TASS Interior Douglas-fir: Recalibration and Pre-commercial Thinning Simulations

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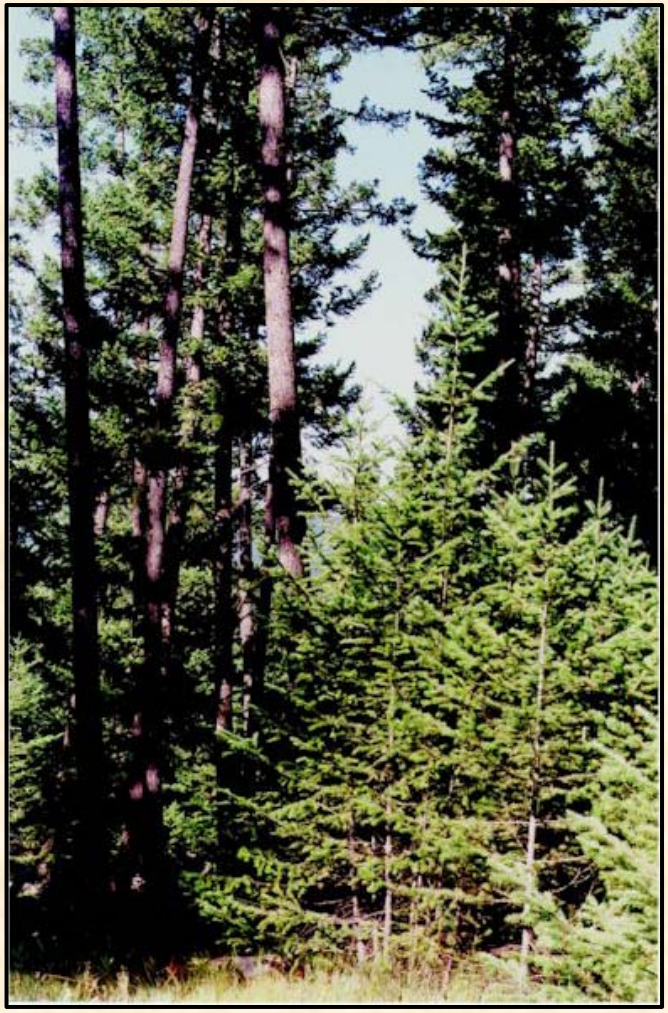
32nd Annual Meeting of the Intermountain Forest Tree Nutrition Cooperative, April 5, 2011

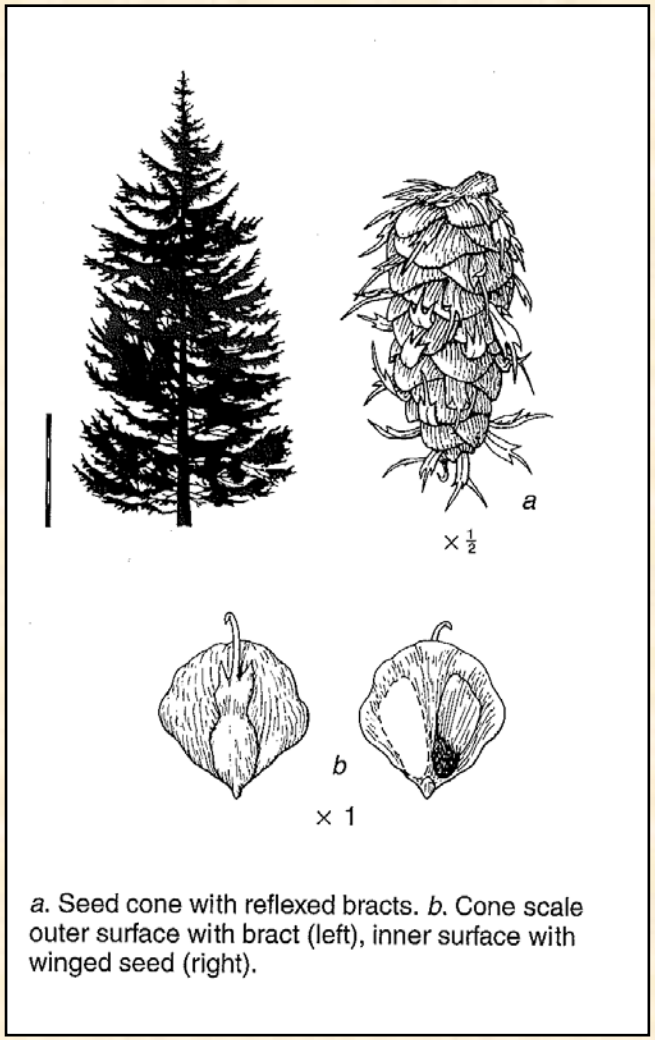
TASS Interior Douglas-fir: Recalibration and Pre-commercial Thinning Simulations

Outline

- Interior DF recalibration -- Why?
- Interior DF recalibration -- How?
- Results
- Demonstration of pre-commercial thinning scenarios with economic analysis.

Pseudotsuga menziesii var. glauca (Beissn.) Franco

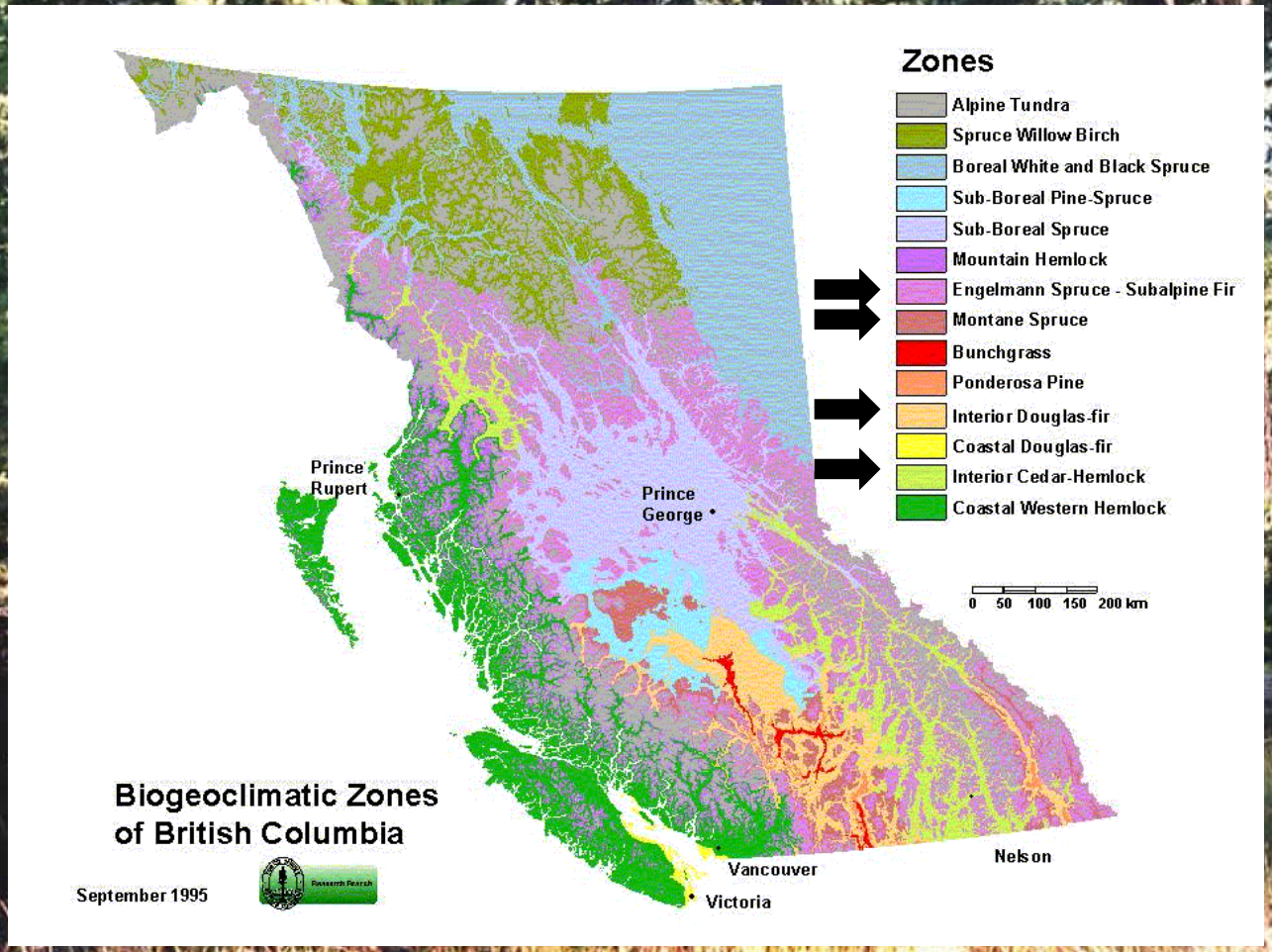




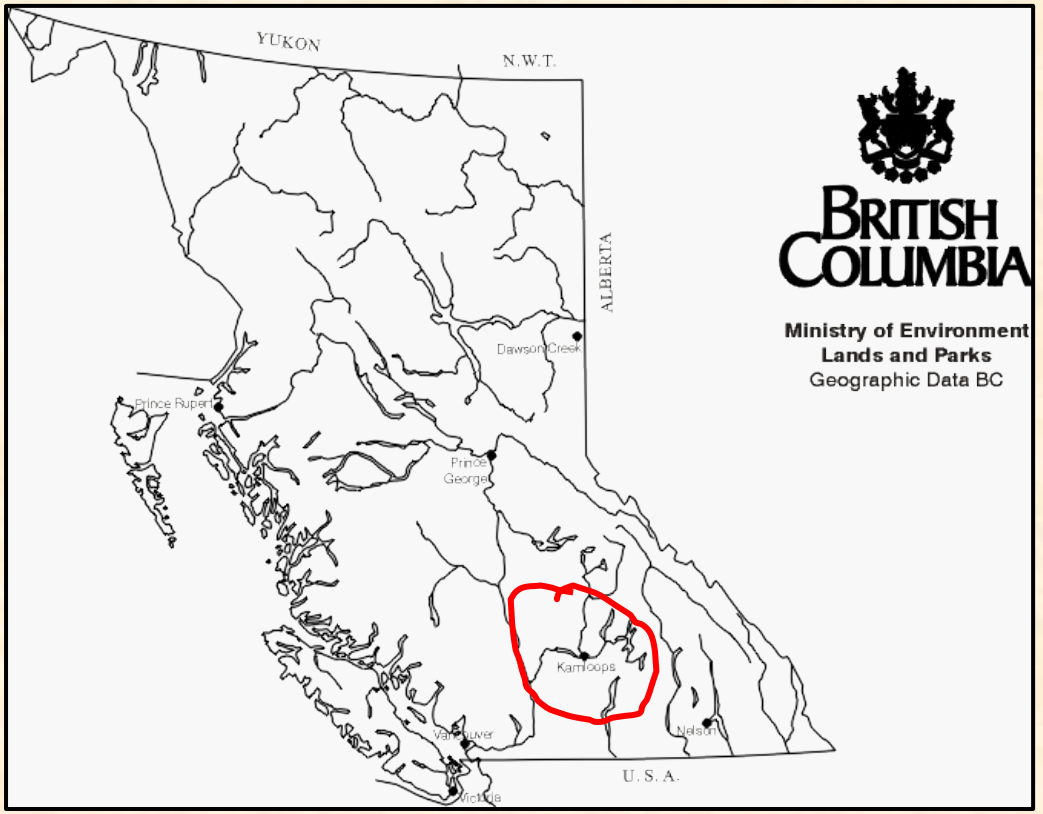
a. Seed cone with reflexed bracts. *b*. Cone scale outer surface with bract (left), inner surface with winged seed (right).

From: Farrar, J.L. 1995. Trees in Canada. Fitzhenry & Whiteside Ltd. and the Canadian Forest Service.

Interior Douglas-fir Distribution in British Columbia



Data for Model Fitting



Destructive Sampling:
142 Trees

Fit individual tree structure and growth functions:

1. Crown profile:

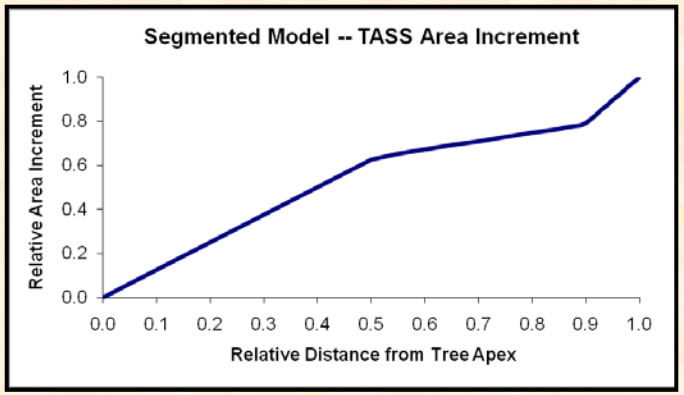
Branch Length = f(Relative branch length, Distance from apex to branch tip)

2. Bole Increment:

Bole Increment = f(foliar volume, foliar volume/maximum foliar volume)

3. Distribution of volume increment down the tree bole:

Define break points and relative magnitudes of a segmented model.



Data for Model Validation

- Permanent sample plots:
  - 167 plots from the IFTNC database.
  - 129 plots from the B.C. inventory database.
  - 20 espacement trial plots
  - 6 species trial plots

IFTNC Data

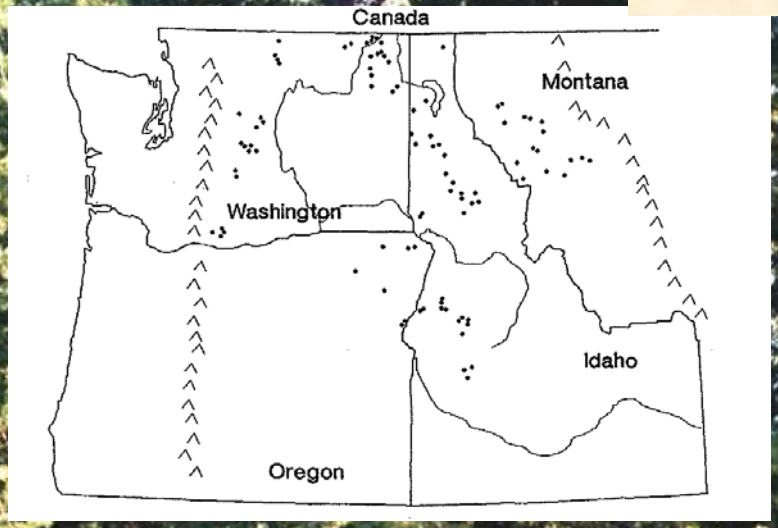


Figure 1. The Inland Northwest region.

Douglas Fir Fertilization Trial Study Sites
From: Mika, P.G. and Moore, J.A. Water, Air, and Soil Pollution 54:477-491, 1990/91. © 1990/91 Kluwer Academic Publishers. Printed in the Netherlands.

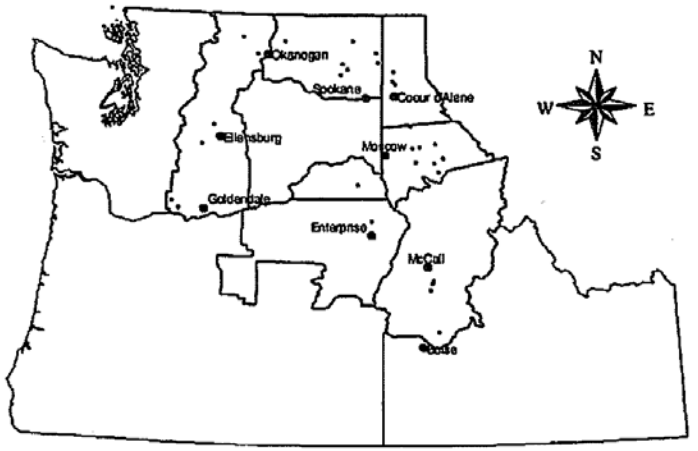
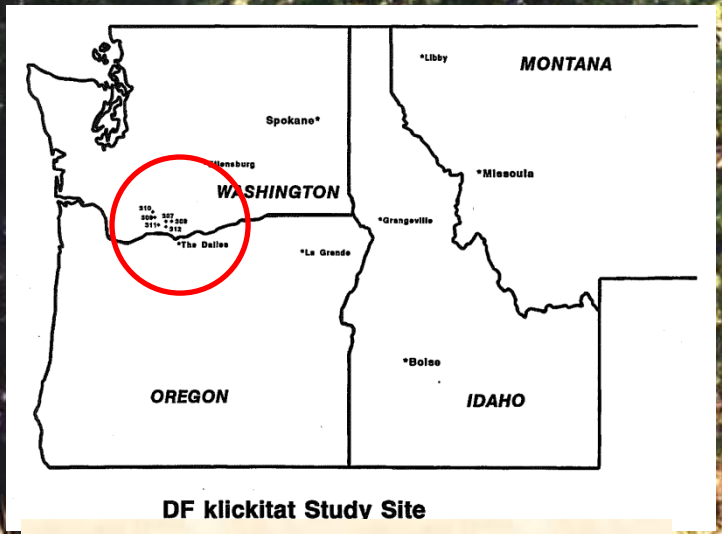


Figure 1: Locations of forest health and nutrition study sites, 1994-1996.

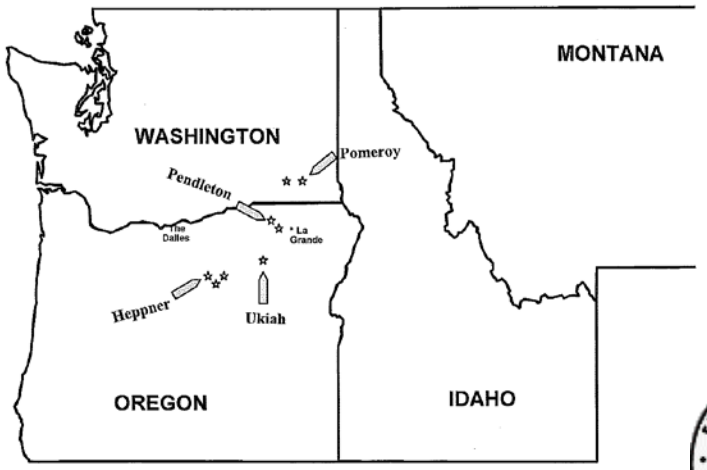
From: Garrison, M.T., Shaw, T.M., Moore, J.A. and Mika, P.G. Establishment Report, 1997.



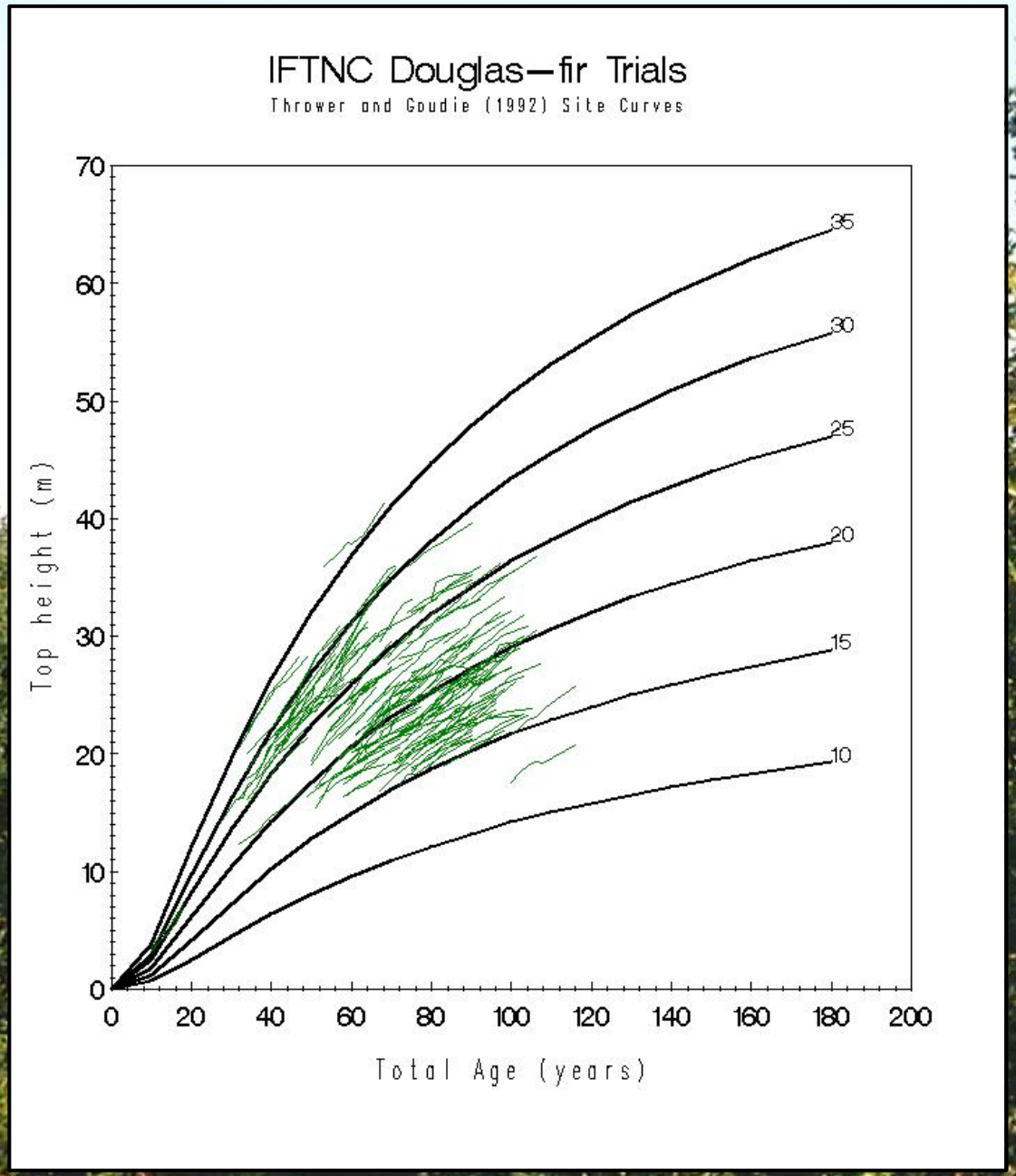
DF klickitat Study Site

From: Shaw, T.M., Mika, P.G., and Moore, J.A. 1995.

Figure 1. Locations of Umatilla Mixed Conifer Study Sites

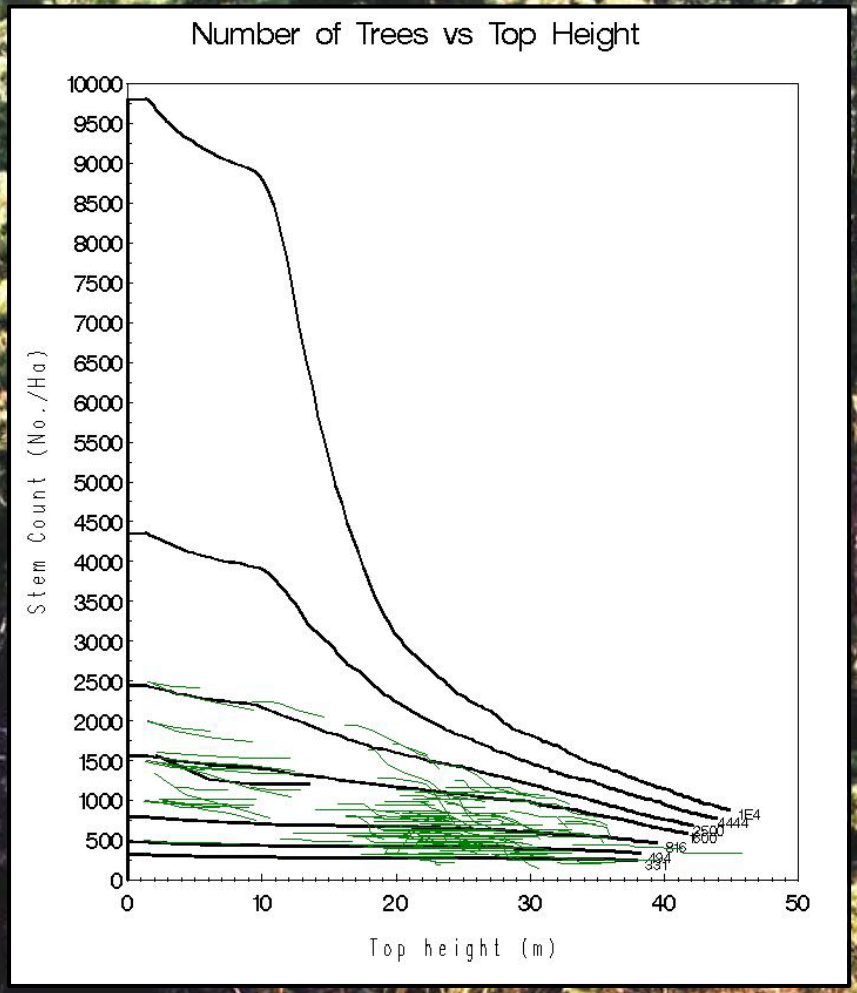


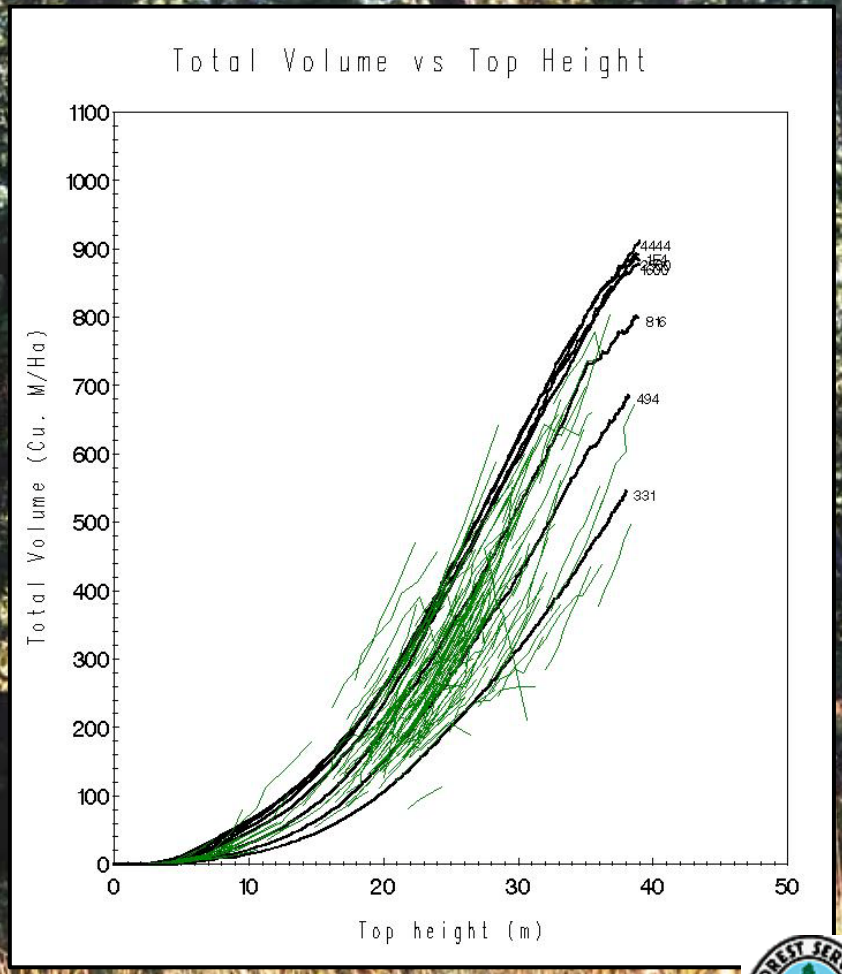
From: Garrison, M.T. and Moore, J.A. 2000.


IFTNC Douglas—fir Trials
Thrower and Goudie (1992) Site Curves
Top height (m)
Total Age (years)
0
10
20
30
40
50
60
70
0
20
40
60
80
100
120
140
160
180
200
35
30
25
20
15
10

Stand Projections With New Coefficients

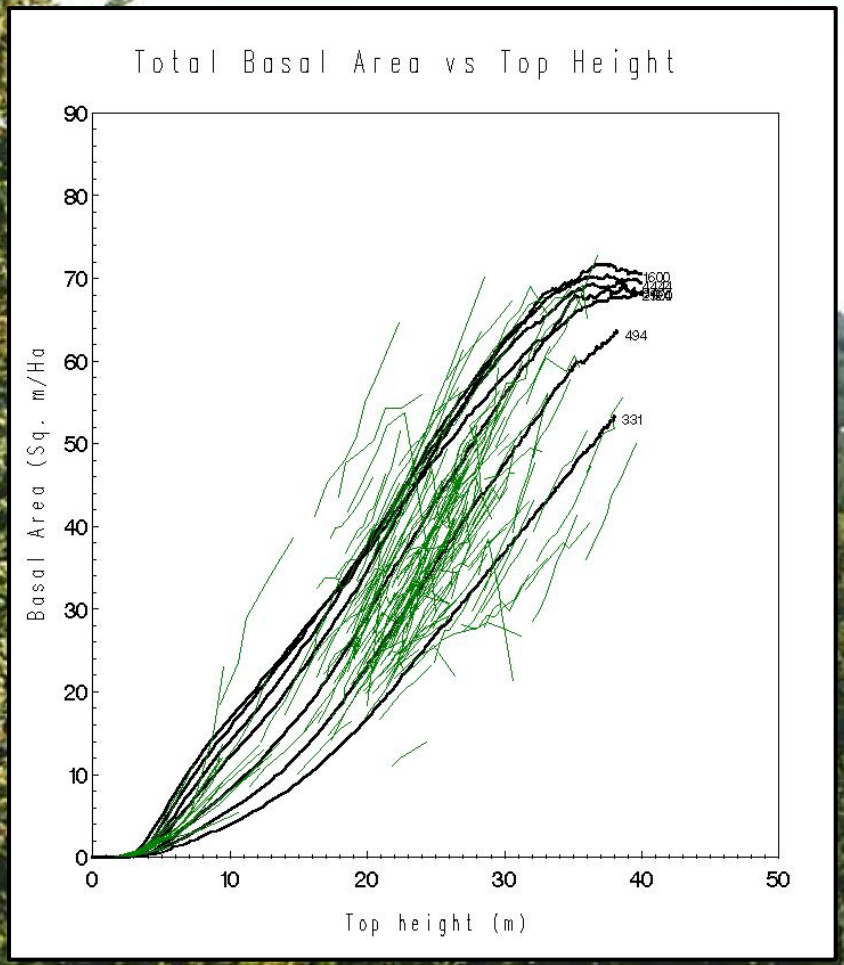
Compared with IFTNC and Espacement Trial Data

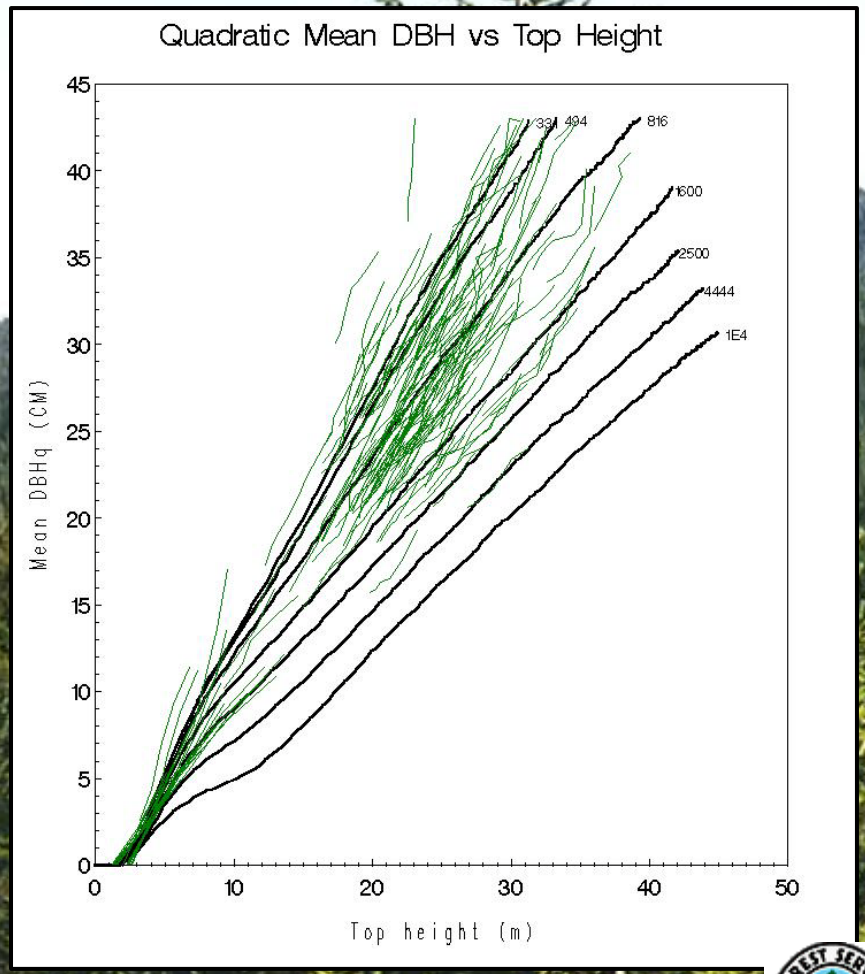




Stand Projections With New Coefficients

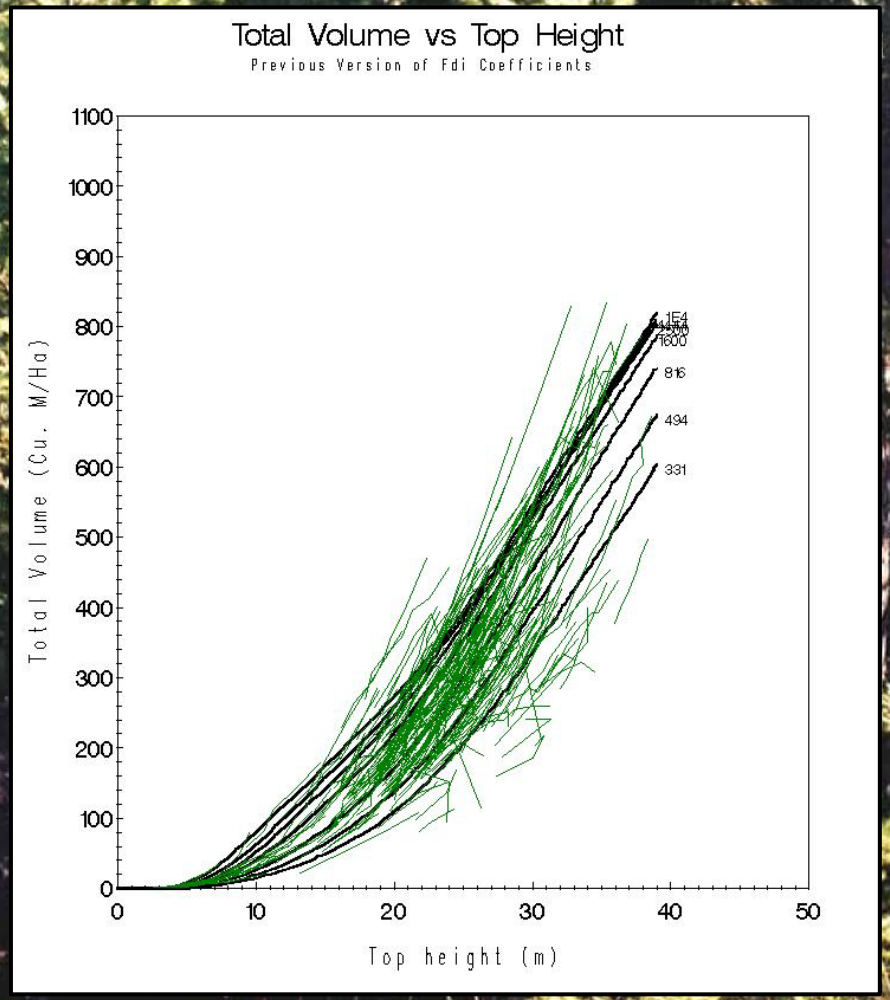
Compared with IFTNC and Espacement Trial Data

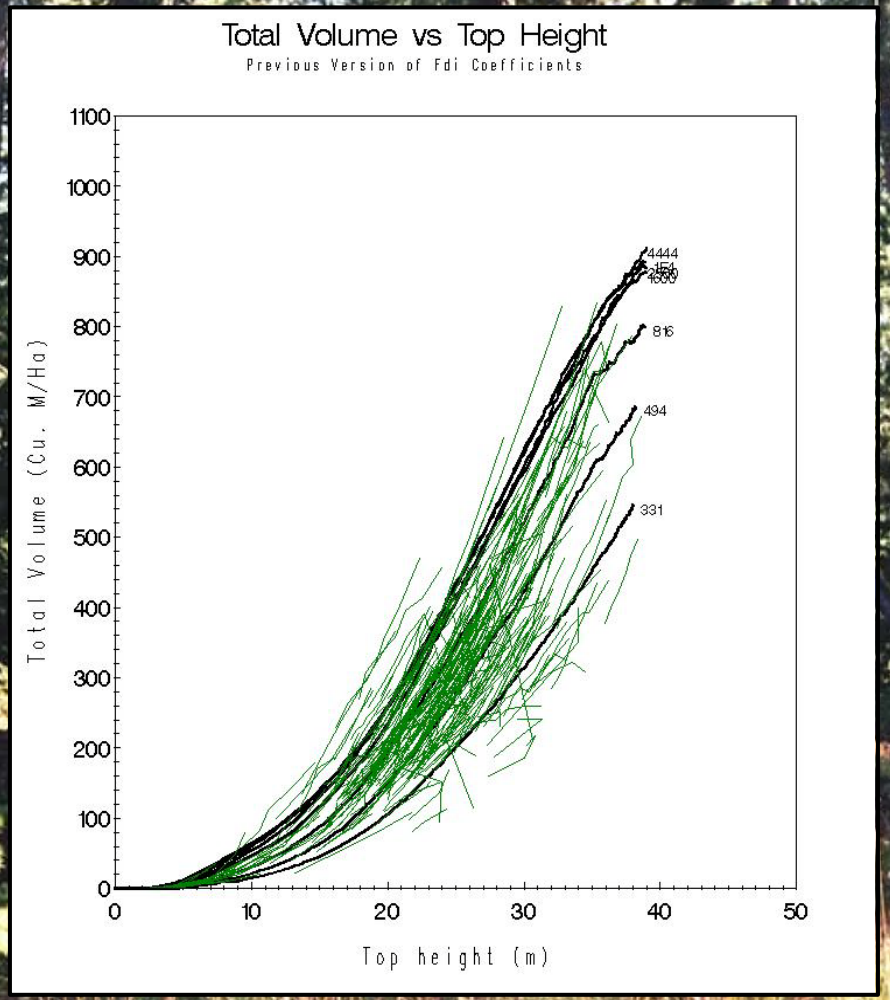




Stand Projections Comparing Older Version with New

Compared with IFTNC and Espacement Trial Data

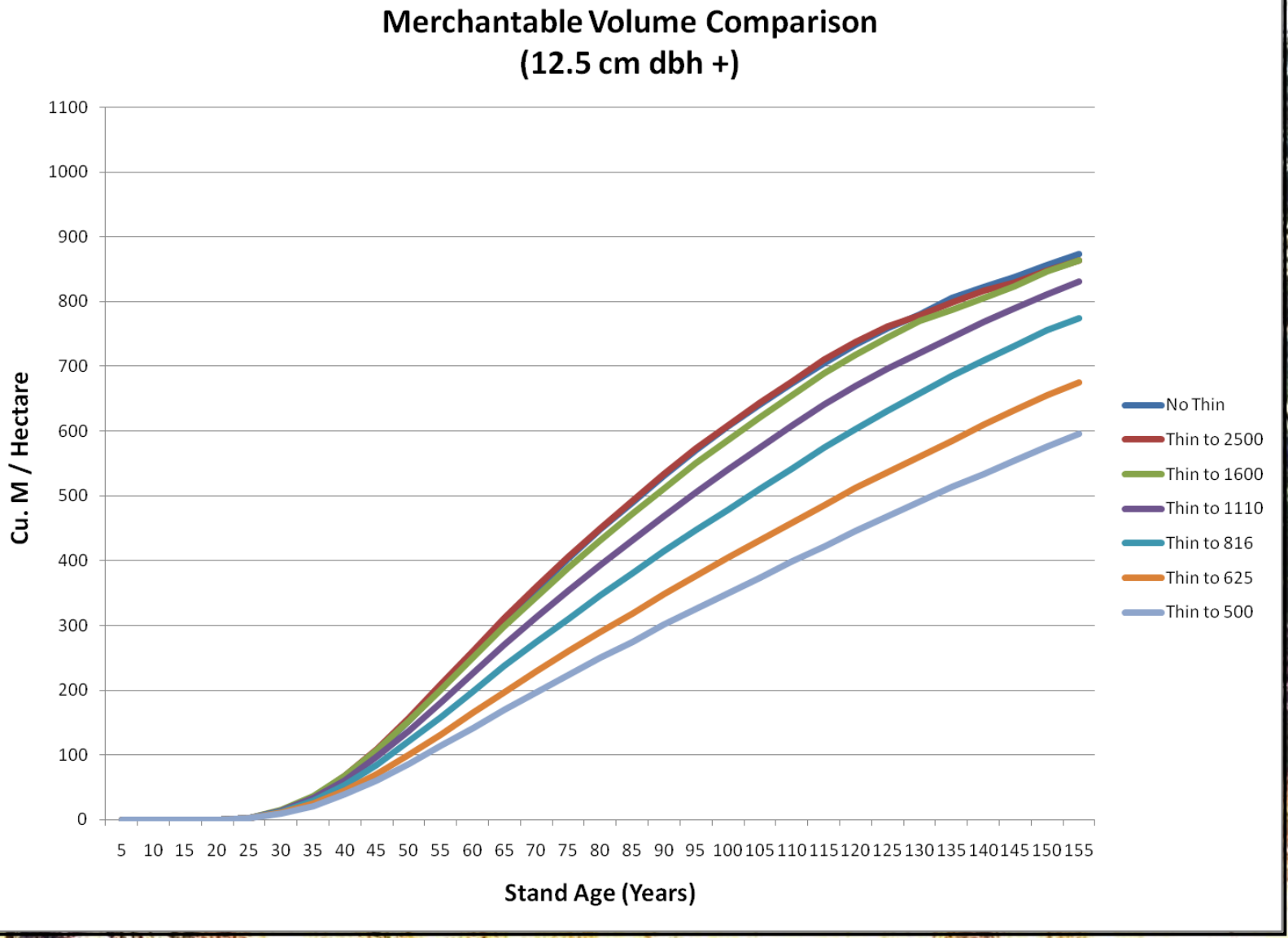




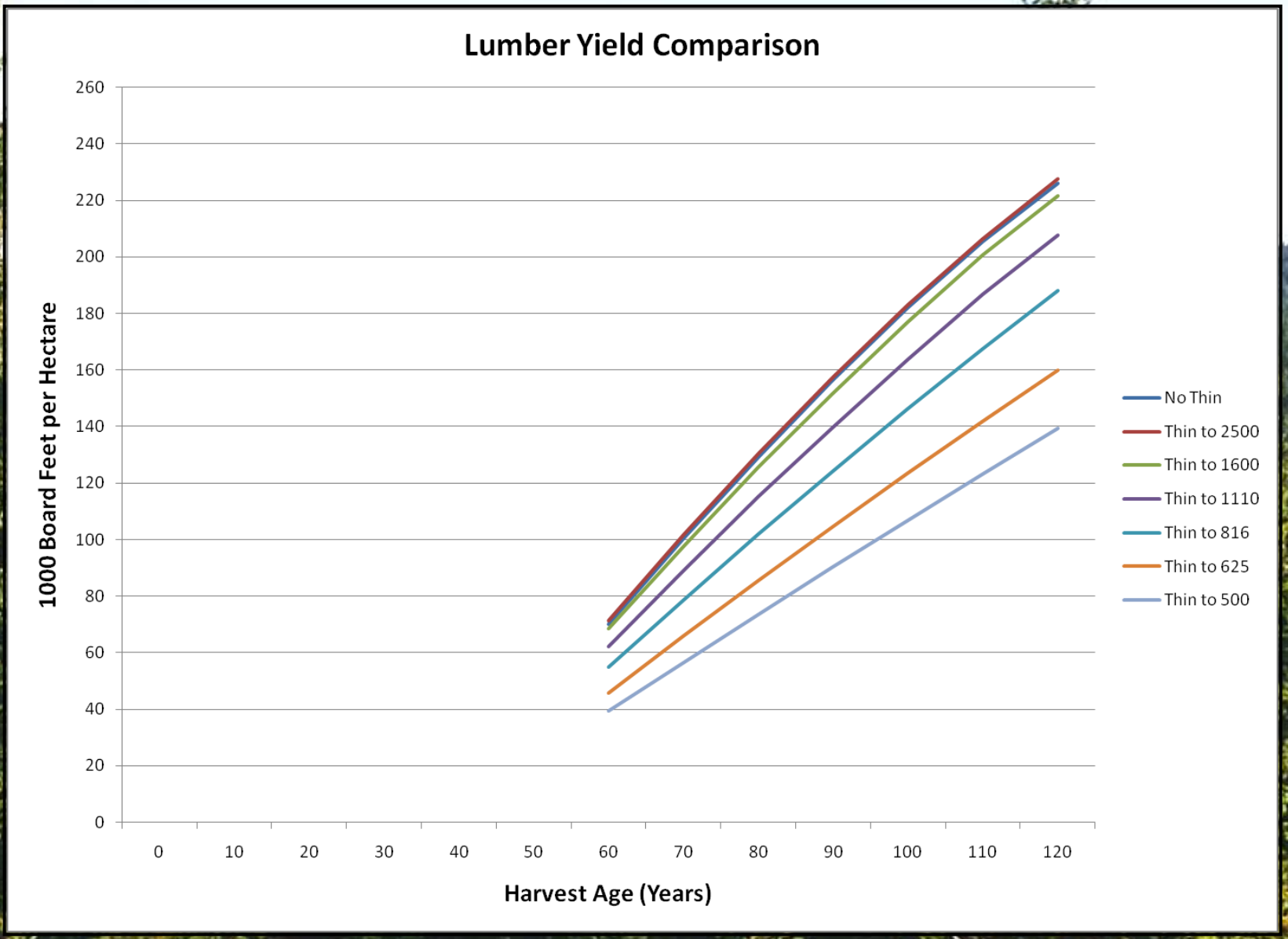
Simulated Pre-Commercial Thinning Experiment

- Site index 25 (m @ 50 years breast height), no operational adjustment factors.
- Naturally regenerated stand, 5000 stems per hectare (sph) initial density.
- Thin down to 2500, 1600, 1110, 816, 625, and 500 sph at 4 m top height.
- Compare volume and lumber yields, net present values and biomass in thinnings.

Volume Yields

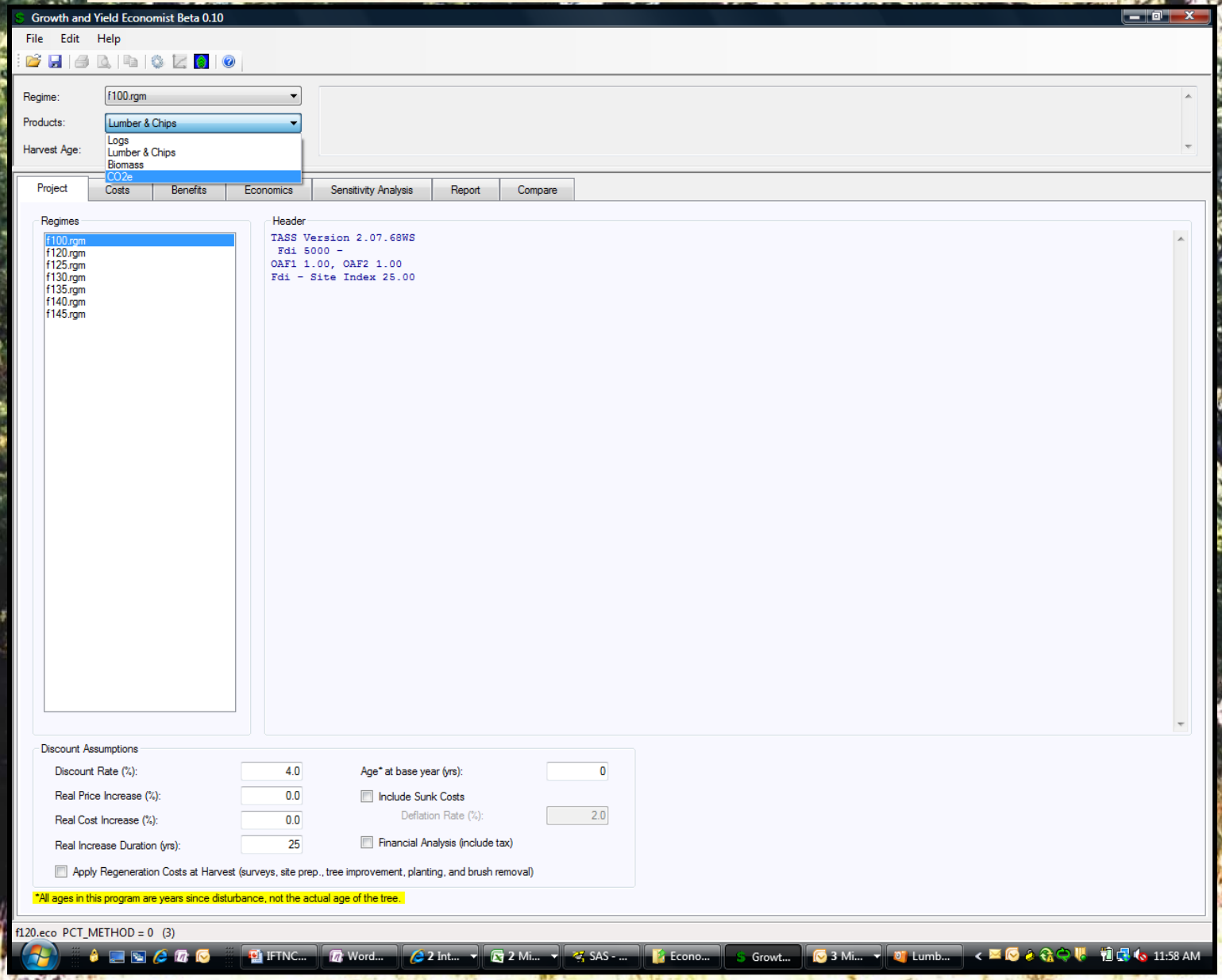


Lumber Yields



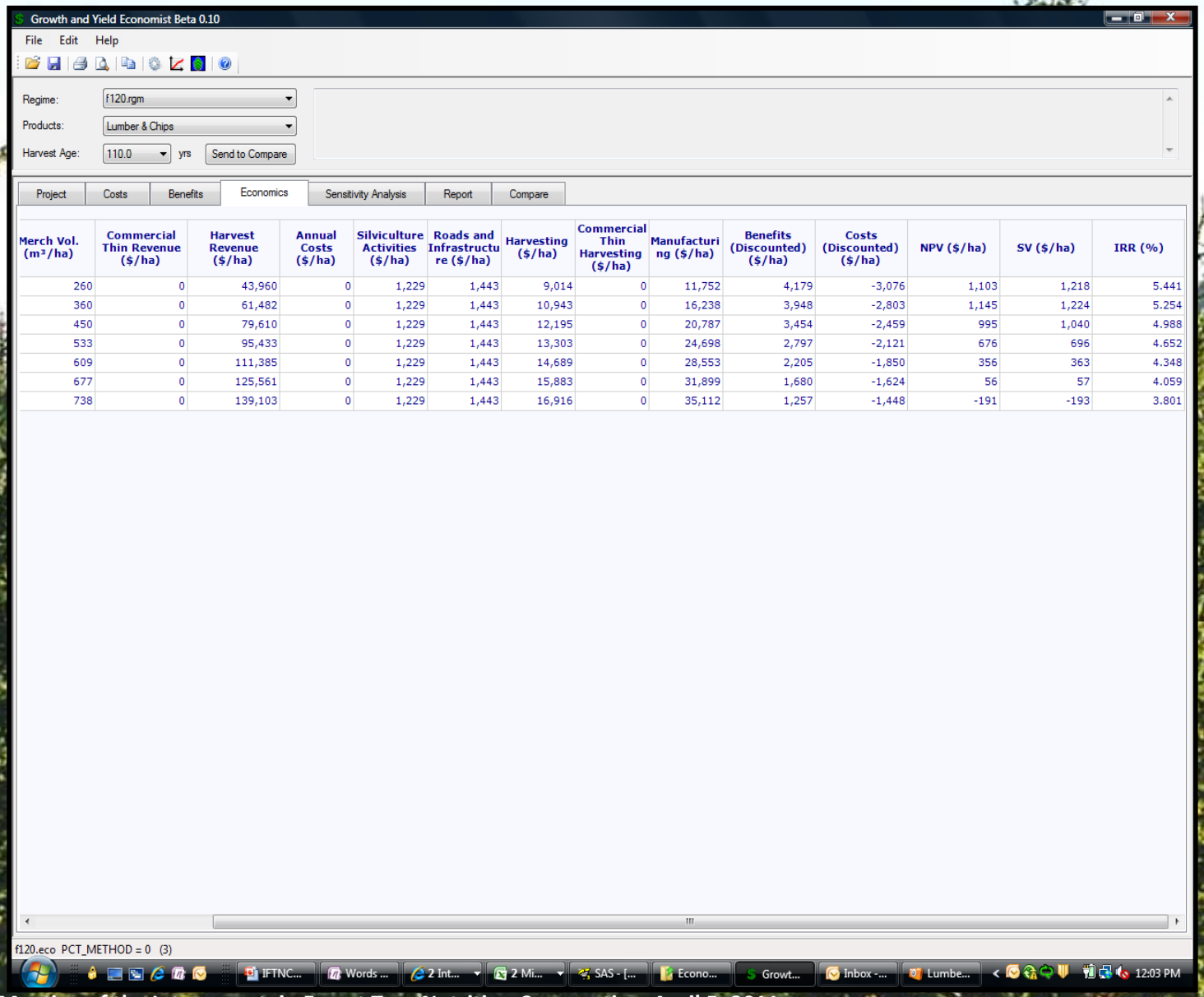
Economic Analysis Module "FAN$IER"

(**F**inancial **A**nalysis **S**ystem **I**ncluding **E**conomic **R**eturn)



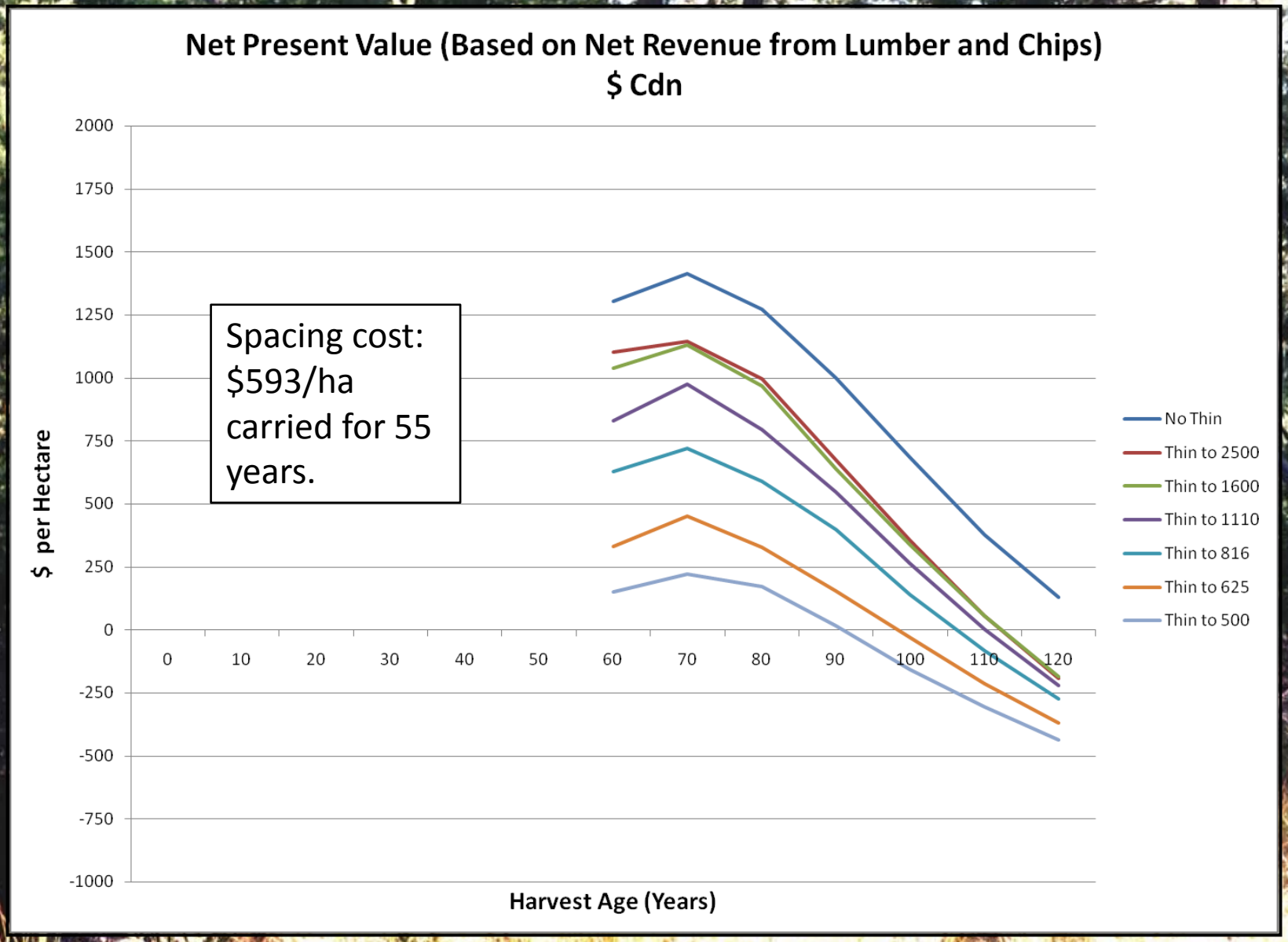
Economic Analysis Module "FAN$IER"

(Financial Analysis System Including Economic Return)

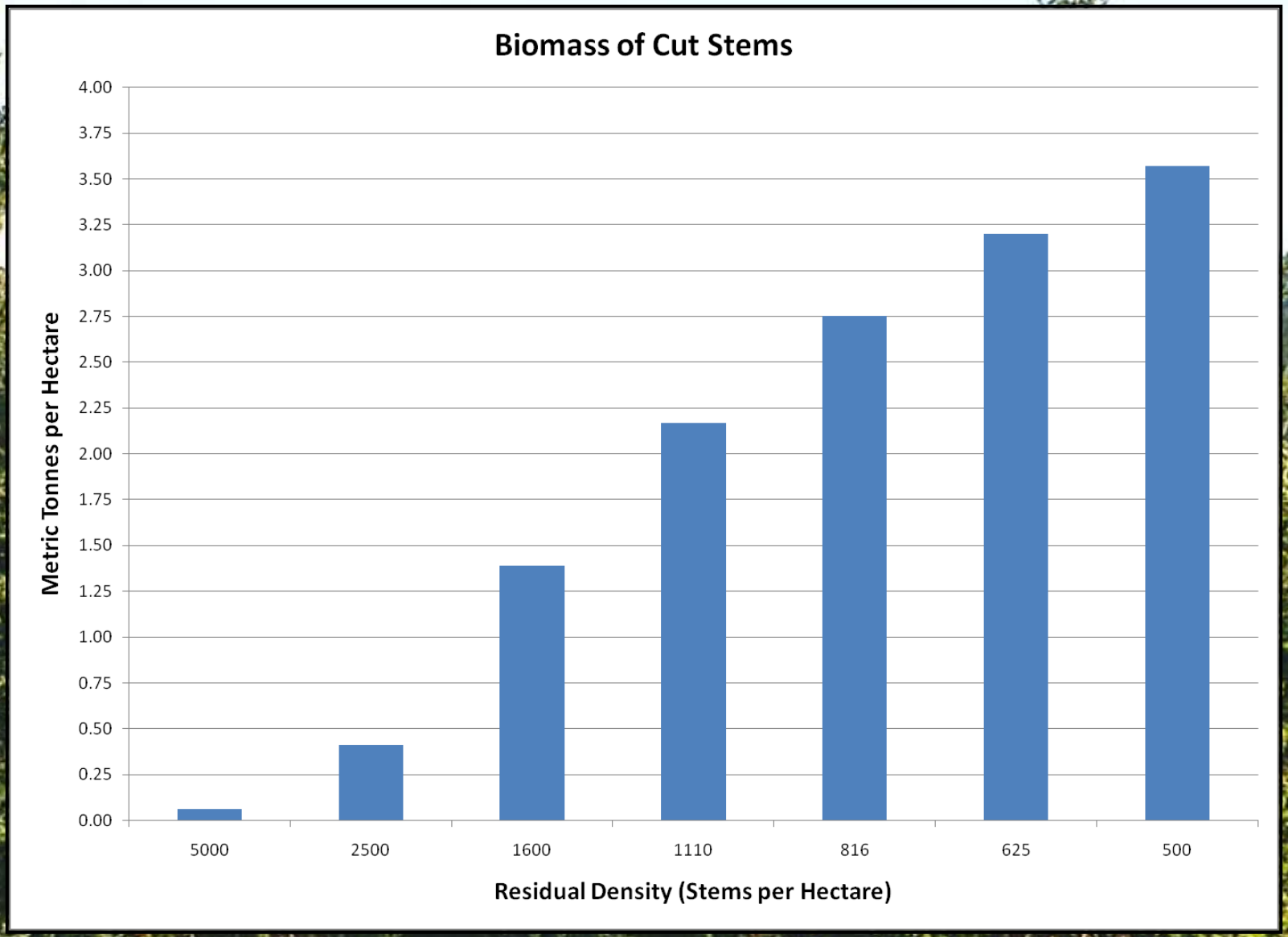


Merch Vol. (m^3/ha)	Commercial Thin Revenue ($/ha)	Harvest Revenue ($/ha)	Annual Costs ($/ha)	Silviculture Activities ($/ha)	Roads and Infrastructure ($/ha)	Harvesting ($/ha)	Commercial Thin Harvesting ($/ha)	Manufacturing ($/ha)	Benefits (Discounted) ($/ha)	Costs (Discounted) ($/ha)	NPV ($/ha)	SV ($/ha)	IRR (%)
260	0	43,960	0	1,229	1,443	9,014	0	11,752	4,179	-3,076	1,103	1,218	5.441
360	0	61,482	0	1,229	1,443	10,943	0	16,238	3,948	-2,803	1,145	1,224	5.254
450	0	79,610	0	1,229	1,443	12,195	0	20,787	3,454	-2,459	995	1,040	4.988
533	0	95,433	0	1,229	1,443	13,303	0	24,698	2,797	-2,121	676	696	4.652
609	0	111,385	0	1,229	1,443	14,689	0	28,553	2,205	-1,850	356	363	4.348
677	0	125,561	0	1,229	1,443	15,883	0	31,899	1,680	-1,624	56	57	4.059
738	0	139,103	0	1,229	1,443	16,916	0	35,112	1,257	-1,448	-191	-193	3.801

Net Present Value



Slash Biomass



Summary

- Douglas-fir PCT scenarios that pay over the long term are hard to construct in southern interior BC under current cost structures and product market conditions.
- IFTNC data very useful in TASS model validation steps.
- Next steps: further testing of new calibration and work on interior Douglas-fir model dynamics in species mixture with lodgepole pine for TASS III.

Thanks!

FIA Forest Investment Account
Forest Science Program

Forest Renewal BC funding

TASS Team