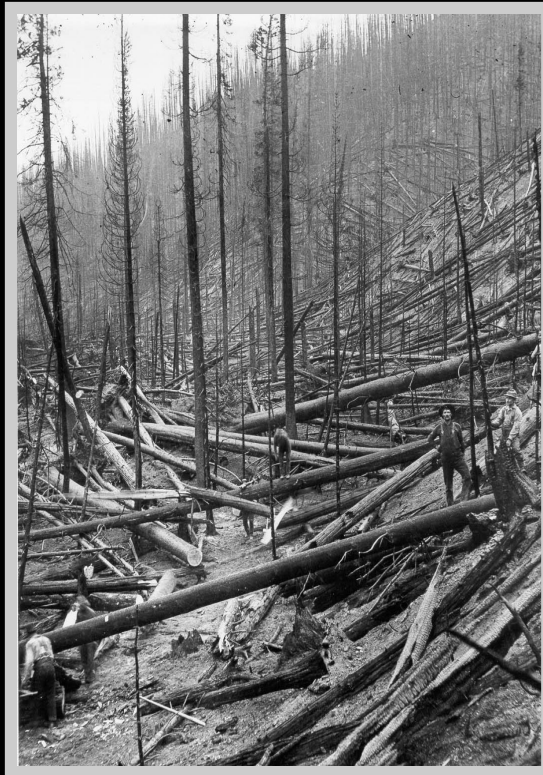
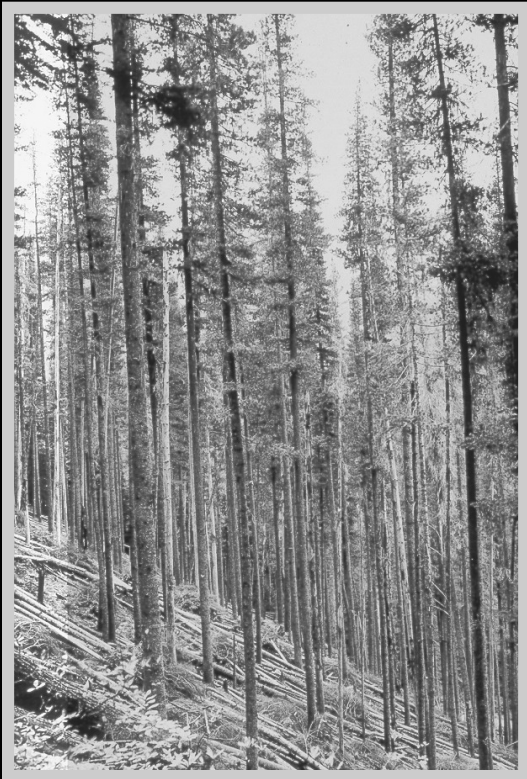


Balance of Canopy Opening and Site Preparation to Successfully Regenerate Moist Mixed Conifer Forests



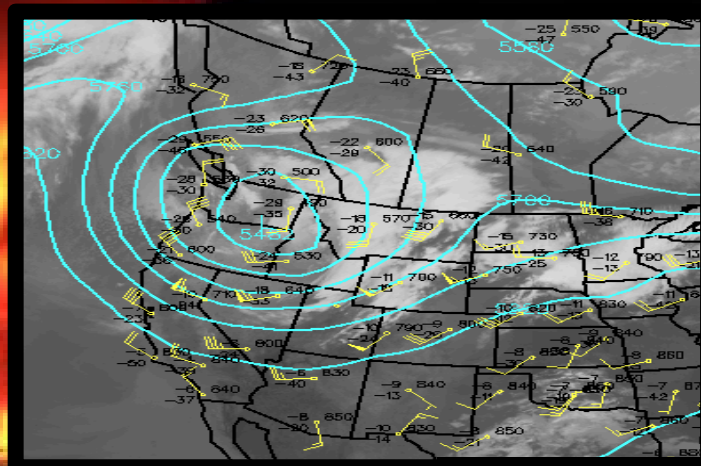
Terrie Jain
tjain@fs.fed.us



Diseases/Insects



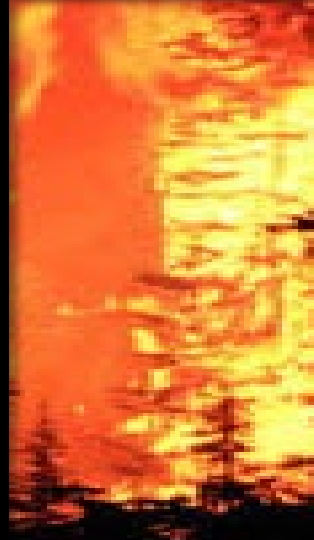
Mixed & Variable
Fire Regime



Climate



Topographic Diversity



Soils



Shade Tolerance



Regeneration

Competitive ability



Regeneration Establishment Phase

Gap

=/> 1 acre opening

Western hemlock

Western redcedar

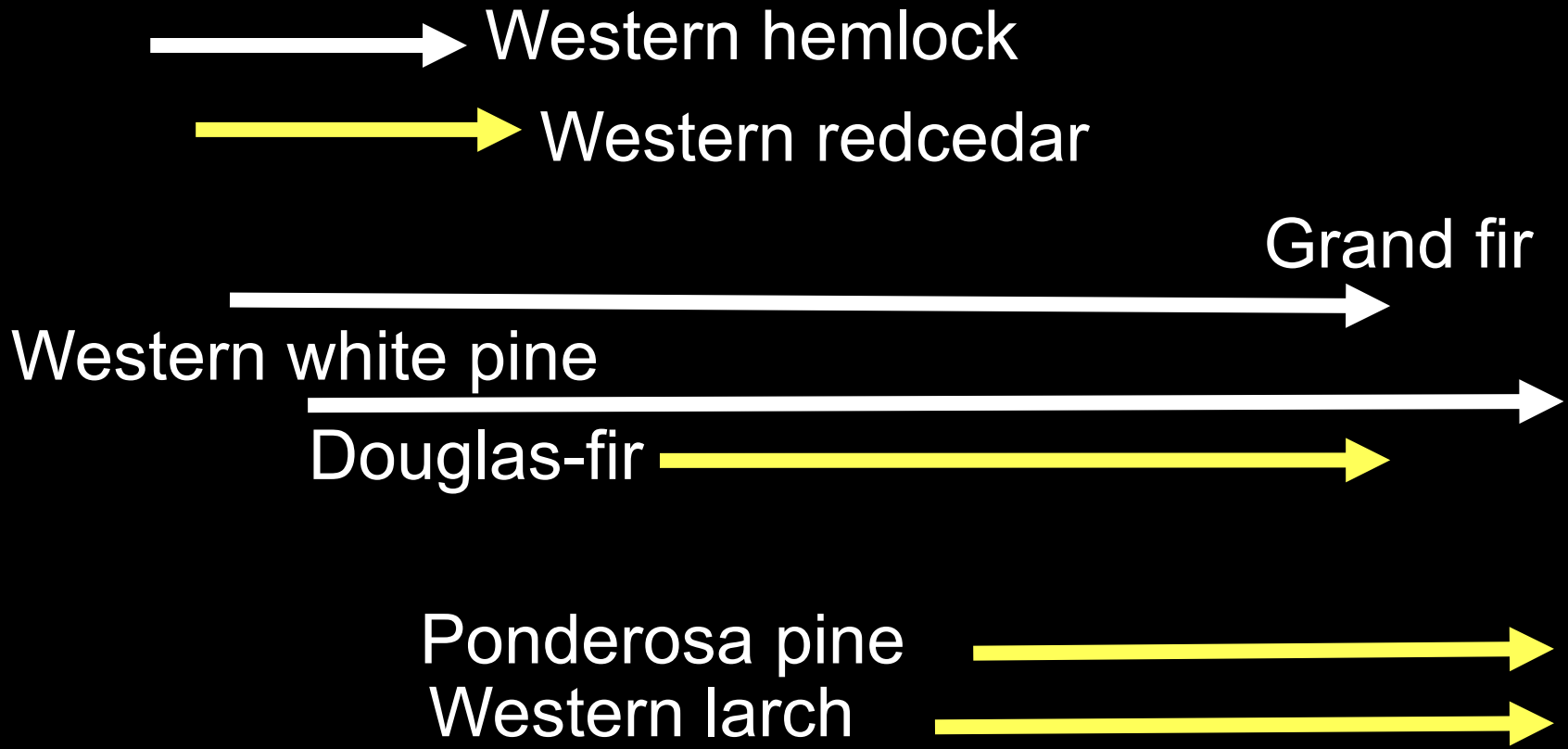
Grand fir

Western white pine

Douglas-fir

Ponderosa pine

Western larch





Species



Vigor



Canopy opening



Forest floor

Vigor

Species

Needle retention

Diameter/height

Density



eg., Keen, Hornibrook, Wellner, Graham

Canopy Opening



Occupancy



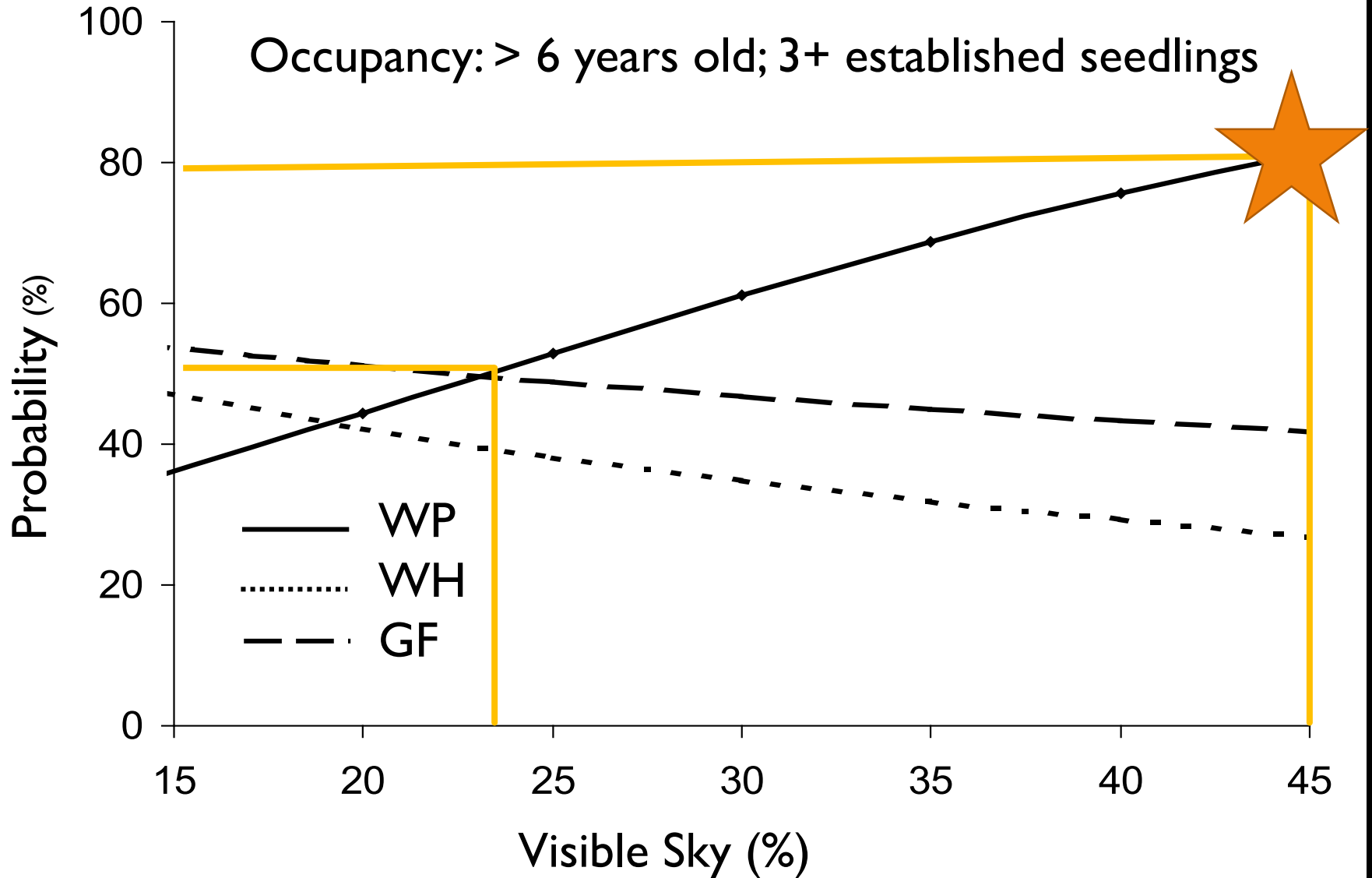
Optimum
Growth

Free-to-grow

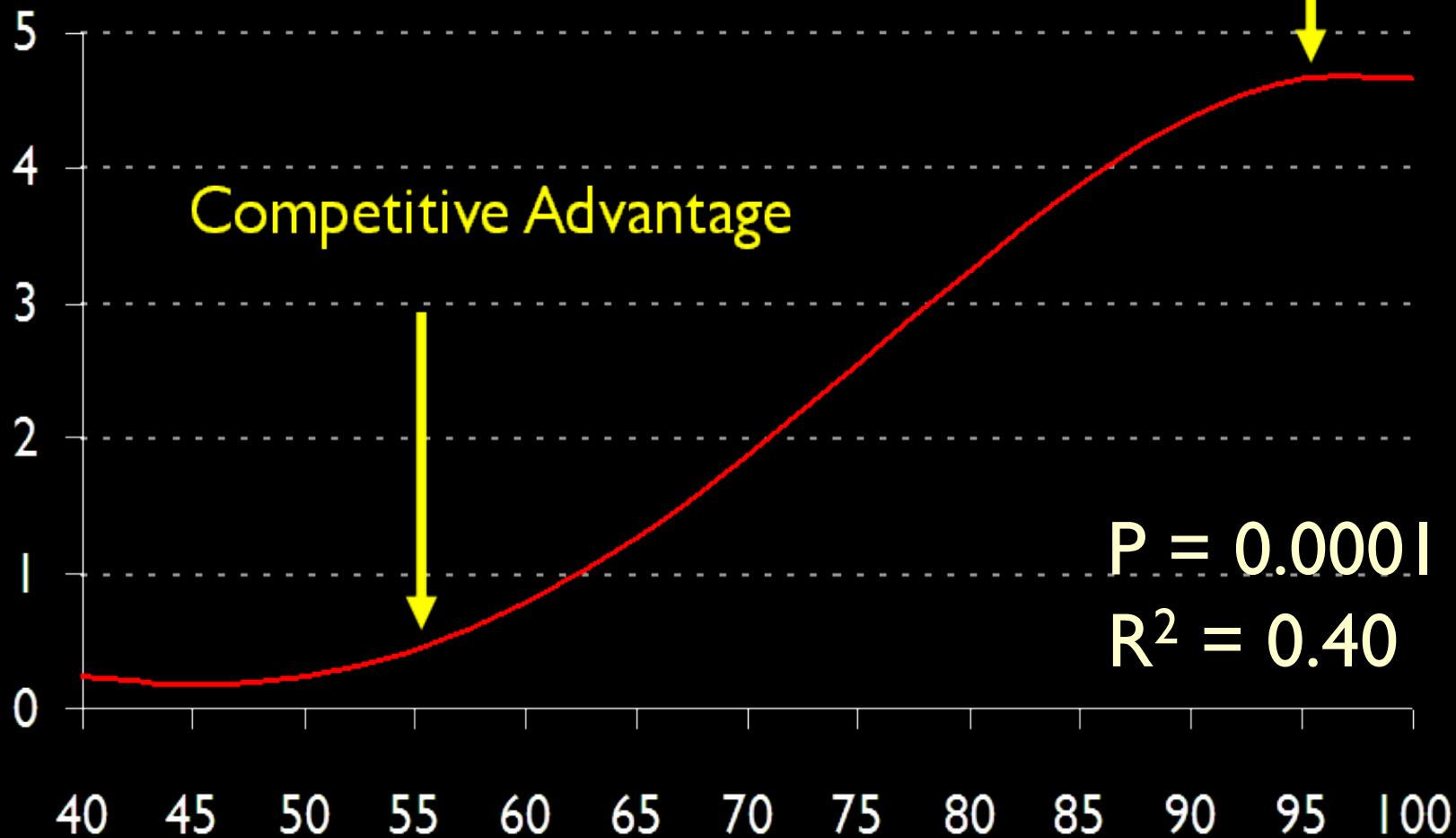


Competitive
Advantage

Probability of Regeneration Establishment (with current seed sources)



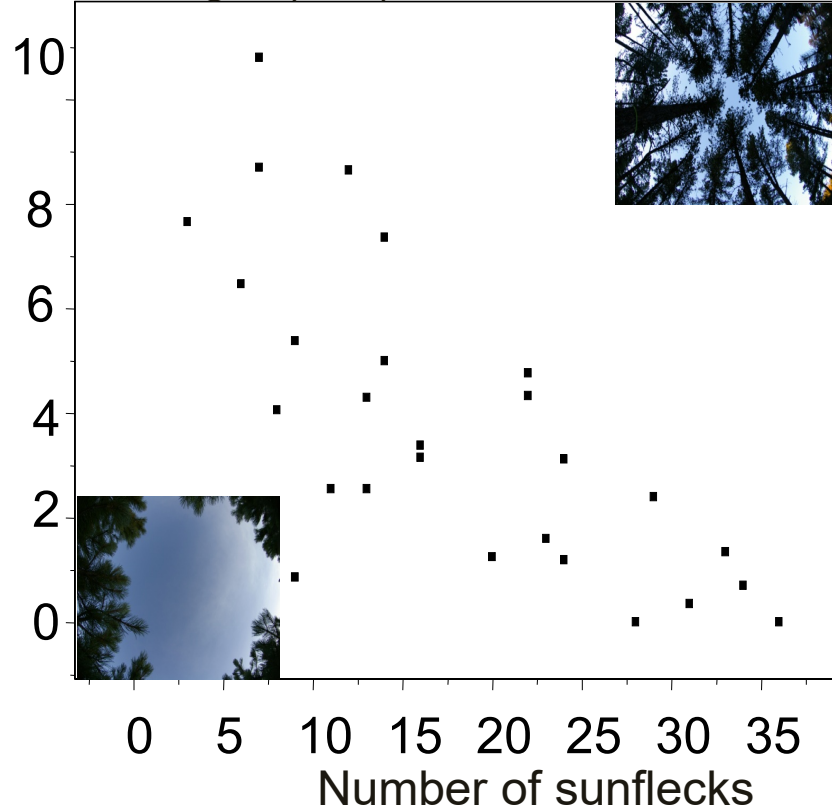
Mean Annual Increment
Height (in)



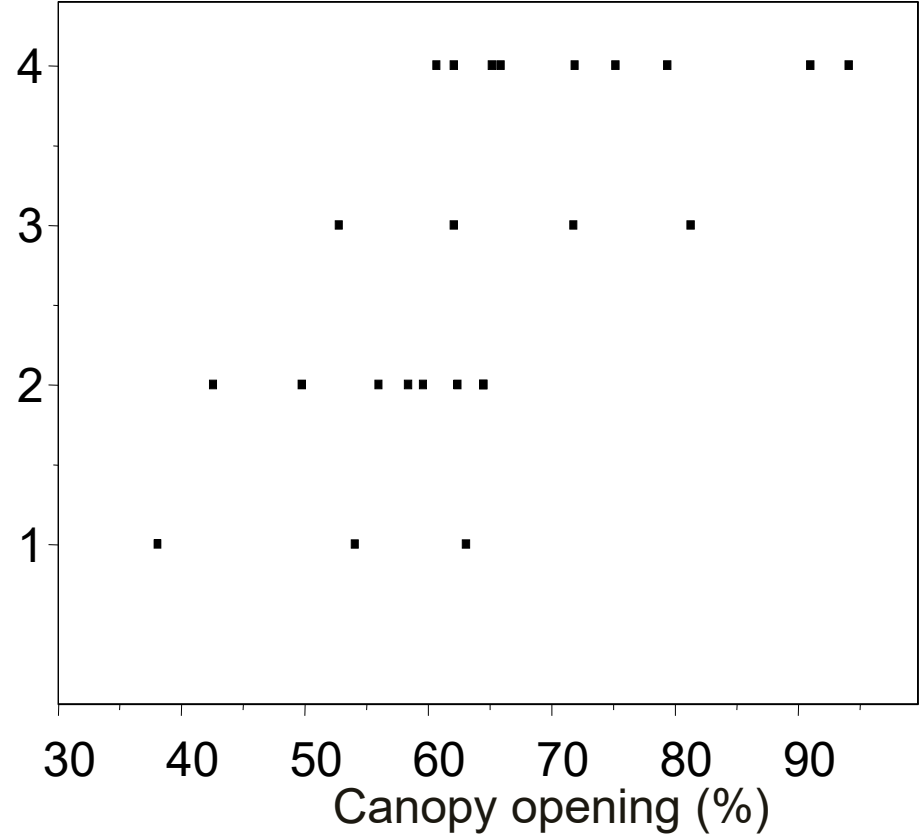
Canopy opening (%)

Height & Sun Fleck Abundance (10 years old)

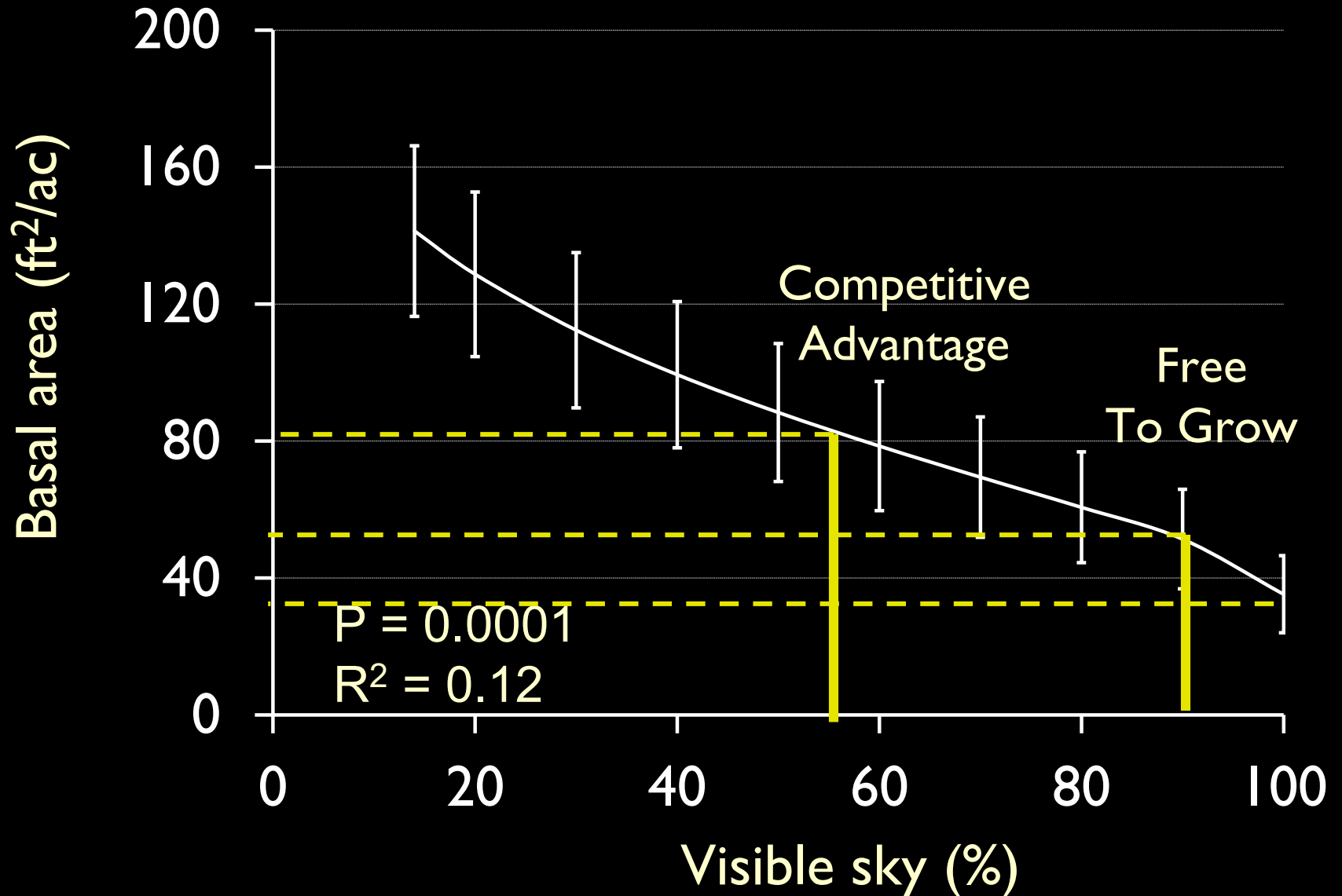
Total height (feet)



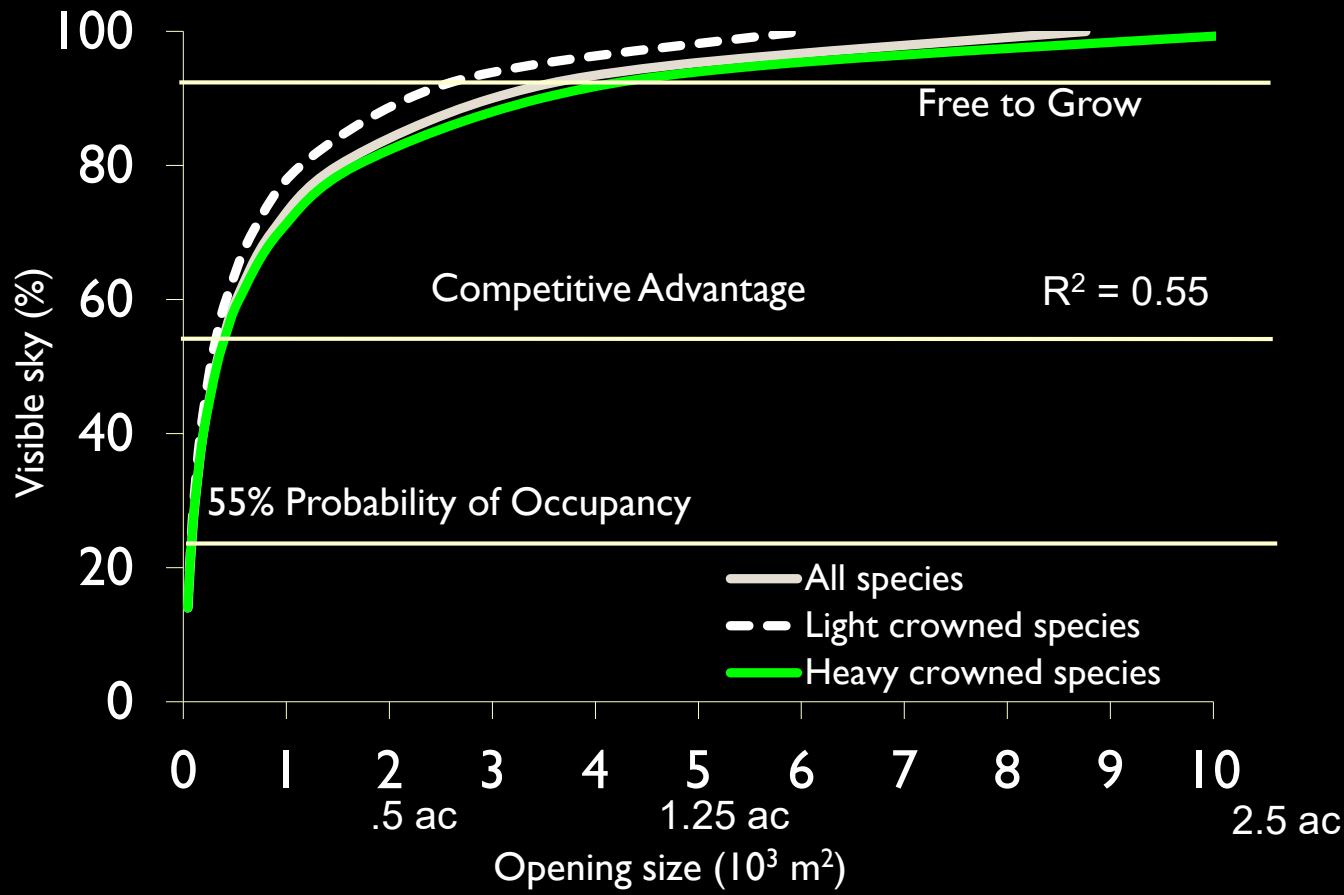
Years of needle retention

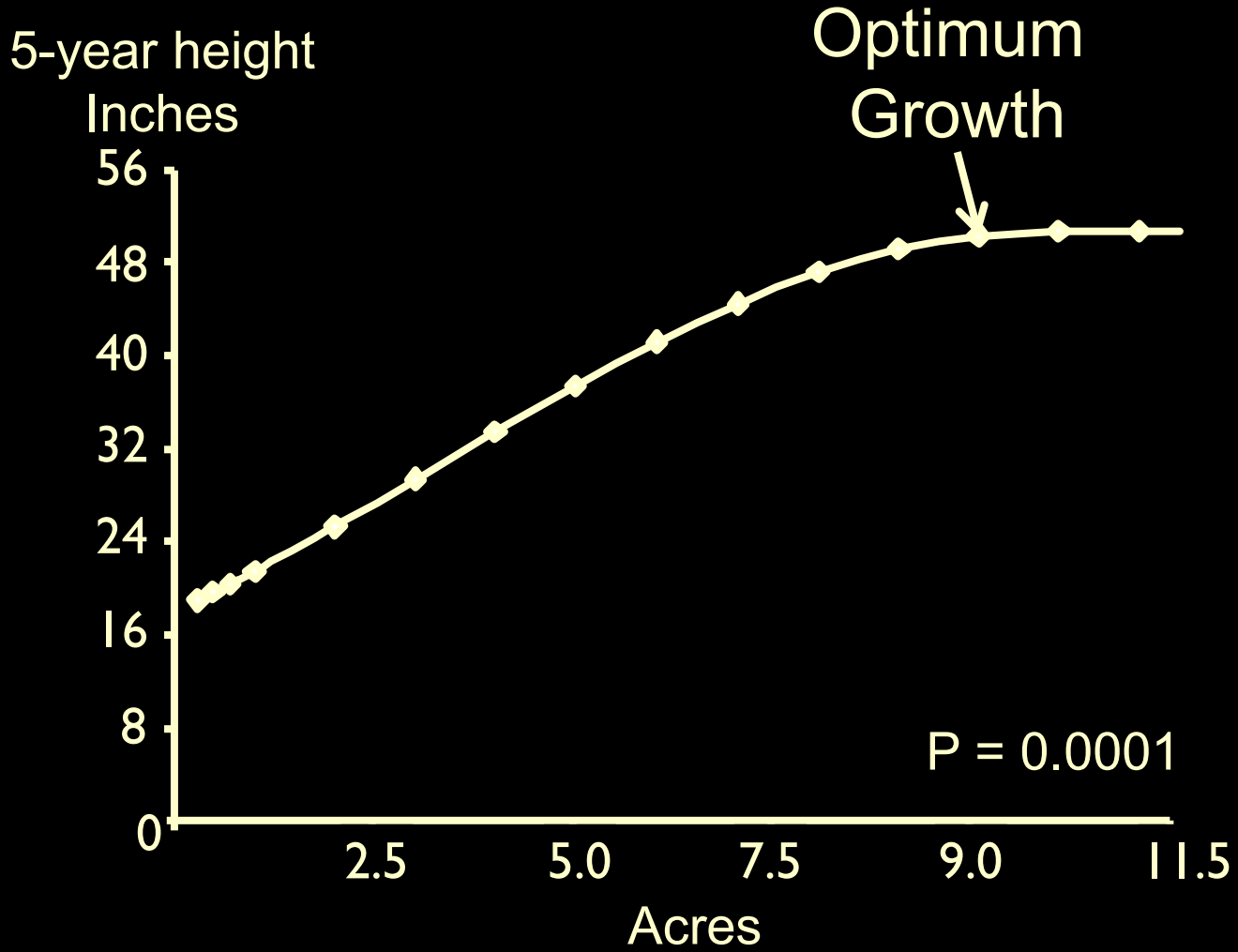


Visible sky and Basal Area



Area and Visible Sky





Species Composition Established



Species abundance (%)

100

trees/ac

223

514

839

1816

268

Chi-square
P=0.0001

80

40

20

0

0-25

26-45

46-55

56-92

> 92

Canopy opening (%)

Western larch

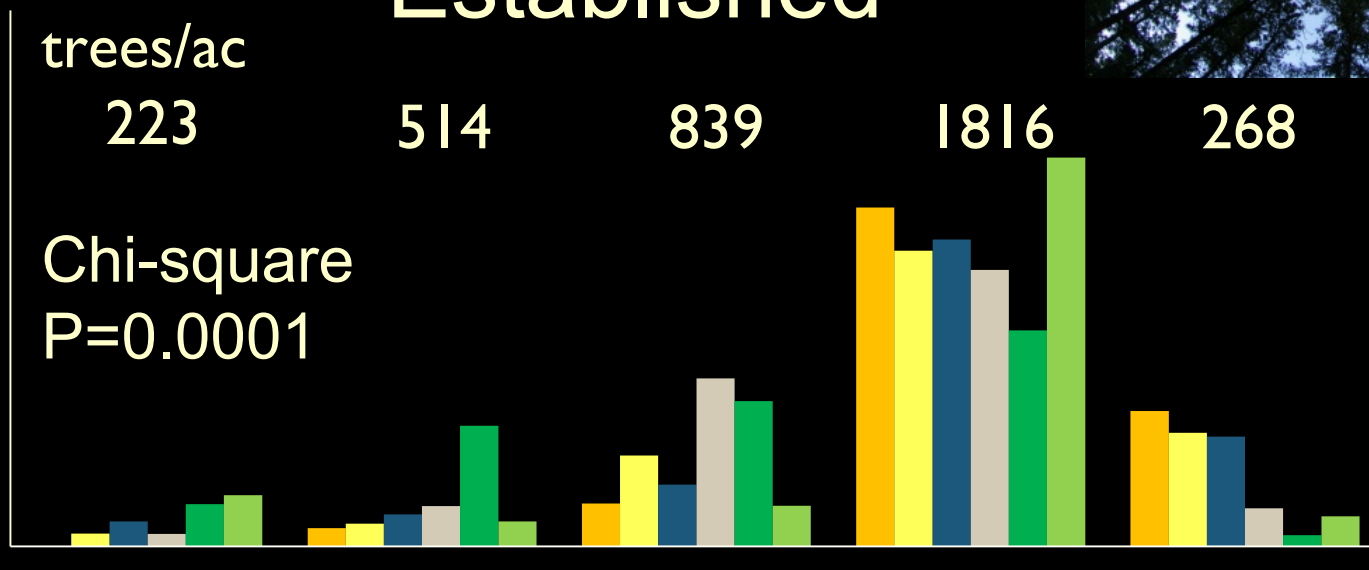
Douglas-fir

Western hemlock

Western white pine

Grand fir

Western redcedar



Masticated

Blackened



Organic

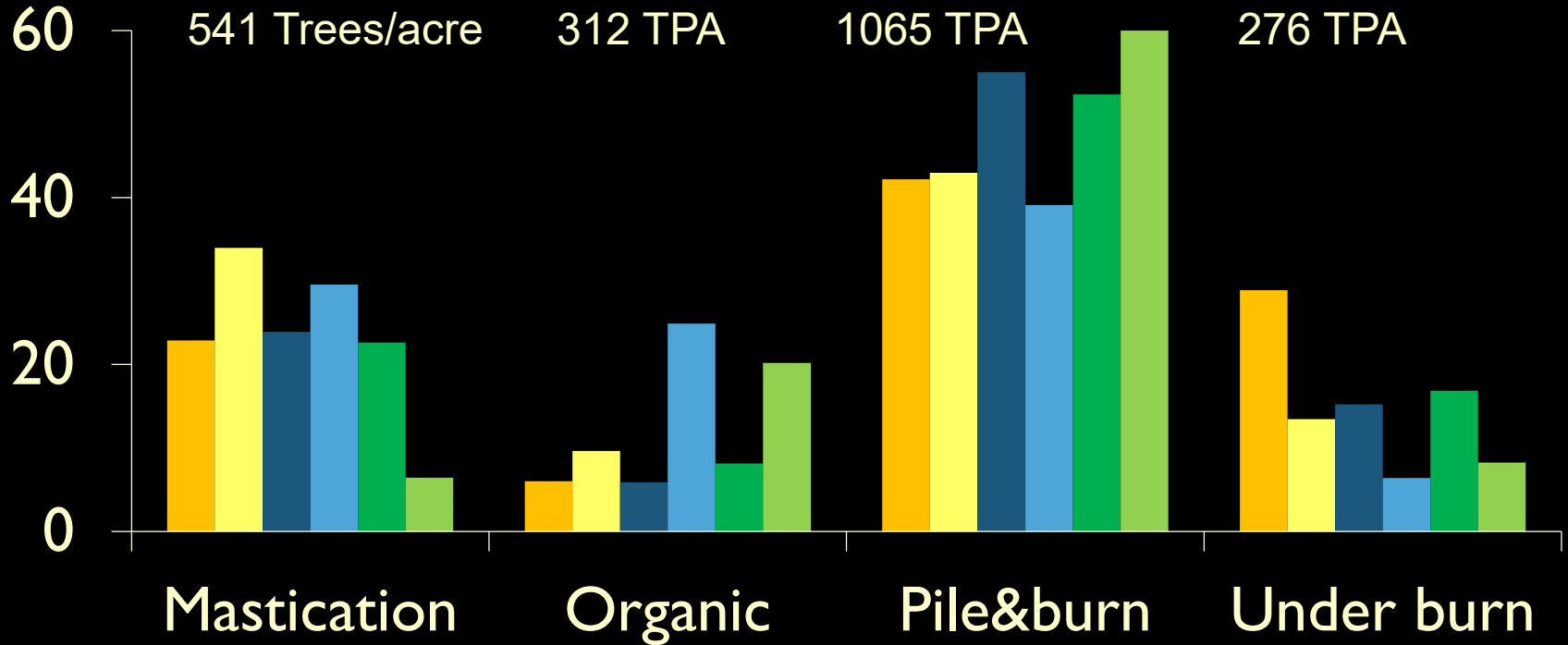


Mineral

Forest Floor

Chi-square
P=0.0001

Species
abundance
(%)



Western Larch
Douglas-Fir
Western Hemlock

Western White Pine
Grand Fir
Western Redcedar

Considerations

Objectives

Site – productivity and disturbances

Species mix – now, survival, growth, opportunities

Opening thresholds

Residual overstory – distribution

Soil substrate – site preparation

