THINNING DURING COMPETITION MORTALITY PHASE

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BLM – ODF Joint Thinning Training – Silver Falls State Park

CHARACTERISTICS OF COMPETITION MORTALITY PHASE

- Trees Dominate the Site
- Relatively Small Diameter Range
- Little Crown Differentiation
- Competition Induced Wave Mortality
- Little Species Diversity
- Little Sunlight Reaches Forest Floor
- Little, if any, Understory Vegetation

OBJECTIVES OF THINNING DURING COMPETITION MORTALITY PHASE

- Recover anticipated mortality
- Maintain growth rate
- Taper modification
- Accelerate habitat creation

ANTICIPATED MORTALITY

MORTALITY RECOVERED

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DOUGLAS FIR MAXIMUM GROWTH GUIDELINES

	Understocked Stands (RD 40)		Overstocked Stands (RD 60)	
Average DBH	Trees per acre	Average Spacing	Trees per acre	Average Spacing
8	324	11.6	486	9.5
10	231	13.7	348	11.2
12	176	15.7	265	12.8
14	140	17.6	210	14.4
16	115	19.5	172	15.9
18	96	21.3	144	17.4
20	82	23.0	123	18.8
22	71	32.0	107	20.2
24	62	26.5	94	21.5

RD THINNING GUIDELINES

	Douglas fir, Noble fir, or Sitka spruce dominant species	Western hemlock or true fir (other than noble fir) dominant species
Thin At:	RD 55-60	RD 65-70
Post Thinning Conditions	Live Crown Ratio ≥ 35% H/D ≤ 90 RD reduced by no more than 40% of pre-thinning RD	Live Crown Ratio ≥ 35% H/D ≤ 85 RD reduced by no more than 40% of pre-thinning RD

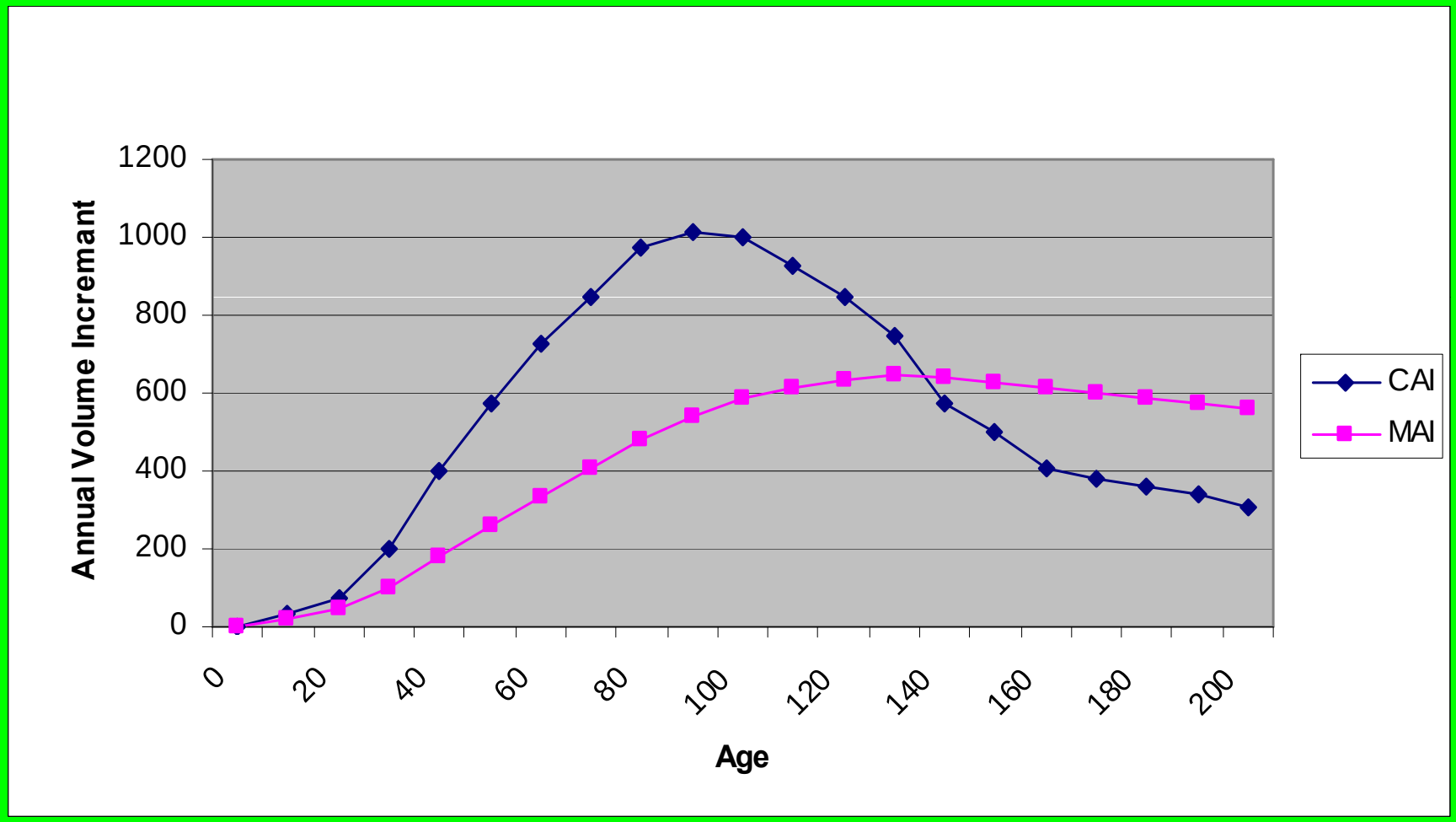
MAINTAINING GROWTH

MINIMUM STOCKING FOR SITE OCCUPANCY

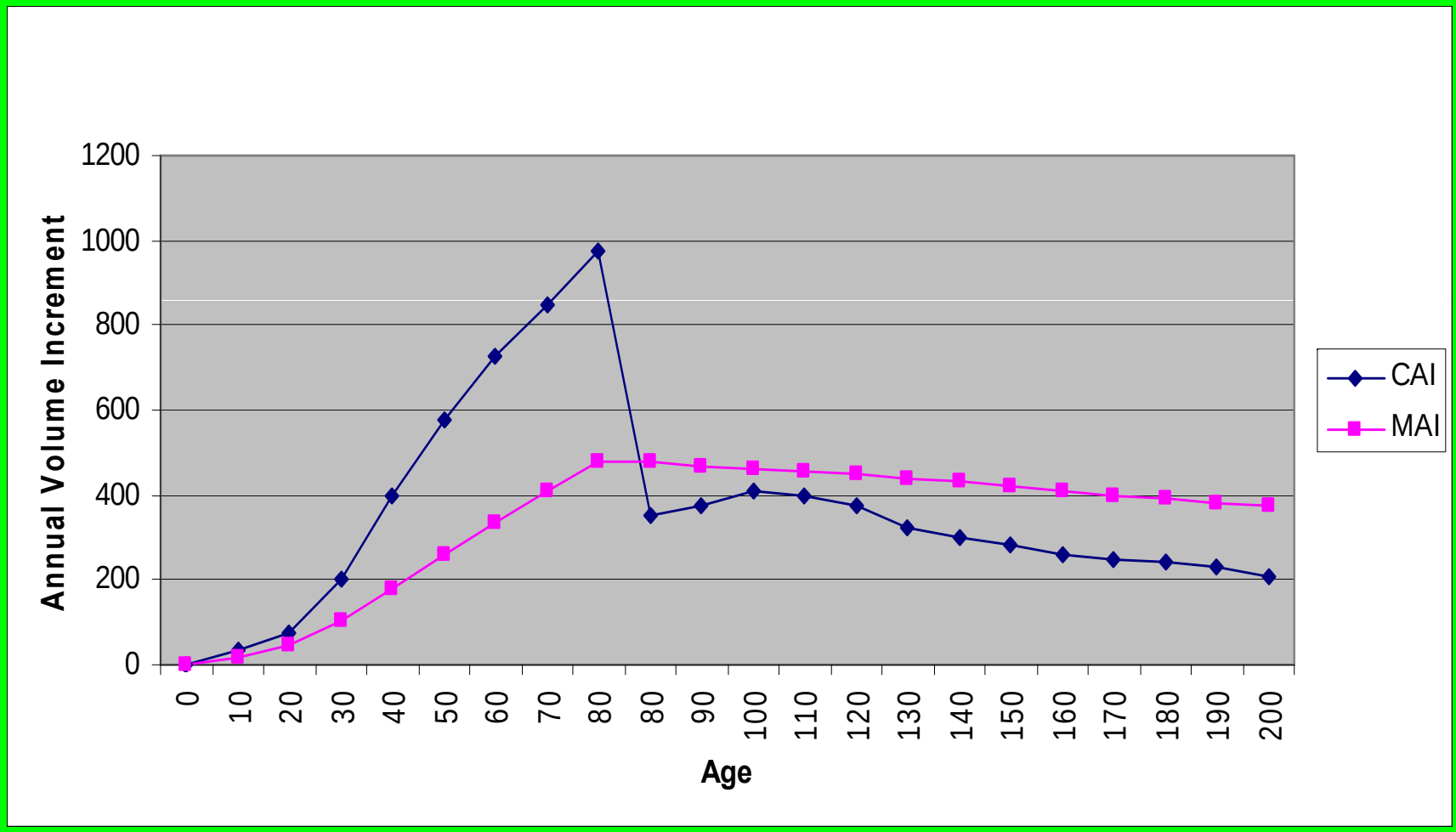
MIMIMUM OVERSTORY STOCKING GUIDELINES

Source: Washington Department of Natural Resources	Shade Tolerant	Shade Intolerant
High Site Productivity	85 – 95 TPA	75 – 85 TPA
Medium Site Productivity	100 – 110 TPA	90 – 100 TPA

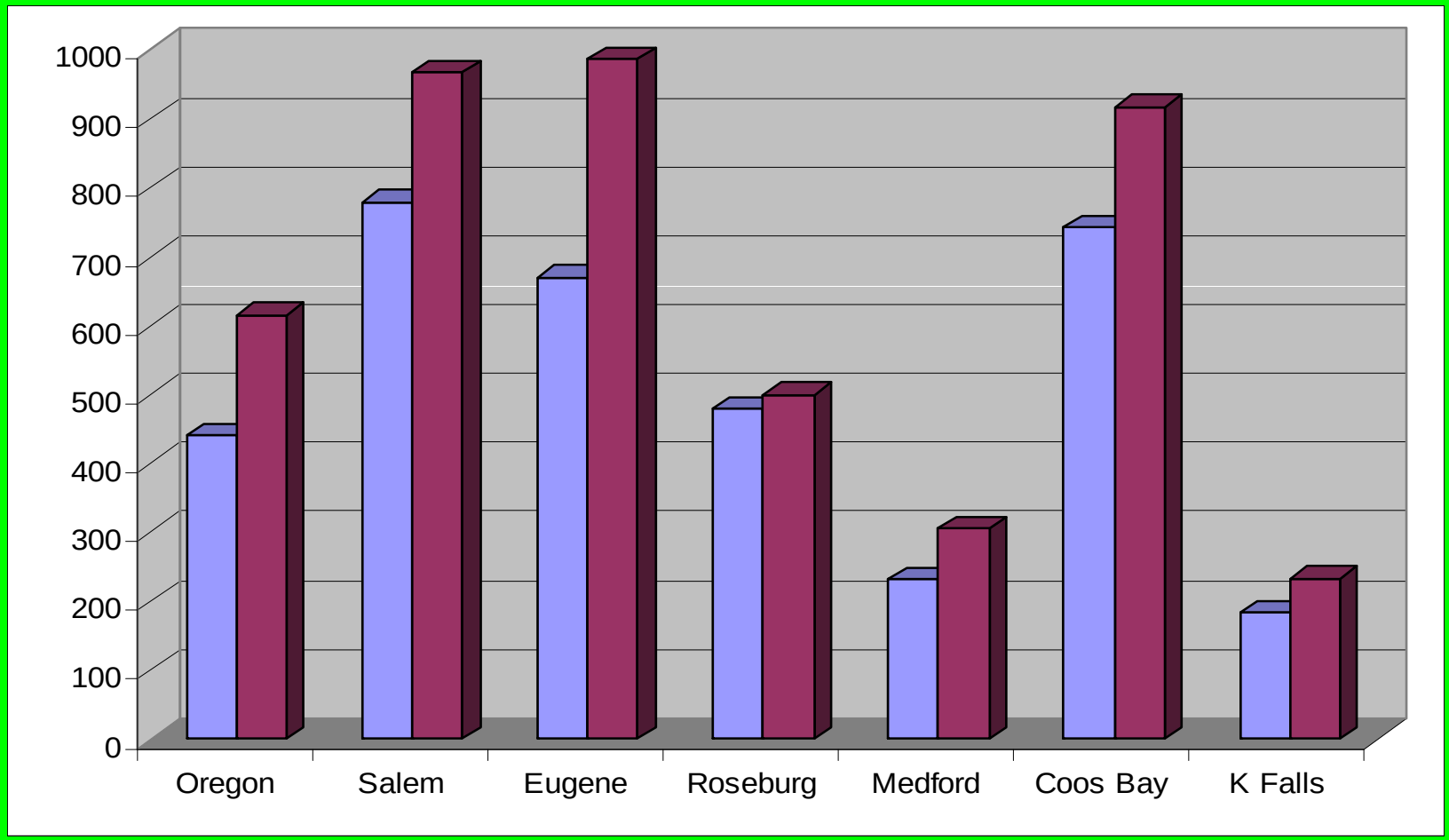
CULMINATION OF MAI



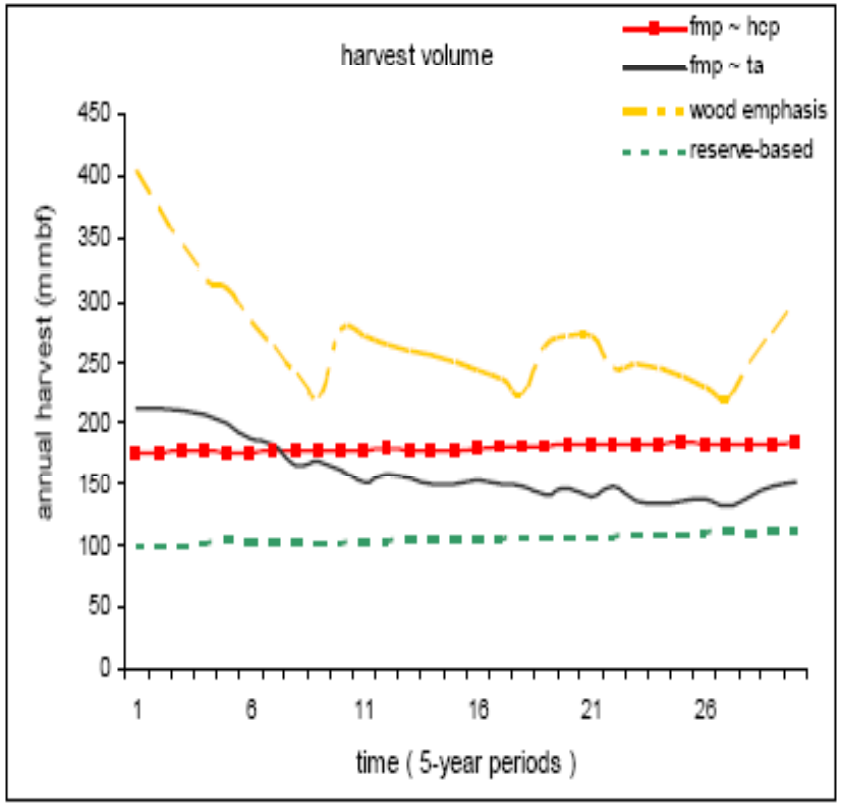
CULMINATION OF MAI

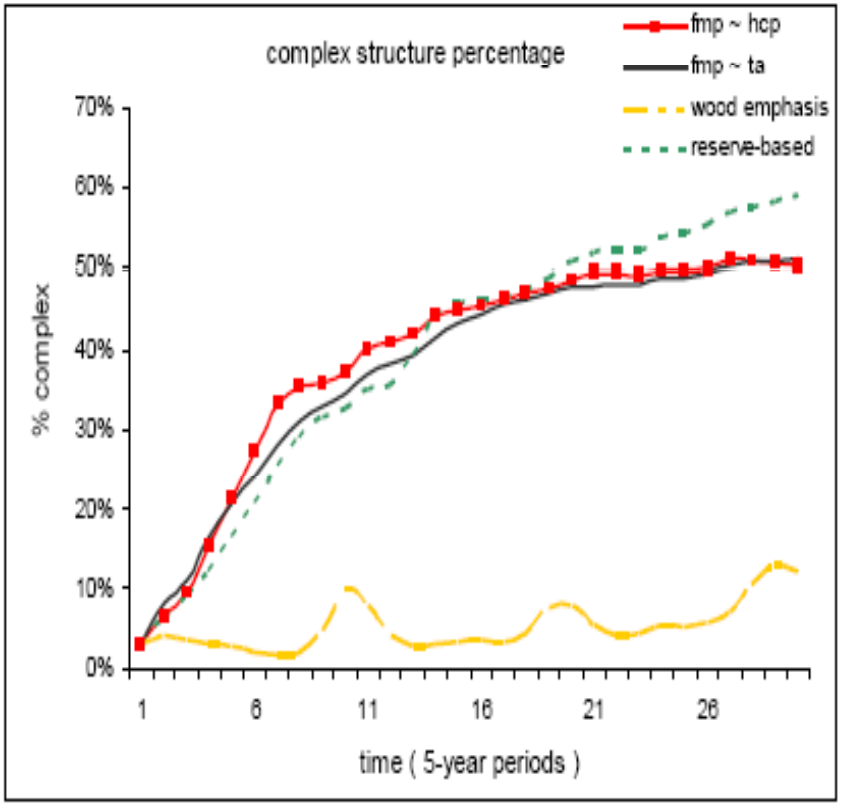


WOPR GROWTH ESTIMATES



HARVEST AND HABITAT





ALTERING TAPER

VOLUME RECOVERY

Not Thinned

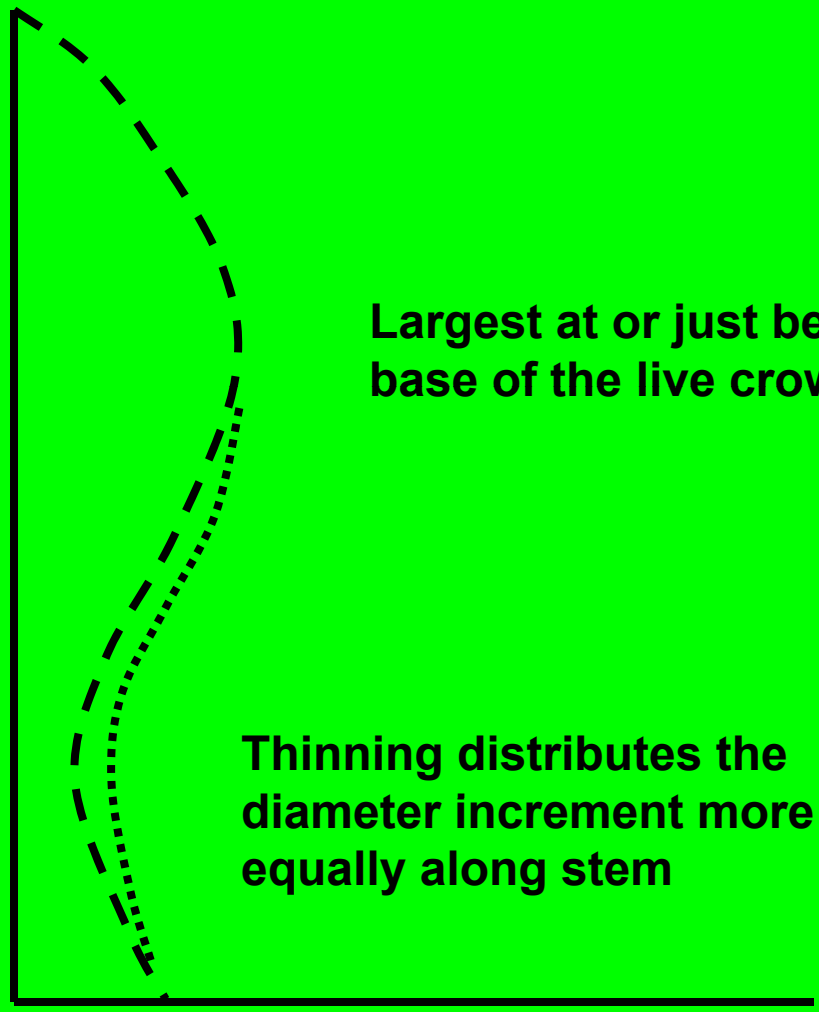
3P	SM	2S	3S	4S	Total
1700	36720	37240	17560	4490	97710

Thinned

0	8770	17605	12025	290	38690
2830	32390	23430	4960	2090	65700
2830	*41160*	*41035*	*16985*	*2380*	*104390*

DIAMETER INCREMENT

ANNUAL DIAMETER INCREMENT



Largest at or just below the base of the live crown

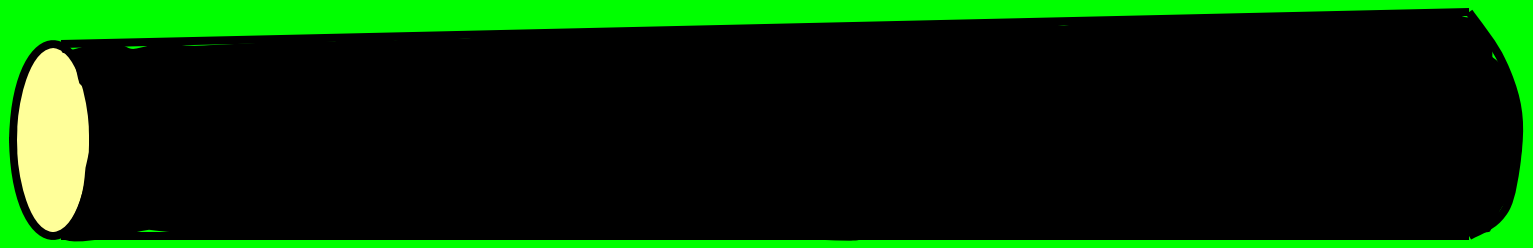
Thinning distributes the diameter increment more equally along stem

Butt Diameter = 20 Inches
SM = $678 / MBF
2 Saw = $575 / MBF
(Feb 2007)

Taper = 1 inch / 8 feet
32 foot / 16 inch log
8 foot / 15 inch log

320 + 70 = 390 Bd Ft
$257.21

40 Feet



Taper = 1 inch / 10 feet
40 foot / 16 inch log

400 + 0 = 400 Bd Ft (2.6)
$271.20 (5.4)

ACCELERATE HABITAT CREATION

VERTICAL STRUCTURE

HORIZONTAL STRUCTURE

MAXIMUM STOCKING FOR UNDERSTORY GROWTH

OVERSTORY STOCKING

Author	Overstory density or light level	Region
Bailey (1996)	<= 16 trees per ha max to grow	W. Oregon
Brandeis (2001)	< 20 m^2 / ha BA to grow	W. Cascades, OR
Carter & Klinka (1992)	>30-40% PACL: other factors have greater influence on relative height growth than light	Coastal B.C.
Deisenhofer (2000)	7% indirect light: Lowest level to maintain DF	W. Oregon
Drever & Lertzman (2001)	40% full sun to grow	Coastal B.C.
Emmingham & Waring (1973)	7% RL: No DF advanced regeneration survival under this level	Southwest OR
Miller & Emmingham (2001)	18-28 m^2 / ha BA to grow	Willamette Valley, OR
Wampler (1993)	<= 12 trees per ha max to grow	W. Washington

UNDERSTORY DOUGLAS-FIR GROWTH

Source: Churchill (2005)		Vigor Class			
		1	2	3	4
Classification Thresholds	Height : Diameter Ratio	90+	80-89	70-79	<70
	Height Growth (cm)	<10	10-29	30-49	50+
	Live Crown Ratio (%)	<40	40-54	55-64	65+
Average Growth Rates	**Relative Vol. Gr. (%)**	**10**	**20**	**35**	**50**
	Radial Growth (mm) [b]	0.9	1.6	3.6	5
	Years to reach overstory	222	174	93	62

MAXIMUM LEAVE TREE STOCKING GUIDELINES

Source: Washington Department of Natural Resources	Shade Tolerant	Shade Intolerant
High Site Productivity	13 – 18 TPA	8 – 13 TPA
Medium Site Productivity	17 – 22 TPA	12 – 17 TPA

GENERALIZED STOCKING ZONES

8 TPA	85 TPA	Shade Intolerant, High Productivity
12 TPA	100 TPA	Shade Intolerant, Med Productivity
13 TPA	95 TPA	Shade Tolerant, High Productivity
17 TPA	110 TPA	Shade Tolerant, Med Productivity

80 Year Rotation

INDIVIDUAL STAND COMPONENTS

STAND STRUCTURE

Stand Structure Classifications (continued)

Stand Structure Classification in SLI

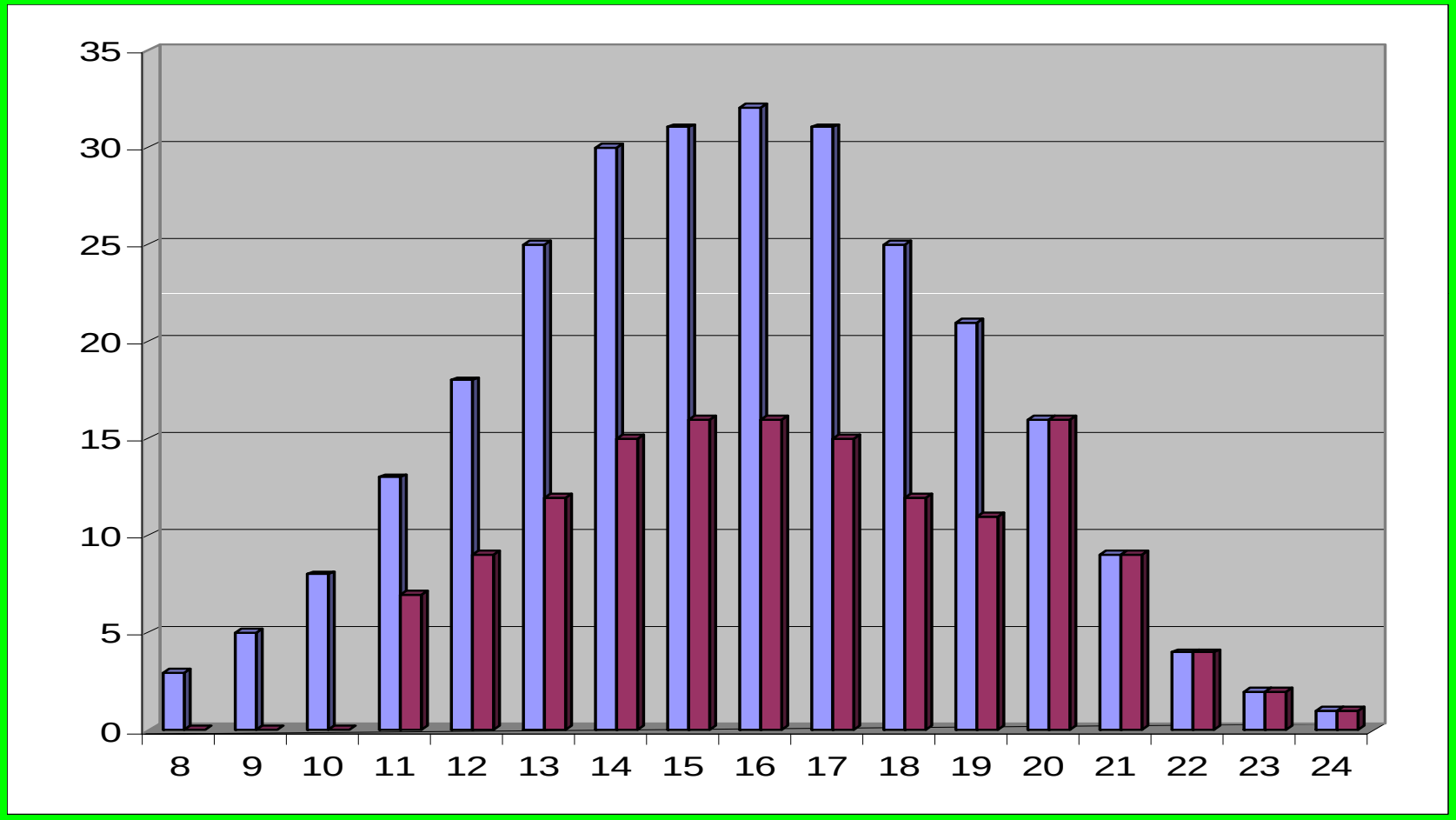
Stand structure type definitions in the FMP (FMP Appendix C pp. 2-15) have been translated into criteria for use in the ODF SLI system that are referred to as the SLI structure algorithm. The criteria are used to classify the stand structure of newly inventoried stands.

The SLI structure classification criteria include the following stand characteristics:

- DBH
- tree height
- TPA
- RD
- DDI
- snags
- downed wood
- shrub/herbs/grass/trees <= 15'
- shrub/herb/grass - number of species

Structural Component	OFS	LYR	UDS	CSC	REG
Tree DBH	>= 8 TPA, 32"+ DBH; and (>= 30 TPA that are 18"+ DBH, or Stand 5.6"+ QMD >= 18" DBH)	>= 30 TPA that are 18"+ DBH, or Stand 5.6"+ QMD >= 18" DBH			< 8" DBH of all trees.
Tree Height	18"+ DBH trees are >= 100' tall	18"+ DBH trees are >= 100' tall	30 TPA are >= 40' Tall		
Trees per acre					>= 50
RD (trees >= 2" DBH)	>= 25	>= 25	>= 15	>= 25	<=35
Layered[8]	Diameter Diversity Index >= 6.5	Diameter Diversity Index >= 6.5			
Snags	>= 2 snags, 24"+ DBH and >= 4 snags, 12"+ DBH				
Downed Wood	600 ft^3 in Decay Classes 1 & 2 or 3000 ft^3 in Decay Classes 1 - 5				
SHGT[3] Amount			>= 40% coverage		
SHG[3] Species			>= 2 species		

DIAMETER DISTRIBUTION



QUESTIONS