Forest Restoration in Dry Pine Forests

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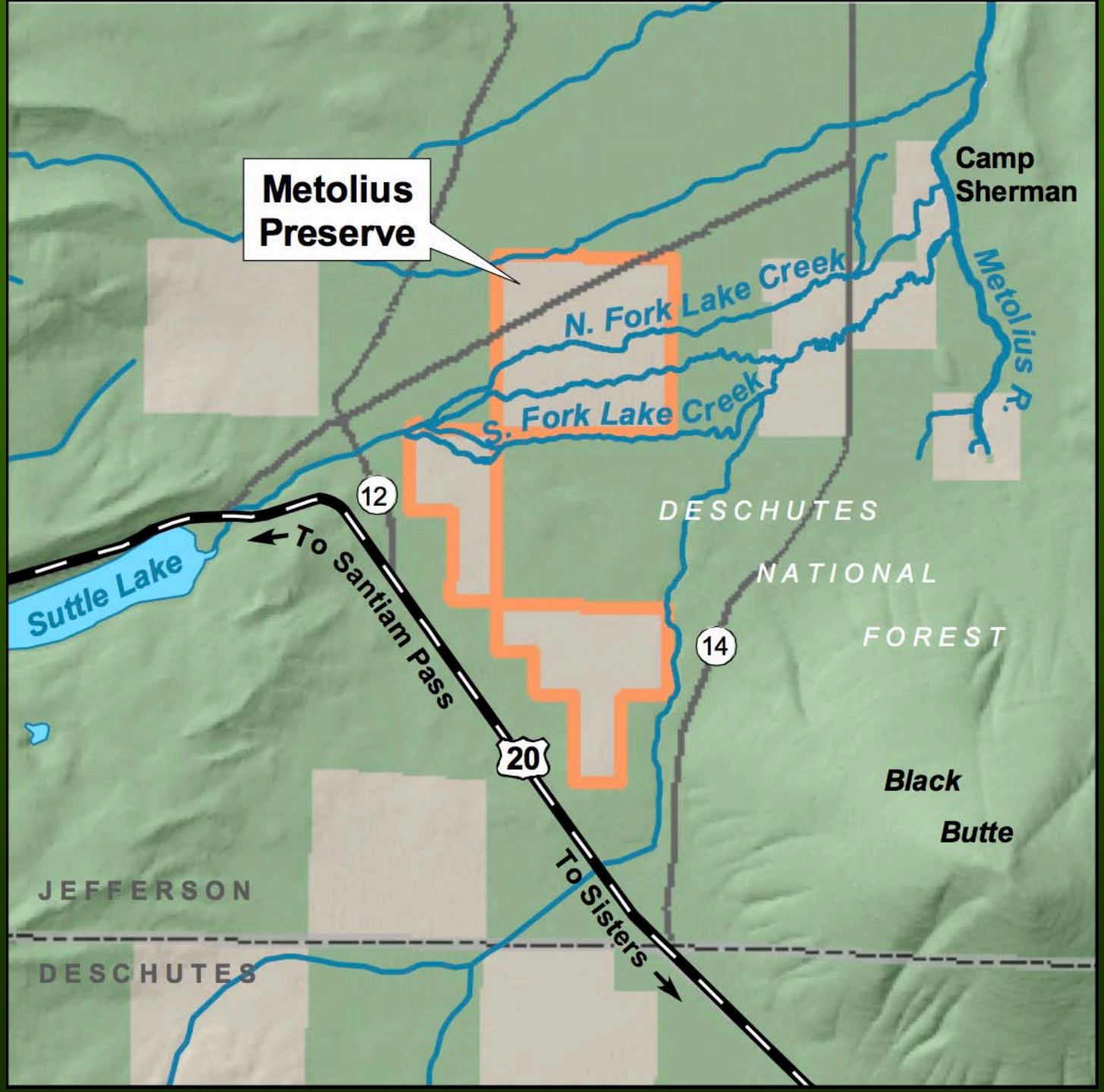
To keep every cog and wheel is the first precaution of intelligent tinkering

Aldo Leopold


Metolius Preserve
Camp Sherman
N. Fork Lake Creek
S. Fork Lake Creek
Metolius R.
12
Suttle Lake
To Santiam Pass
DESCHUTES
NATIONAL
FOREST
14
20
Black
Butte
To Sisters
JEFFERSON
DESCHUTES

Target desired features for dry ponderosa pine stands on the Metolius Preserve

- Ponderosa pine dominance
- Unevenage structure prevalent (group-wise common, 16+ age classes)
- Prevalence of large tree structure (trees > 20 inch DBH)
- Diverse spatial tree patterns at multiple scales
- Large snags, low densities 1-4 snags/acre
- Low volumes of down wood (1-3 tons per acre)
- Native grass/forb dominated understory
- Low duff/litter accumulation

Desired future disturbance processes for dry ponderosa pine stands on the Metolius Preserve

- **Bark Beetles** (individual tree and small group mortality)
- **Sap and heart rot fungi, cankers**
- **Animal** (scattered porcupine/squirrel tree deformation)
- **Fire** (both prescribed and natural low intensity/severity)
- **Wind/snow/lightning**

Current Condition

Starting Conditions

1- Density: 250+ Trees/Acre >5”dbh, 120 ft2/acre

2- Tree Size: 10” dbh

3- Evenaged

4- Composition: Overstory Ponderosa Pine (90%), remainder DF and GF

5- Very few snags (<1 per acre)

Mosaic Thinning

- **Density Reduction**

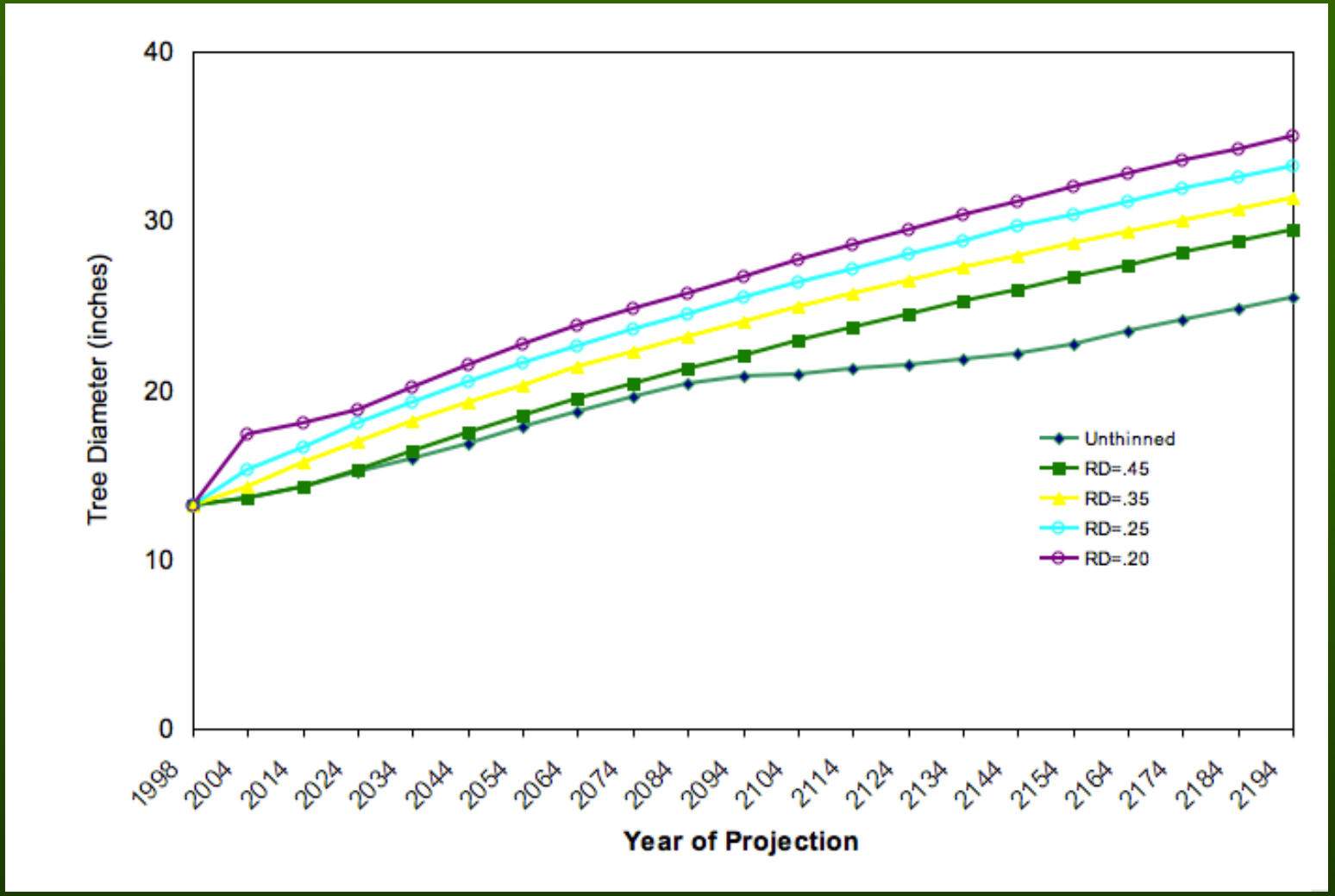
  - Release of dominants and co-dominant ponderosa pine and Western larch
  - Reduce high intensity/severity fire behavior by raising crown base, removing ladder fuels and decreasing crow bulk density
  - Reduce large-scale bark beetle mortality and resulting fuel buildups


Precommercial Thin in the 1970s

Mosaic Thinning

- Density Reduction
- **Create variable patterns of tree distribution**

  - Variable tree release (maximize increment in some trees, maintain optimal stand growth in others)



The Projected Effect of Thinning to Different Densities on Growth of Ponderosa Pine

Growth projection using Forest Vegetation Simulator (FVS)

Mosaic Thinning

- Density Reduction
- **Create variable patterns of tree distribution**

  - Variable tree release (maximize increment in some trees, maintain optimal stand growth in others)

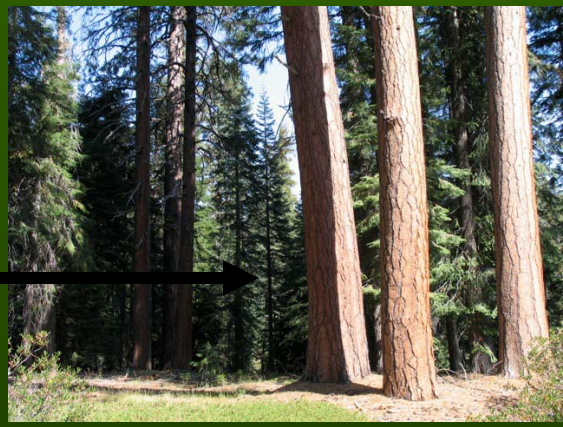
  - Wildlife habitat structure

  - Increase variation of understory light environment

  - Reduce active crown fire behavior?

Mosaic Thinning

- Density Reduction
- Variable patterns of tree distribution
- **Tree variability spatial-scales**
  - **Clump**
  - **Group**
  - **Openings**

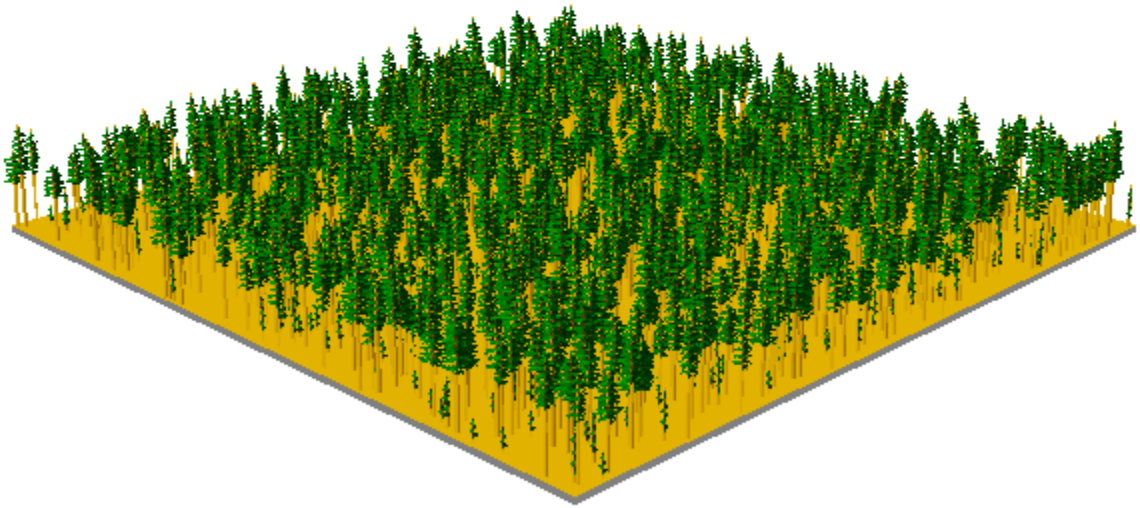


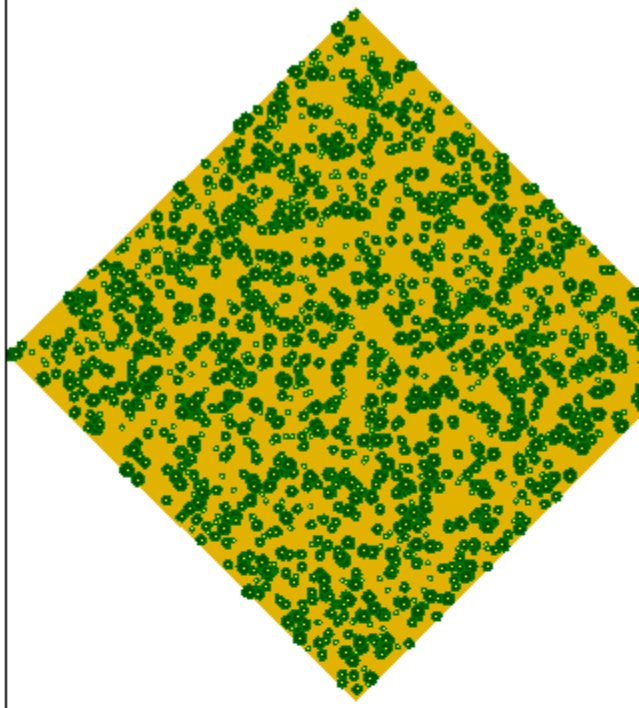
Mosaic Thinning

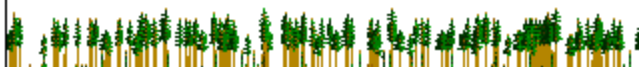
- Density Reduction
- Create variable patterns of tree distribution
- Tree variability at two spatial-scales
- **Initiate new tree cohorts**

Starting Conditions

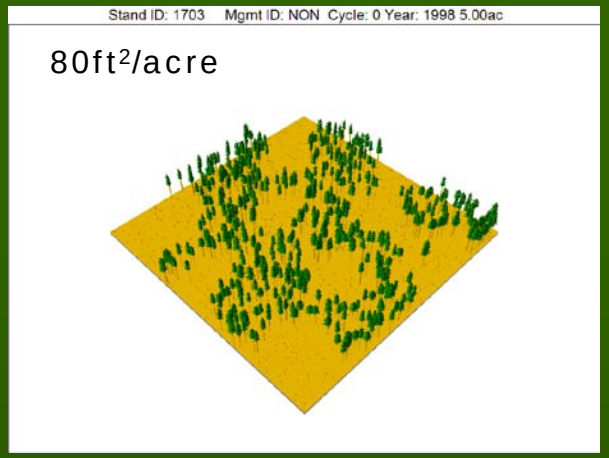
Five-acre 60-year old evenage pine stand

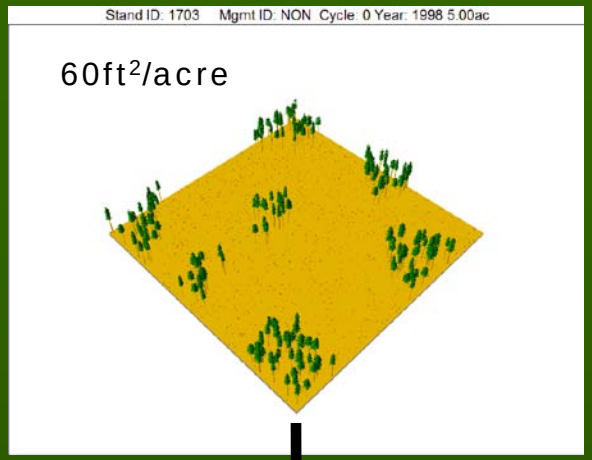


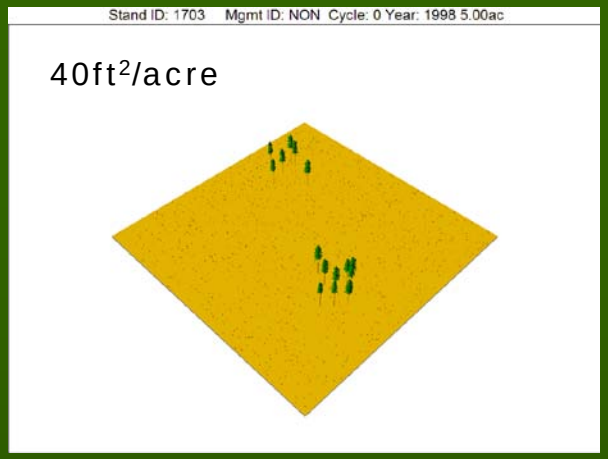


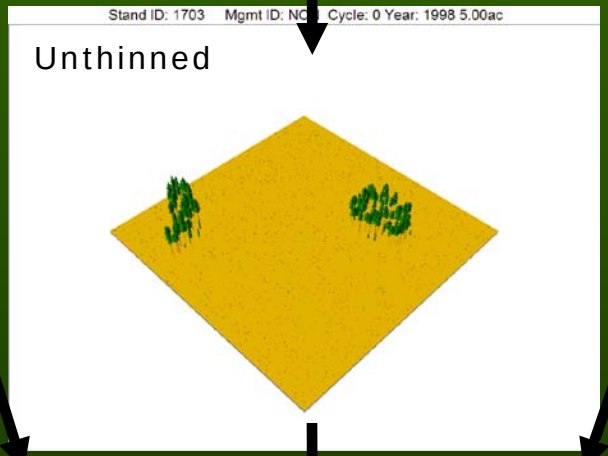


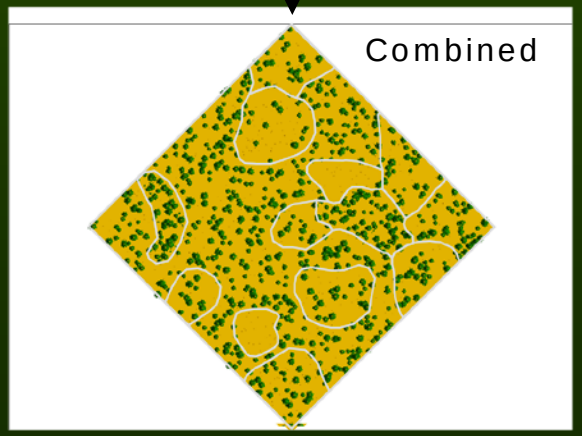
Graphics created with Stand Visualization System (SVS)











Mosaic Thinning Overlays

Treatment Groups

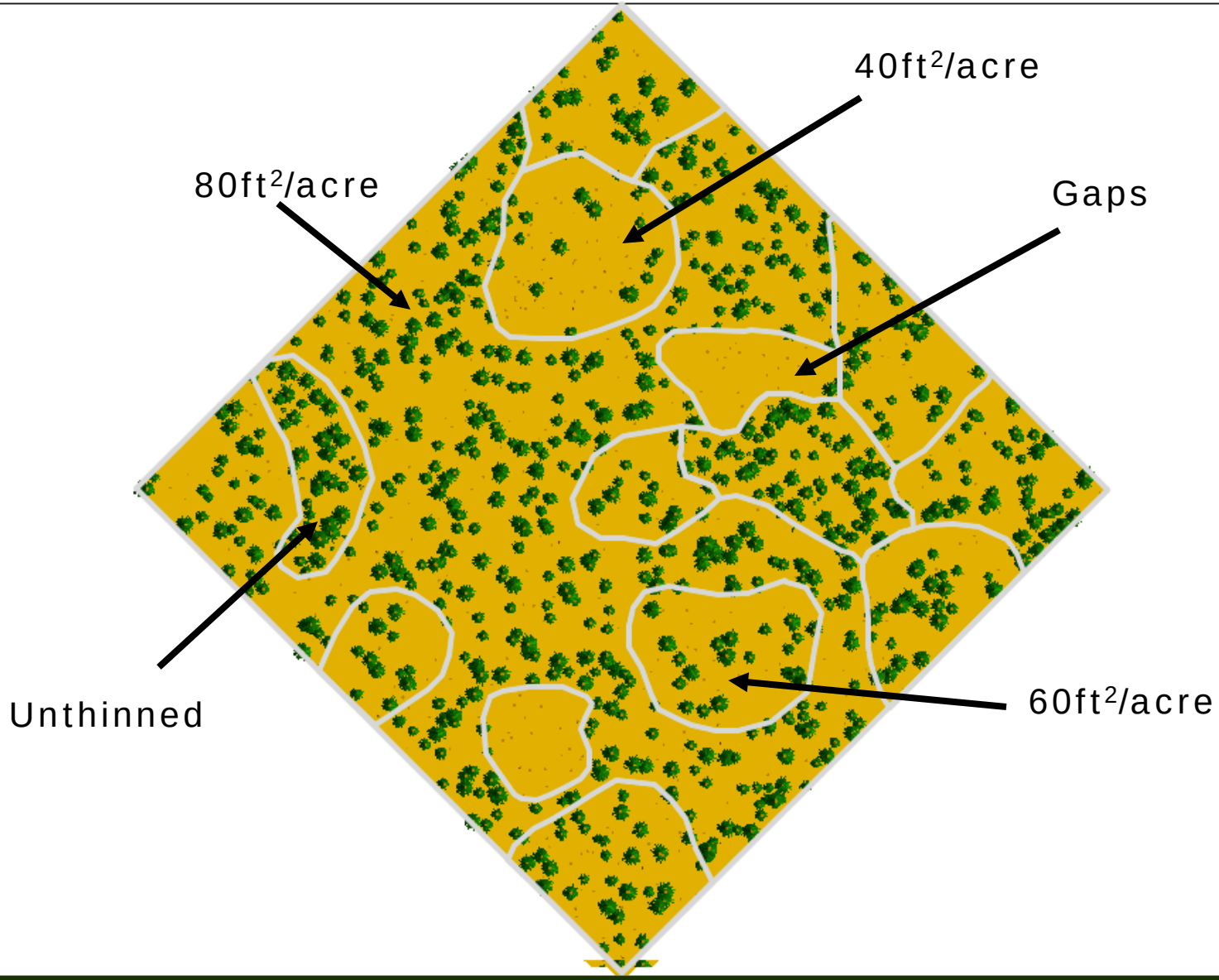
- 80ft²/Acre (50% area)
- 60ft²/Acre(25%)
- 40ft²/Acre(10%)
- Unthinned (10%)
- Gaps (5%)

Patch Size

- 1/10-1/2 acre

Patch Shape and Pattern

- Vary with site

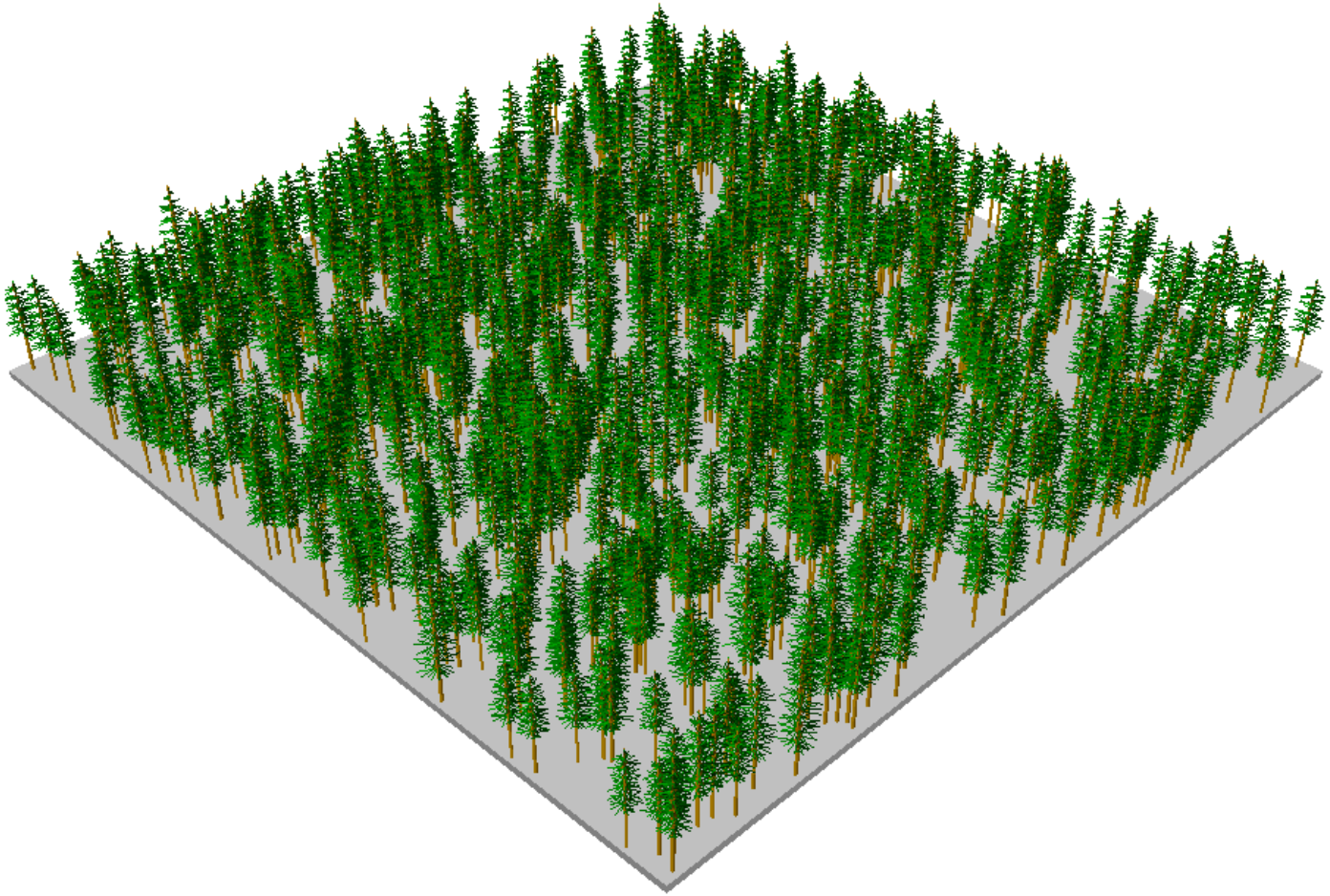


Mosaic Thinning -All Treatment Groups Combined on 5-Acre Plot

Stand ID: 1703 Mgmt ID: NONE Cycle: 0 Year: 1998 5.00ac

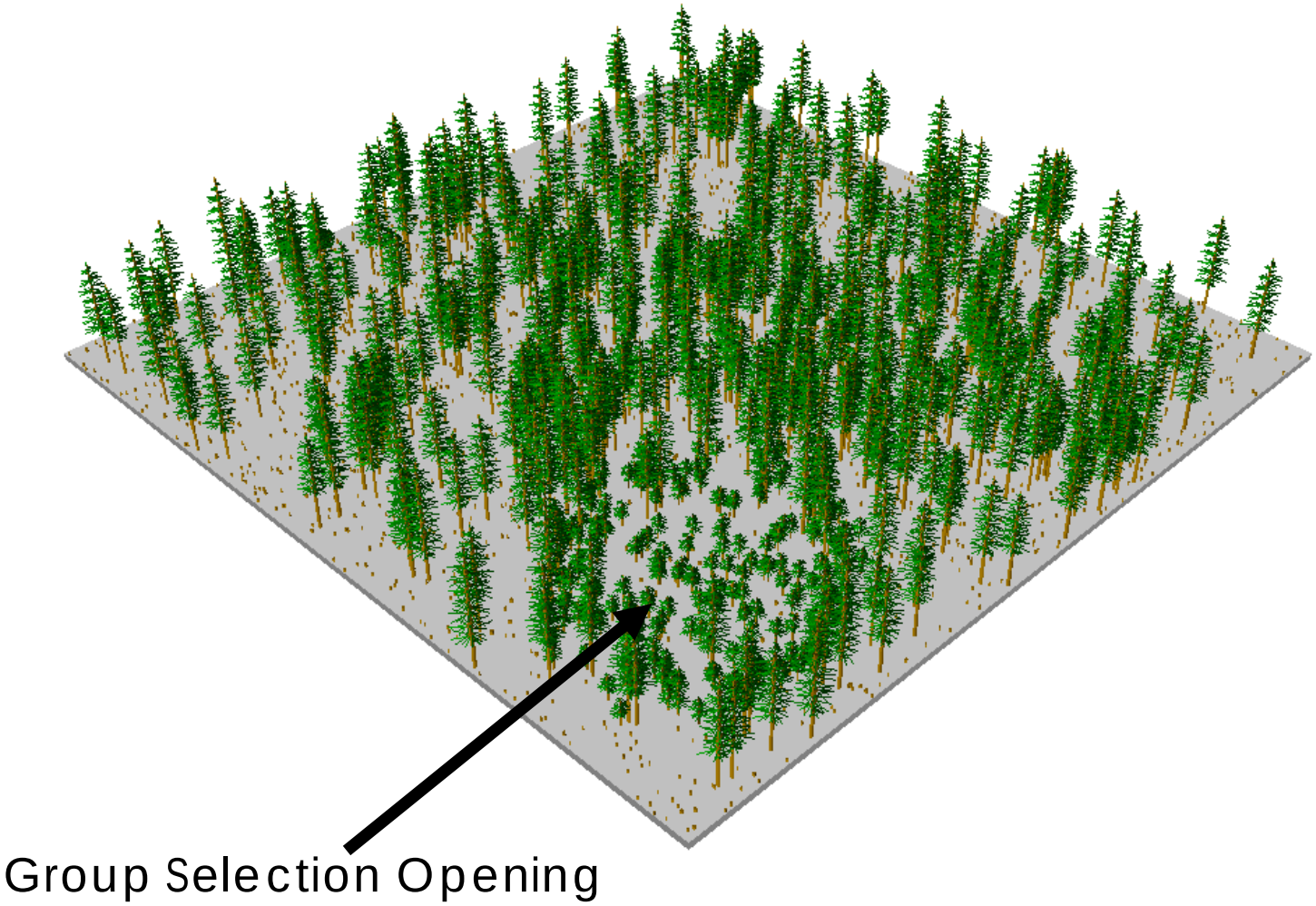
60-Year Old Ponderosa Pine Stand

Year 1 Pre-Treatment

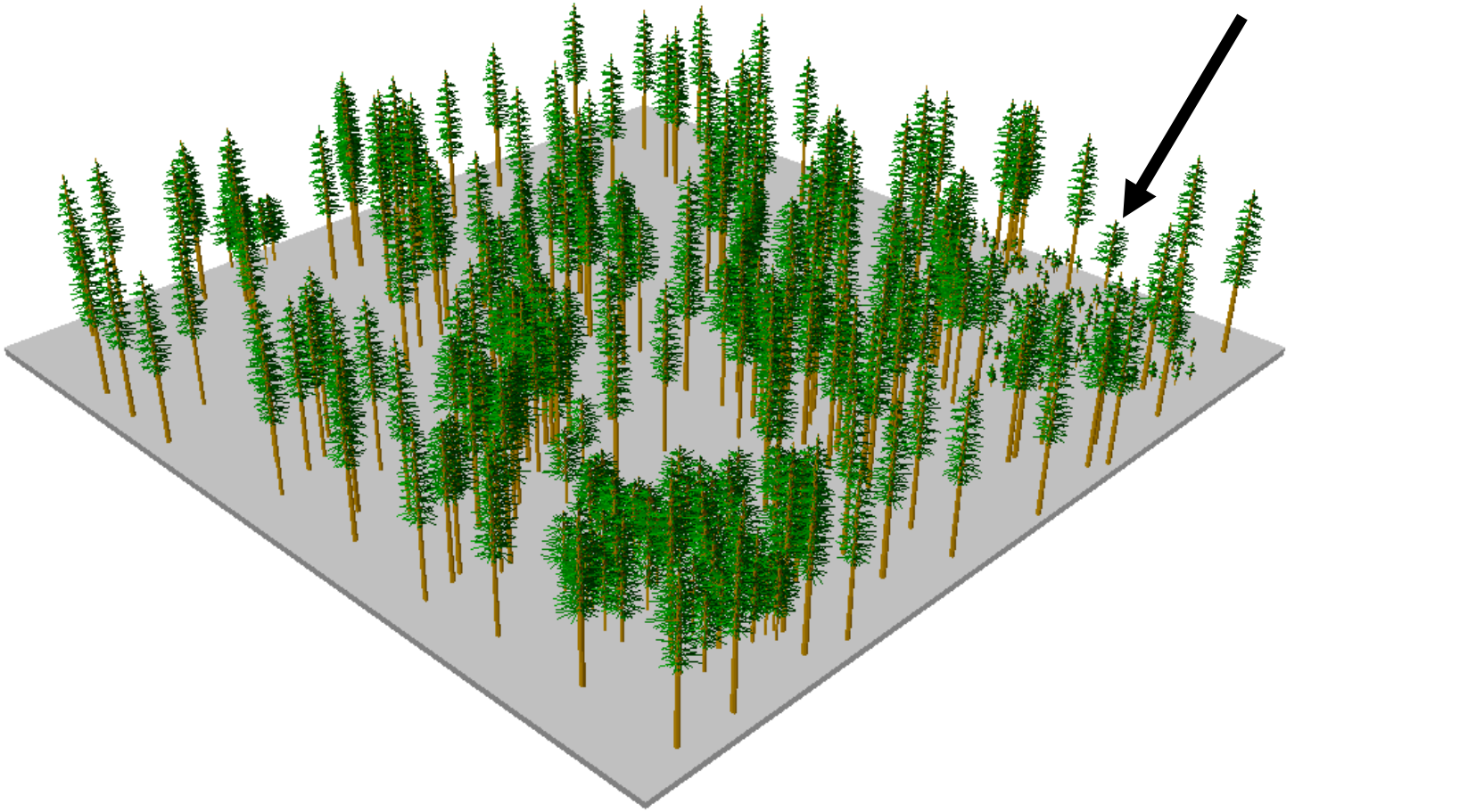


Stand ID: 1703 Mgmt ID: NONE Cycle: 0 Year: 1998 5.00ac

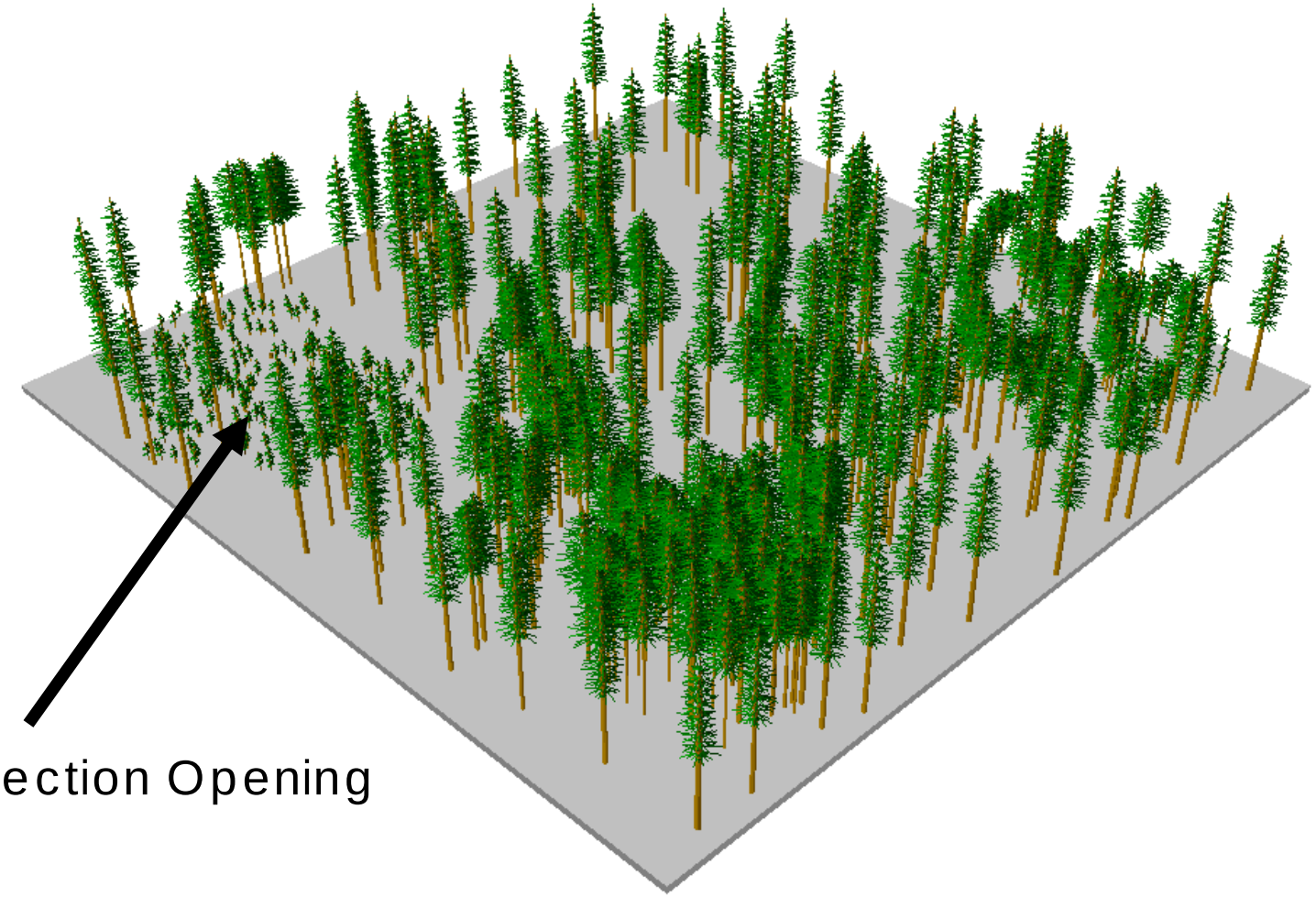
Year 1 Post-Treatment



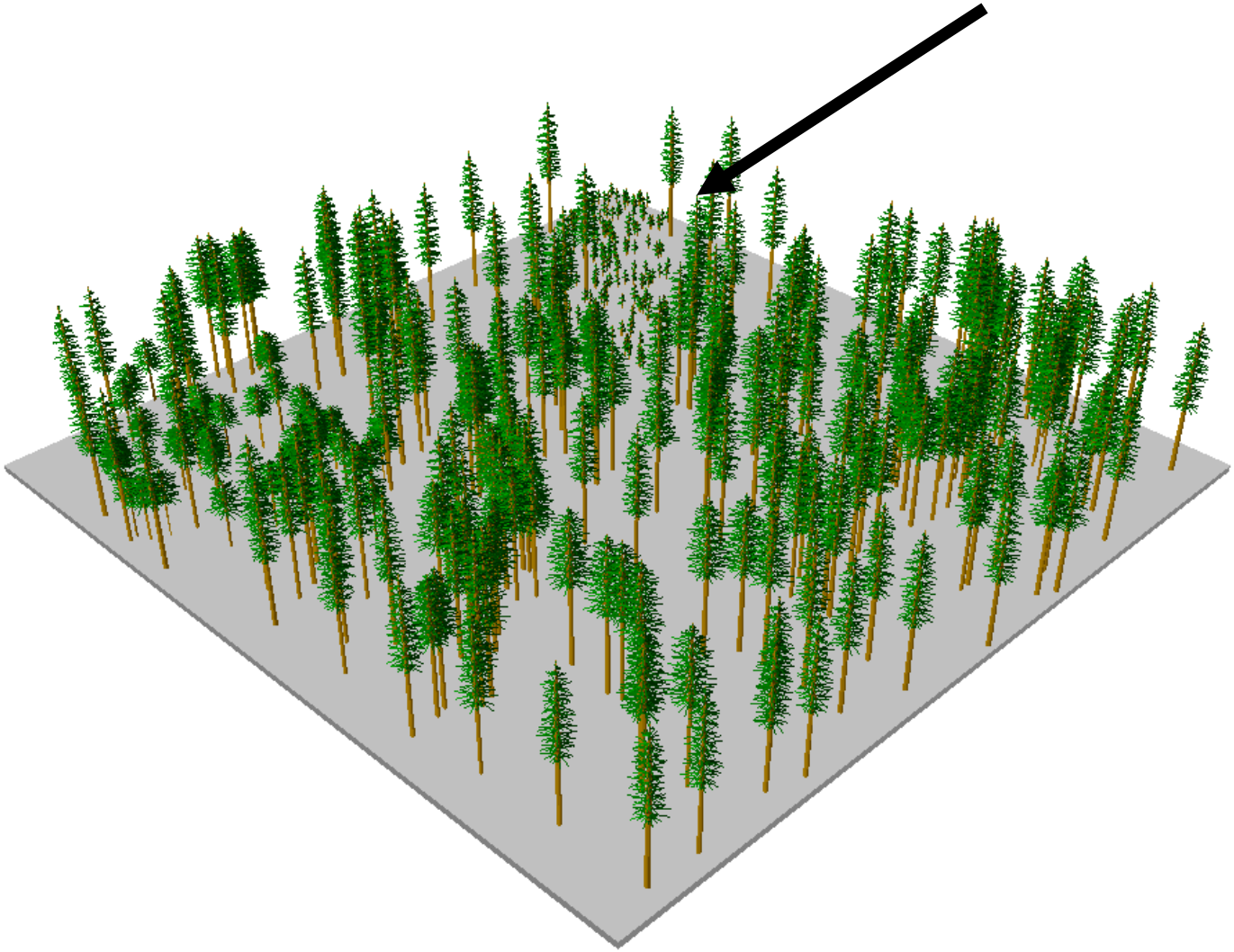
Year 50 Post-Treatment



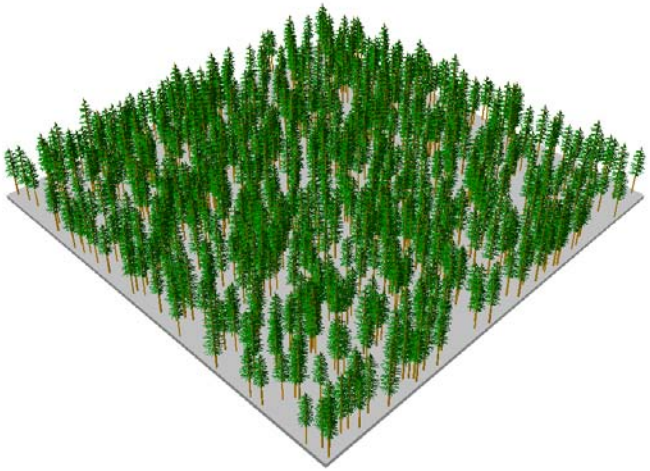
Year 100 Post-Treatment



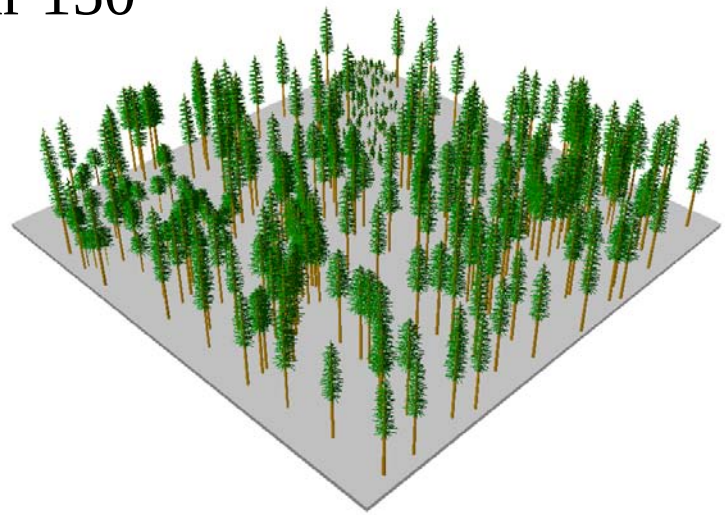
Year 150 Post-Treatment



Year 1



Year 150



Harvester-Processor

Log Forwarder

Unthinned

Thinned

Glaze Unit 1 Pre Thinning
NAIP 2009 Imagery

Glaze Unit 1 Post Thinning
NAIP 2011 Imagery

Snag Creation Trials at the Metolius Preserve

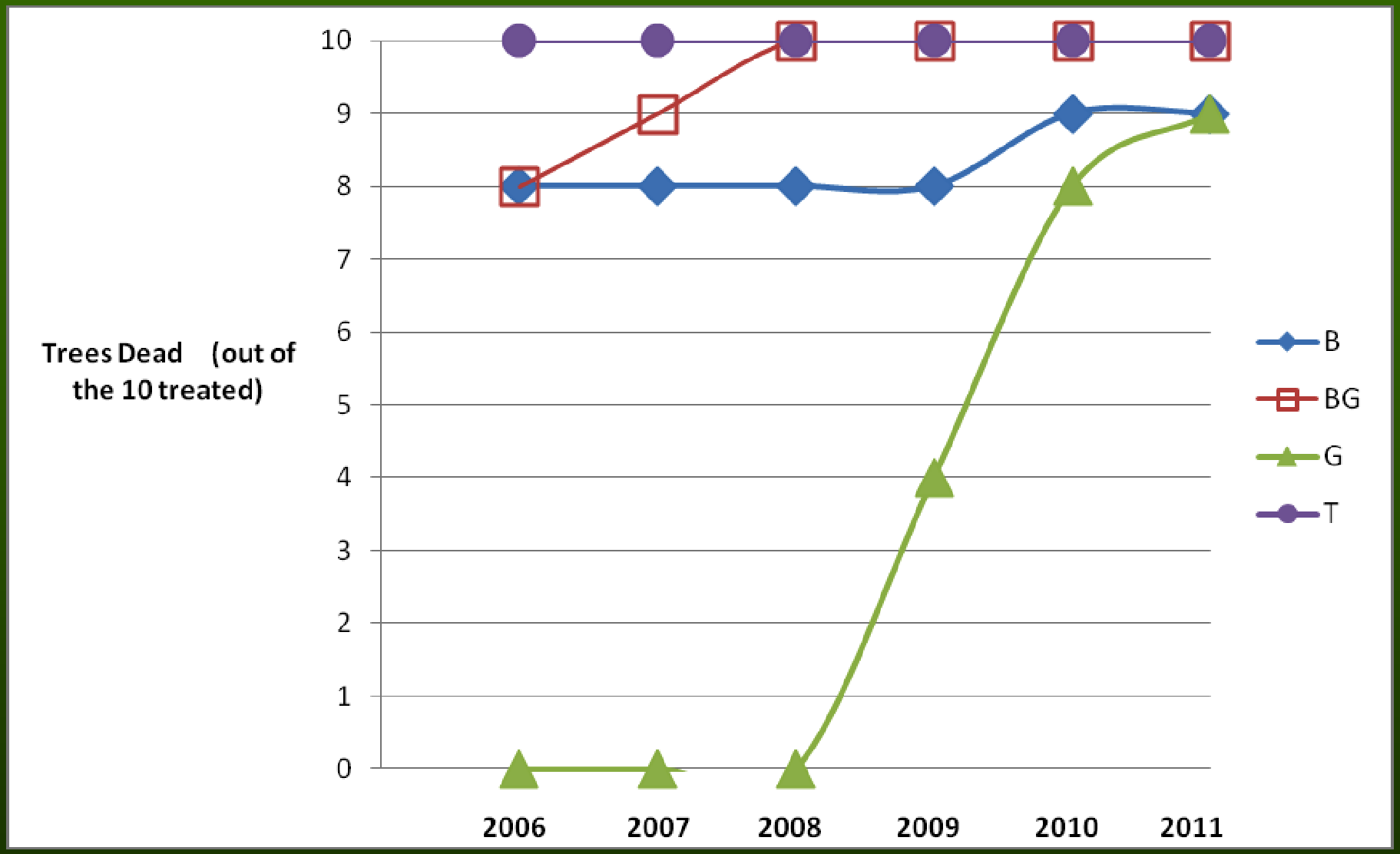
In 2006, three snag creation treatments were applied:

1- Tree topping using a harvester *(23 trees)*

2- Girdling at tree base *(10 trees)*

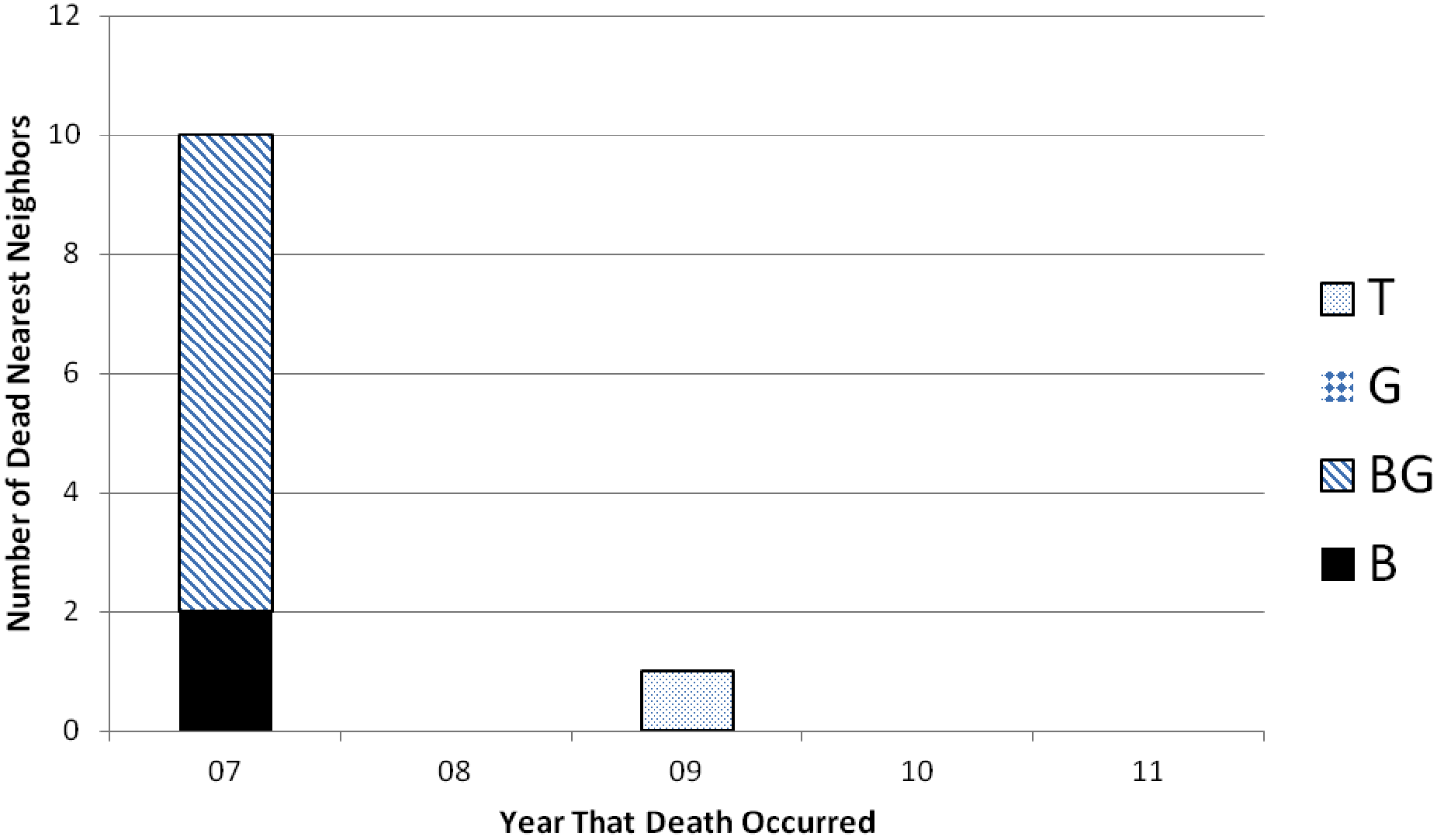
3- Pheromones *(10 trees)*

4- Pheromones & Girdle *(10 trees)*



Tree Mortality by Treatment Type

B=Bait, BG=Bait/Girdle, G=Girdle, T=Top



Nearest Neighbor Mortality

B=Bait, BG=Bait/Girdle, G=Girdle, T=Top

Snag Creation at the Metolius Preserve

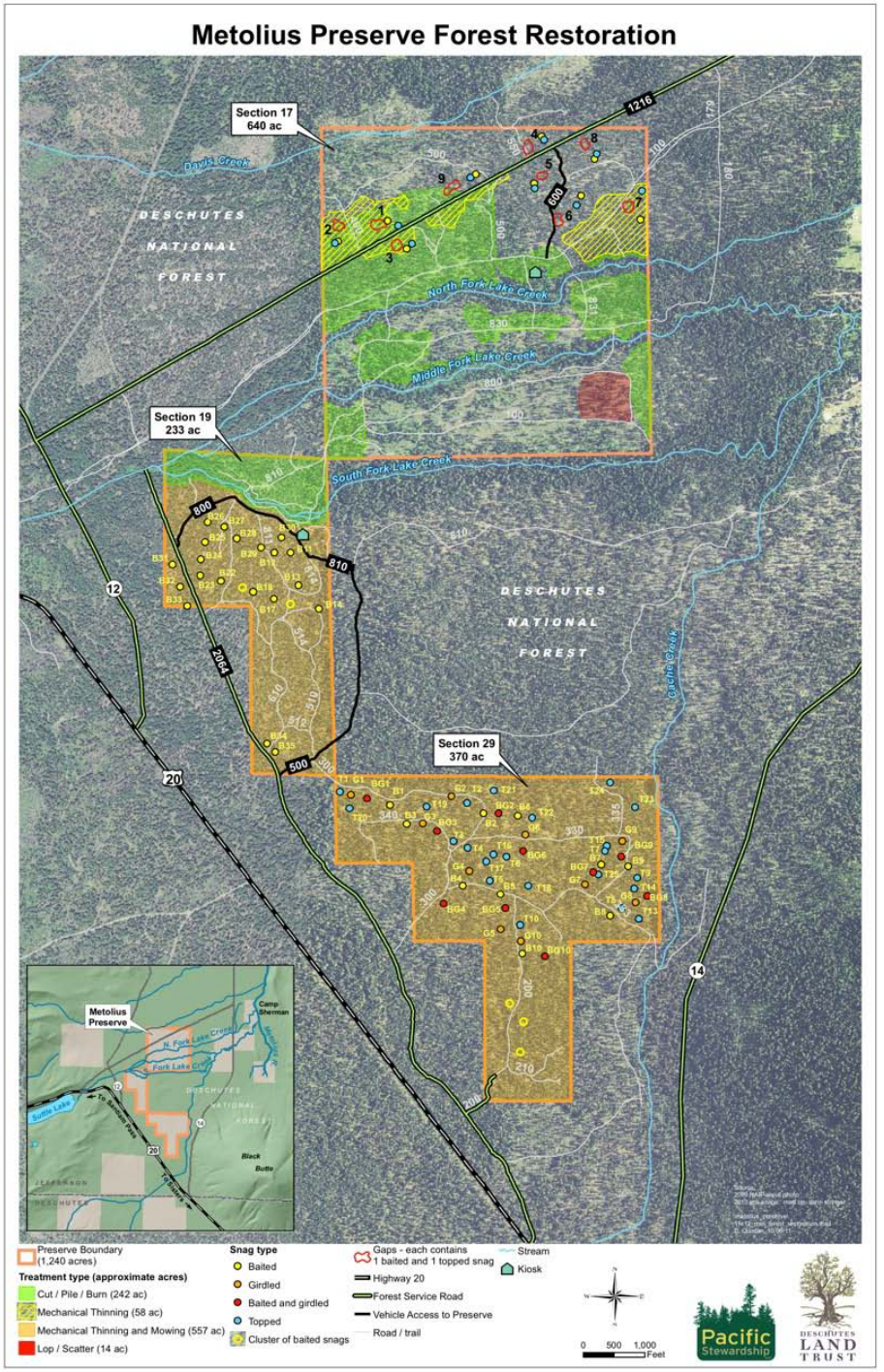
2005/06 - 25 trees topped

2006 - 30 trees baited/ girdled/bait & girdled

2008 - 25 trees baited

2009 - 15 trees baited (in groups)

2011 - 18 trees topped/18 baited




Thanks!
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