1-0 WL Seedlings:  
6720 total  
3200 for buffer  
3520 for monitoring



# CHEMICAL APPLICATIONS



2007/2008  
Herbicide\*

Year	Application Method	Chemical	Rate
Summer 2007	Wavy-wand broadcast	Chopper Foresters Atrazine 4L	1 qt/ac 2 qts/ac 1 gal/ac
Summer 2008	Wavy-wand spot w/seedling cover	Chopper Escort	2% 2 oz./100 gal.

\*Spot treatment as necessary in 2010, 2011, 2012



Fall 2008  
Fertilization\*\*

Treatment	Element	Elemental rate (lbs/acre)	Product source
Control	-	-	-
N-Only	Nitrogen	100	Urea (46-0-0)
Multi-nutrient	Nitrogen	100	Urea (46-0-0)
	Potassium	100	KCl (0-0-51)
	Sulfur	90	(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> (20-0-0-24)
	Boron	3	Borate FG (0-0-0-15)
	Copper	10	CuSO <sub>4</sub> (0-0-0-25-25)

\*\*Plots will be re-fertilized in 2012

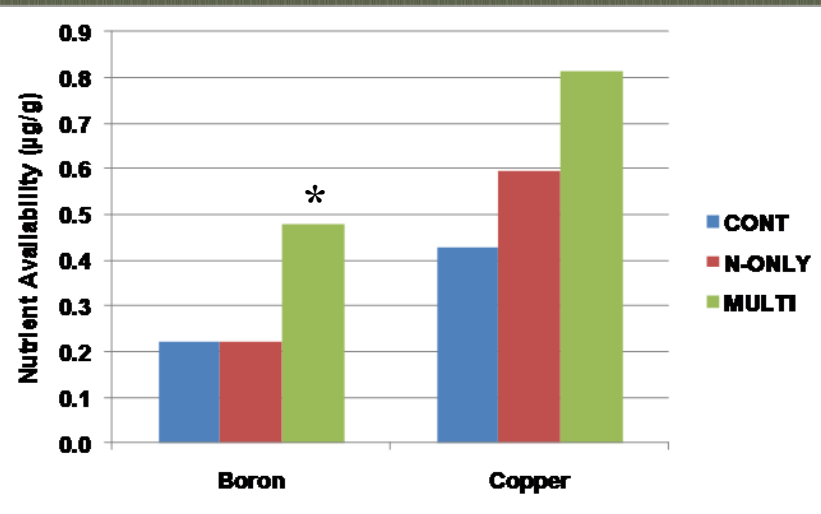
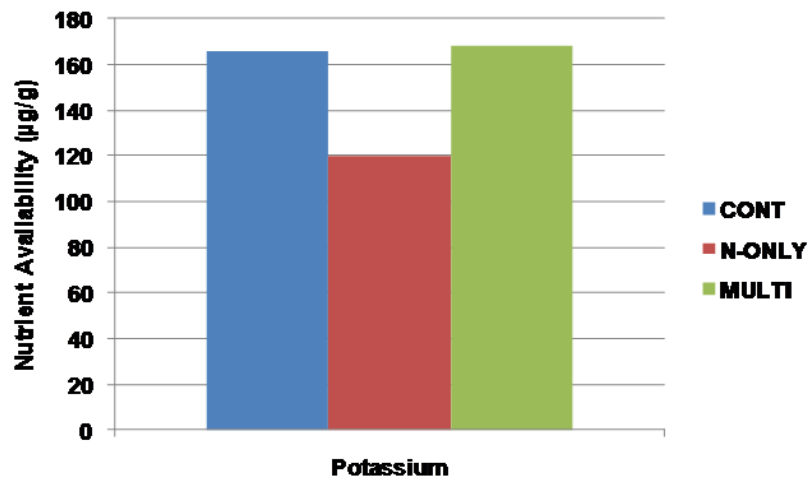
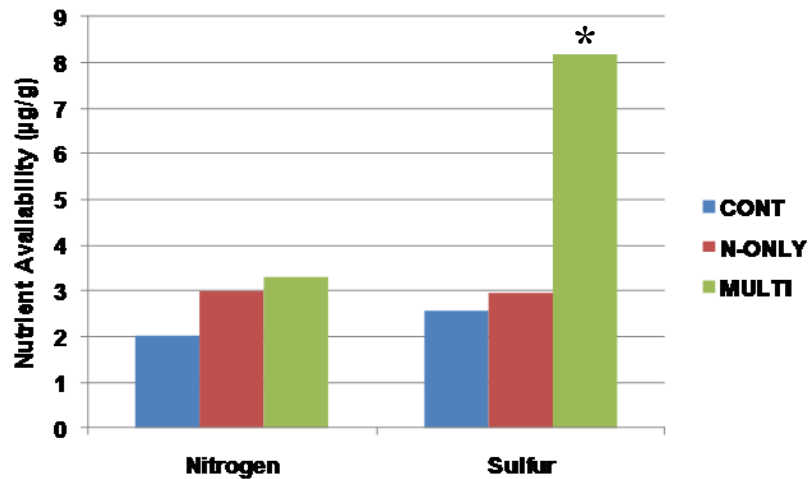


# 2009 FIELD MEASUREMENTS

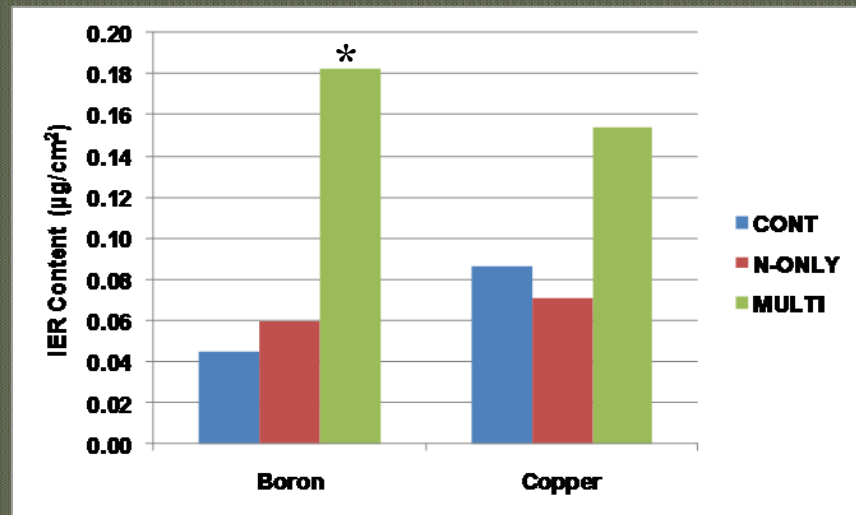
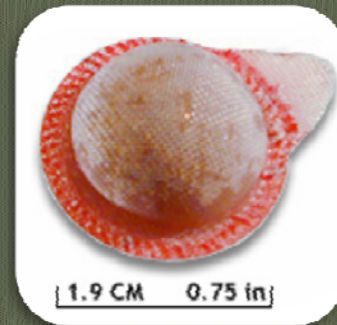
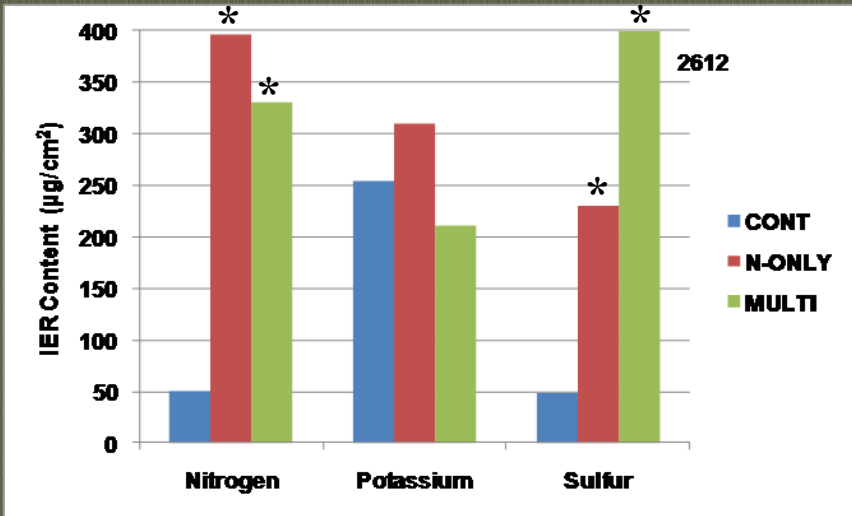
- 1-Yr Post-Fertilization
  - Soil Chemistry
  - Soil Ion Exchange Resins
  - Foliar Nutrition
  - Seedling Caliper & Height
  
- 2-Yr Post-Planting Seedling Vigor & Mortality



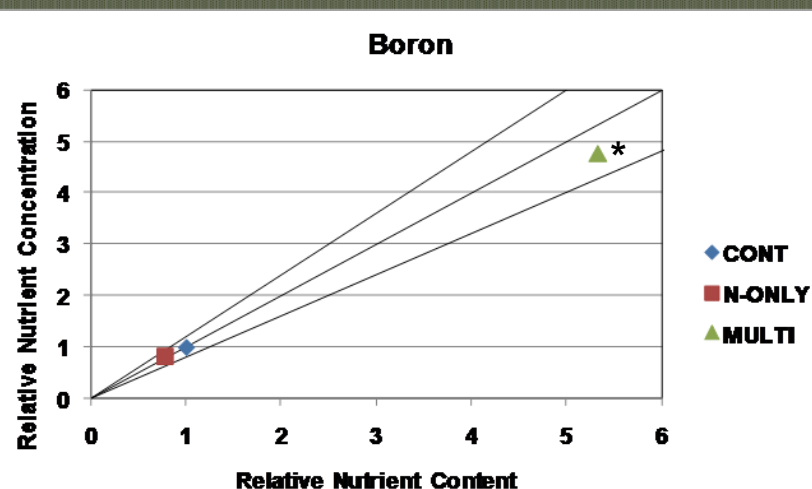
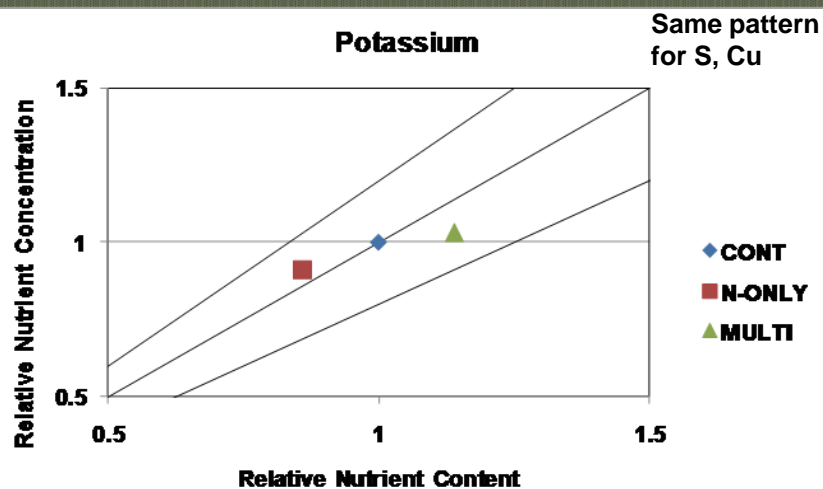
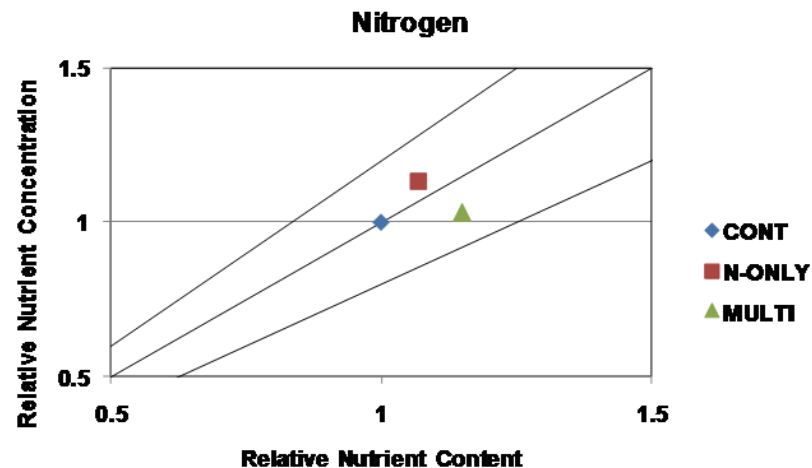
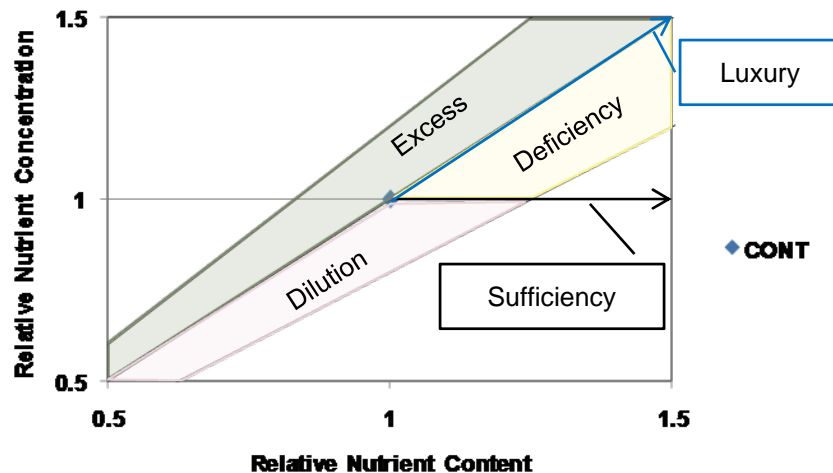
# 1-YR POST TREATMENT SOIL CHEMISTRY



# 1-YR POST TREATMENT ION EXCHANGE RESIN INDICES

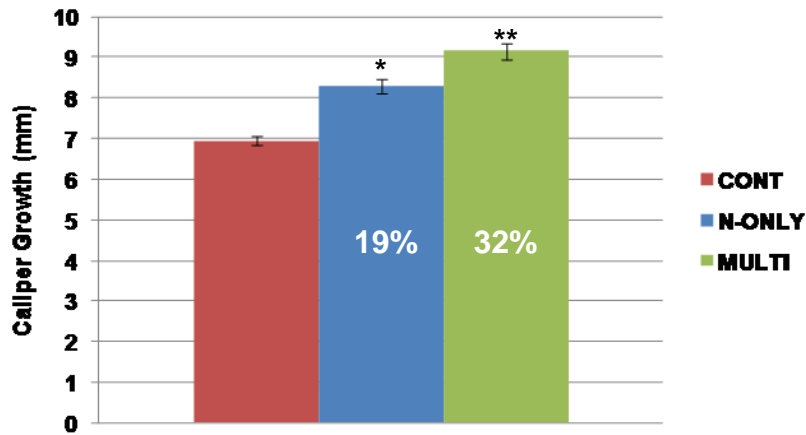


# 1-YR POST TREATMENT FOLIAR VECTOR DIAGRAMS

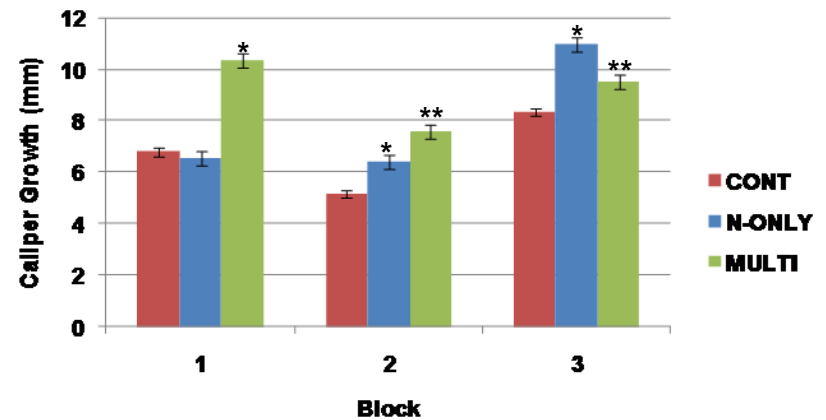


# 1-YR POST TREATMENT SEEDLING CALIPER & HEIGHT

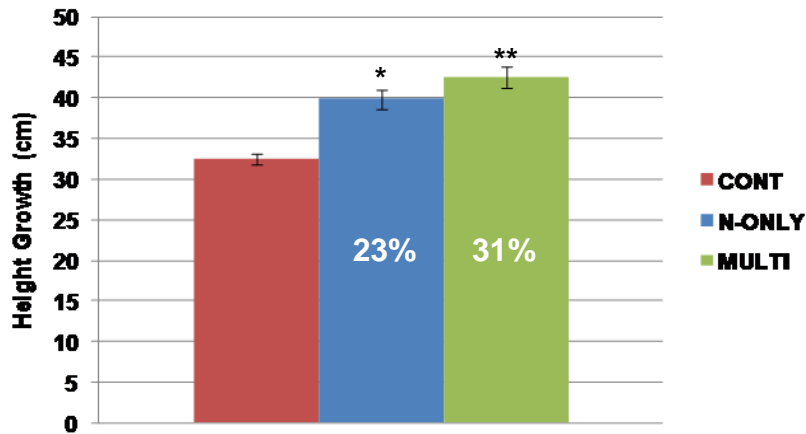
YR 1-2 Caliper Growth Across Blocks



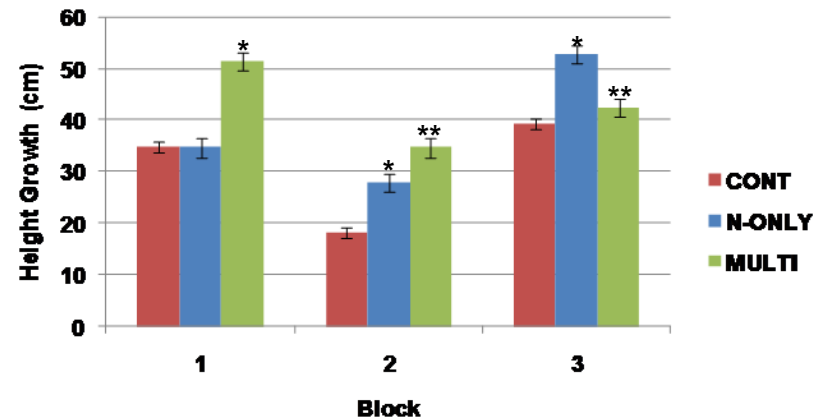
YR 1-2 Caliper Growth By Block



YR 1-2 Height Growth Across Blocks



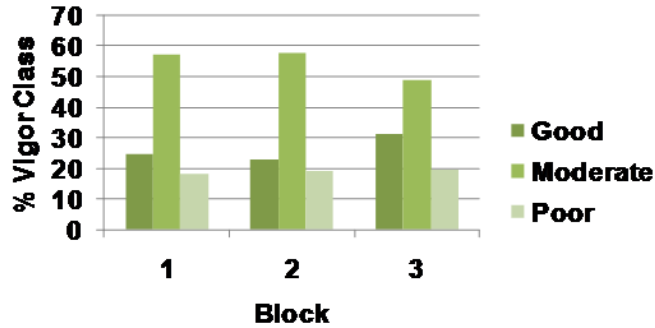
YR 1-2 Height Growth By Block



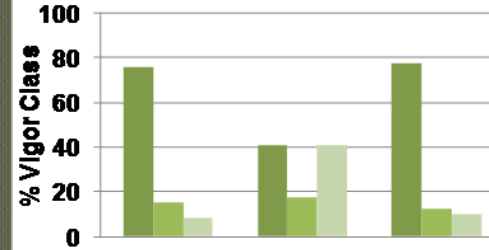


# 2-YR POST PLANTING SEEDLING VIGOR

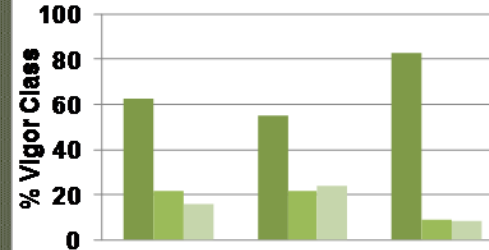
YR1 - ALL TREATMENTS



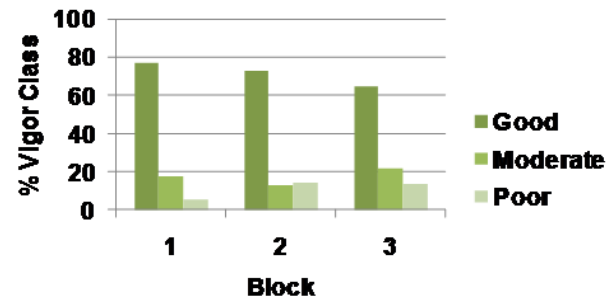
YR2 - CONT



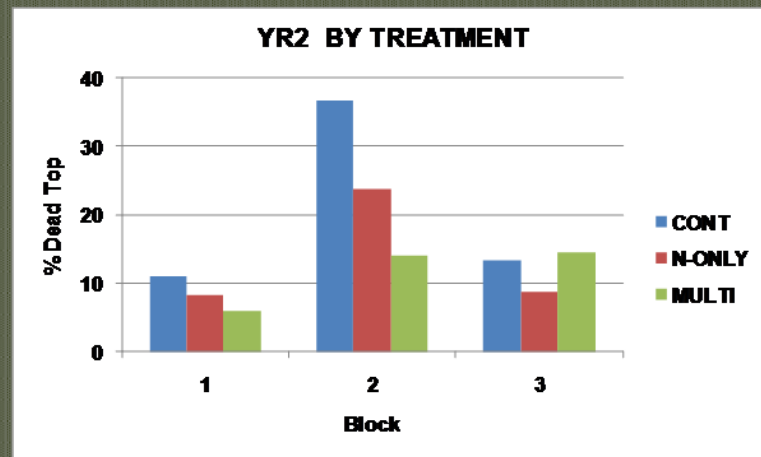
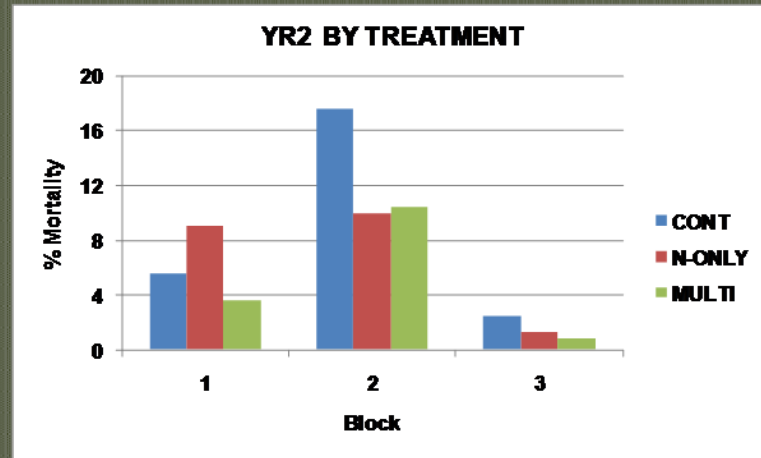
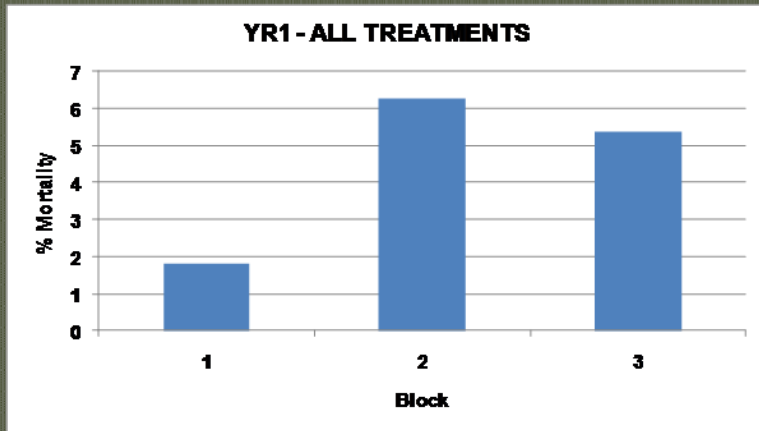
YR2 - N-ONLY



YR2 - MULTI



# 2-YR POST PLANTING SEEDLING MORTALITY & TOP KILL






## 2-YR SUMMARY PRELIMINARY FINDINGS

- Standard soil chemistry indicates that N has been immobilized 1 YR after fertilization
- Ion exchange resins indicate that N fertilizer entered soil solution, but vector diagrams do not reflect significant N uptake into the foliage
- Strong foliar response to B amendments suggests high site B deficiency





## 2-YR SUMMARY PRELIMINARY FINDINGS

- Block 1 showed no N-Only treatment growth effect
  - Block 2 showed the highest mortality, lowest vigor, and smallest caliper and height growth across all treatments
  - Growth on multi-nutrient applications generally outperformed N-Only treatments – Block 3 excepted
  - Overall caliper and height fertilizer growth response relative to control:
    - N-Only = 19% caliper, 23% height
    - Multi = 32% caliper, 31% height
- 



# FUTURE SYLVIS WORK

- Summer 2010: Vegetation Control (if necessary)
  - Fall 2010: 3-Year Growth Monitoring
    - (height, caliper, defect, vigor, crown estimates)
  - Spring 2011: Vegetation Control (if necessary)
  - Fall 2011: 4- Year Growth Monitoring
  - Fall 2012:
    - Thinning and Lynx/Hare Habitat Assessment
    - 5-year Re-fertilization
    - 5-year Growth Monitoring
- 