Wood quality and incremental silviculture
What do we know? What are we still learning?

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Coastal Silviculture Committee
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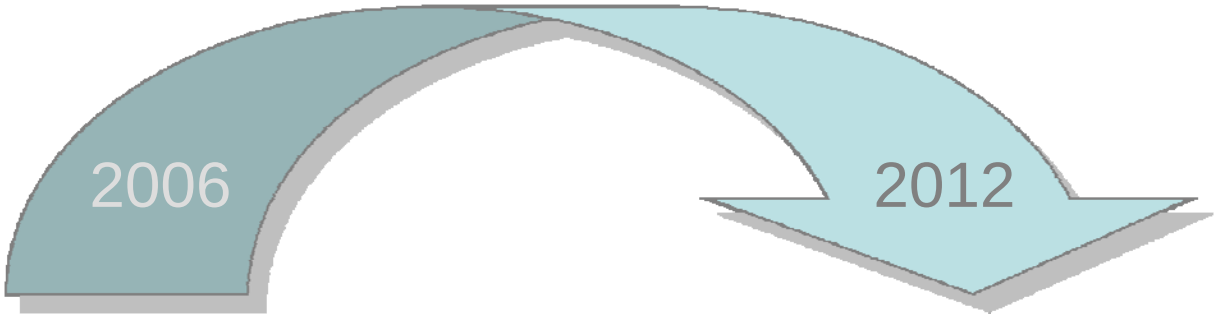


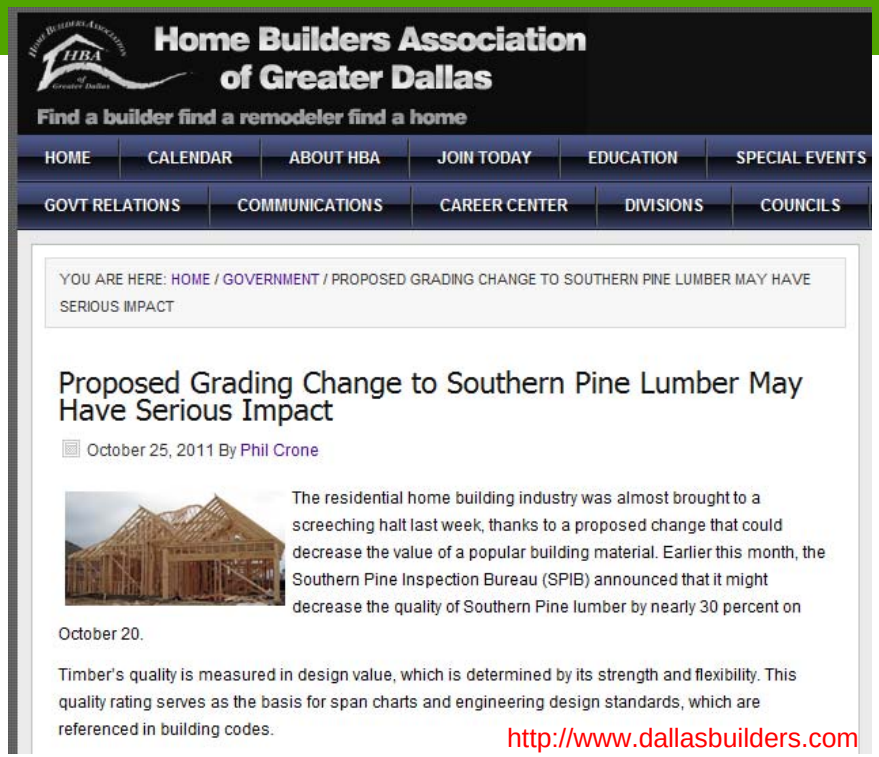
Linking the Forest to the Value Chain

The British Wars (1801-1814)

The Battle of Copenhagen (1807)

200 years later “Your Oaks are ready now”

The “Battle” of Southern Pine Lumber (2011-2012)



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Proposed Grading Change to Southern Pine Lumber May Have Serious Impact

October 25, 2011 By Phil Crone

The residential home building industry was almost brought to a screeching halt last week, thanks to a proposed change that could decrease the value of a popular building material. Earlier this month, the Southern Pine Inspection Bureau (SPIB) announced that it might decrease the quality of Southern Pine lumber by nearly 30 percent on October 20.

Timber's quality is measured in design value, which is determined by its strength and flexibility. This quality rating serves as the basis for span charts and engineering design standards, which are referenced in building codes.

http://www.dallasbuilders.com

ProSales hanley wood

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WOOD

Posted on: January 11, 2012 6:12:32 PM | From: ProSales 2012

ALSC Approves Design Value Changes for Southern Pine 2x4s

Declines to approve changes to any other dimensions pending further testing

By: Brendan Rimetz

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The American Lumber Standard Committee (ALSC) approved today a reduction in some design value changes for visually graded No. 2 Southern pine 2x4s, but said it lacked the authority to change any other grades and sizes of the species until testing occurs.

The changes reduce by 25% to 30% some of the design values for No.2 2x4s, effective June 1, ALSC's decision said. In a supplemental ruling, the ALSC said the design value changes are also effective for all lower grades of Southern pine 2x4s.

http://www.prosalesmagazine.com

Design values reduced by 20-35%

FEA - demand loss 1 – 2 ½ billion BF; prices ↓

WHY? Decreased lumber quality - change of the resource mix

What is WOOD QUALITY?

- **Briggs and Smith (1986)**

"…the appropriateness of wood for a particular end use"

- **Zhang (1997)**

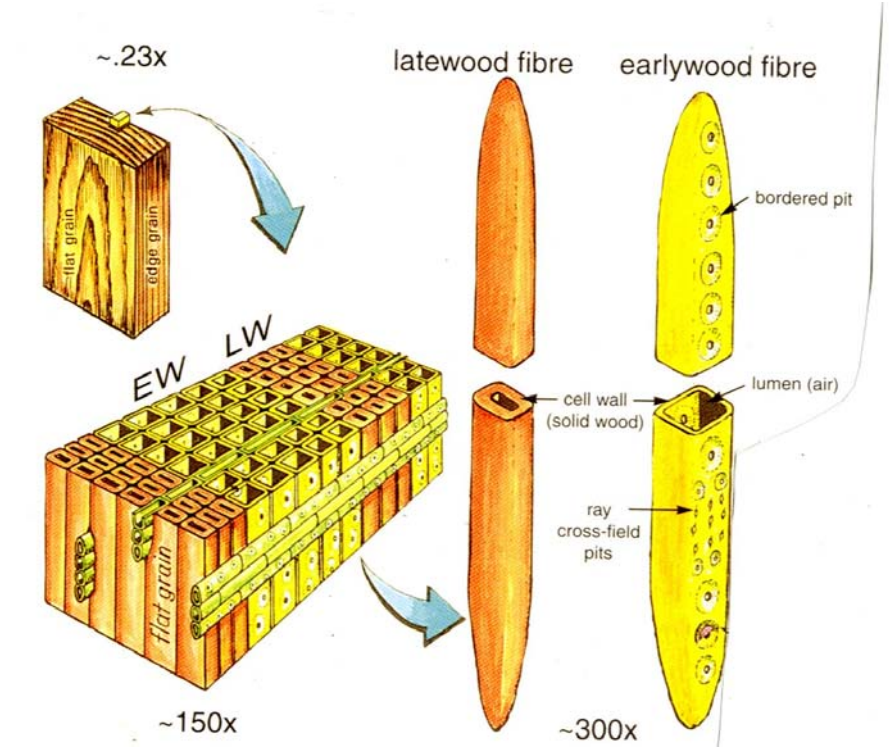
"all the wood characteristics and properties that affect the value recovery chain and serviceability of end products"

Net VALUE = Volume * (Gross VALUE – COSTS)

Wood properties (attributes)

- Wood Density
- Dimensions and dimensional stability
- Mechanical properties (stiffness and strength)
- Stem taper
- Knottiness (size and frequency)
- Uniformity / rate of growth
- Proportion juvenile / mature wood
- Microfibril angle
- Fibre length and coarseness
- Chemical composition

Wood structure 101



Jozsa and Middleton (1994)

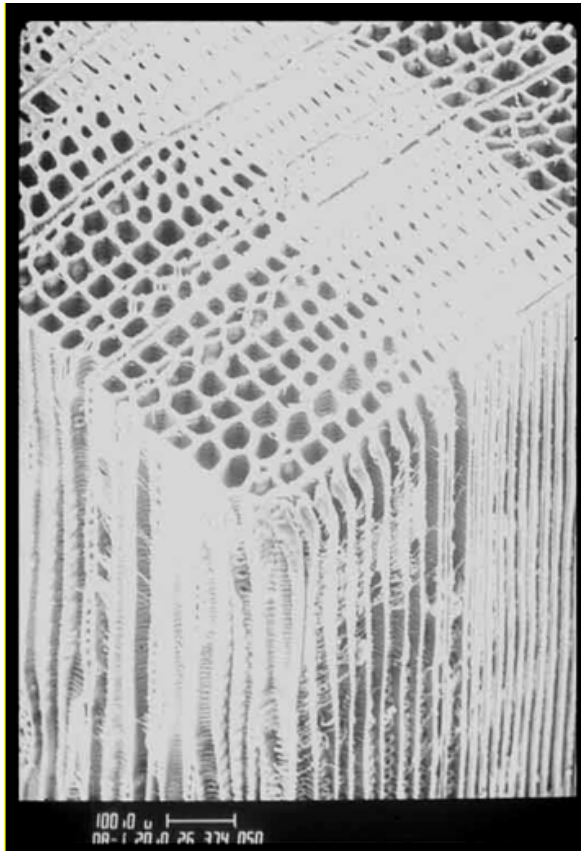
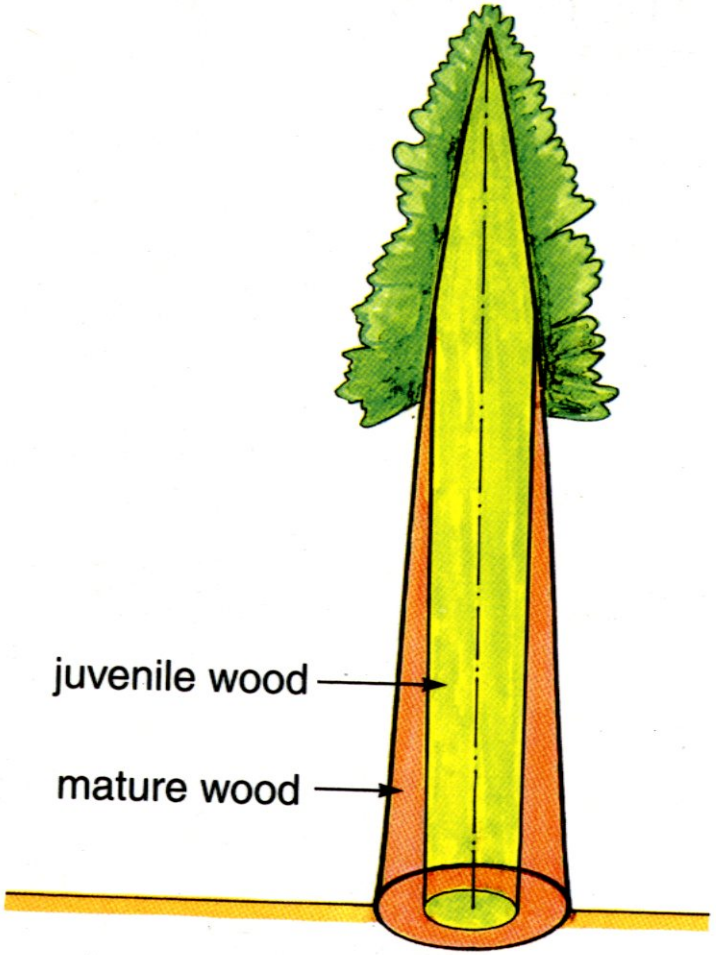


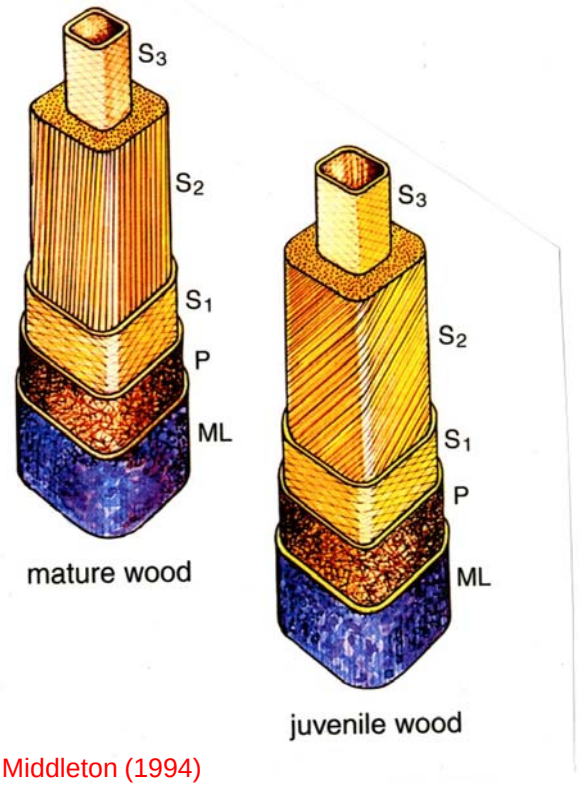
Photo by Vicki Herian

Juvenile / mature wood



Jozsa and Middleton (1994)

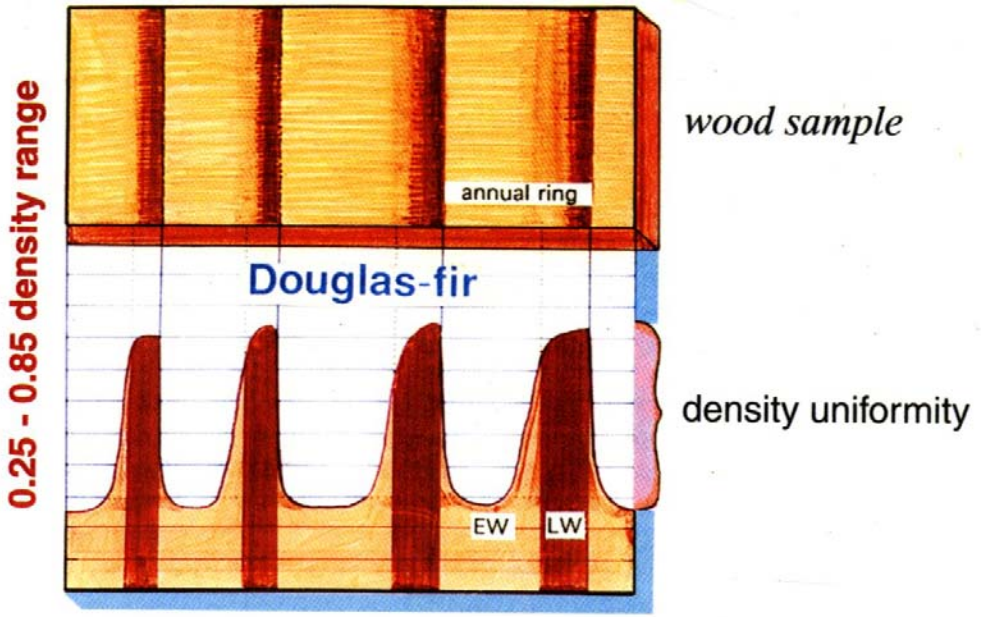
Microfibril angle



Jozsa and Middleton (1994)

- Strength
- Stiffness
- Dimensional stability

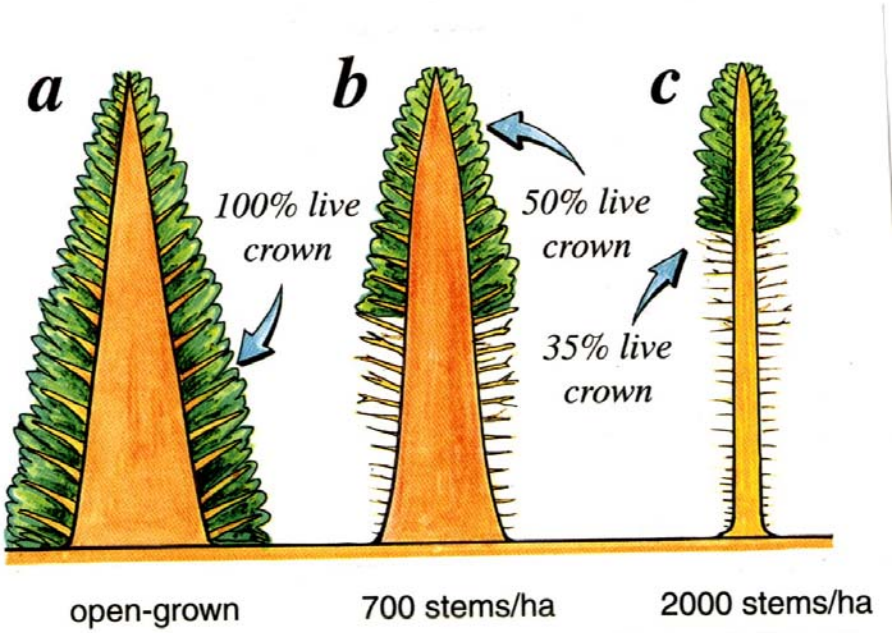
Uniformity



Jozsa and Middleton (1994)

- Rate of growth
- Age
- Physiology
- Site

Stocking – crown – stem



Jozsa and Middleton (1994)

- Crown length
- Taper
- Branchiness

Stand Density Management – Wood Quality

- Rate of growth
- Crown ratio (proportion of juvenile wood)
- Branchiness
- Taper
- Wood density (specific gravity)
- Strength and stiffness

Timing, intensity, type of treatment, species

Fertilization – Wood quality

- Rate of growth
- Wood density
- Juvenile wood
- Branchiness
- Strength and stiffness

Site, species, type and amount of fertilizer

Pruning – wood quality

- Branchiness
- Rate of growth
- Crown ratio – juvenile wood
- Taper

kyoto-shugi.org

Levels of growing stock - LOGS

LOGS site	Location		Elev.	Establ.	Age	DBH	Site Index
	Lat.	Long.	(m)		(yrs)	(cm)	(m, 50 yrs)
Sayward, BC	N50° 04'	W125° 35'	274	1969	62	19.6	34
Shawnigan L., BC	N48° 38'	W123° 43'	335	1970	64	17.2	29
Iron Creek, WA	N46° 24'	W121° 59'	762	1966	60	33.5	40
Hoskins, OR	N44° 40'	W123° 31'	305	1963	66	36.2	41
Stampede, OR	N42° 93'	W122° 95'	823	1968	75	27.6	34

UNTHINNED

758-1696 sph

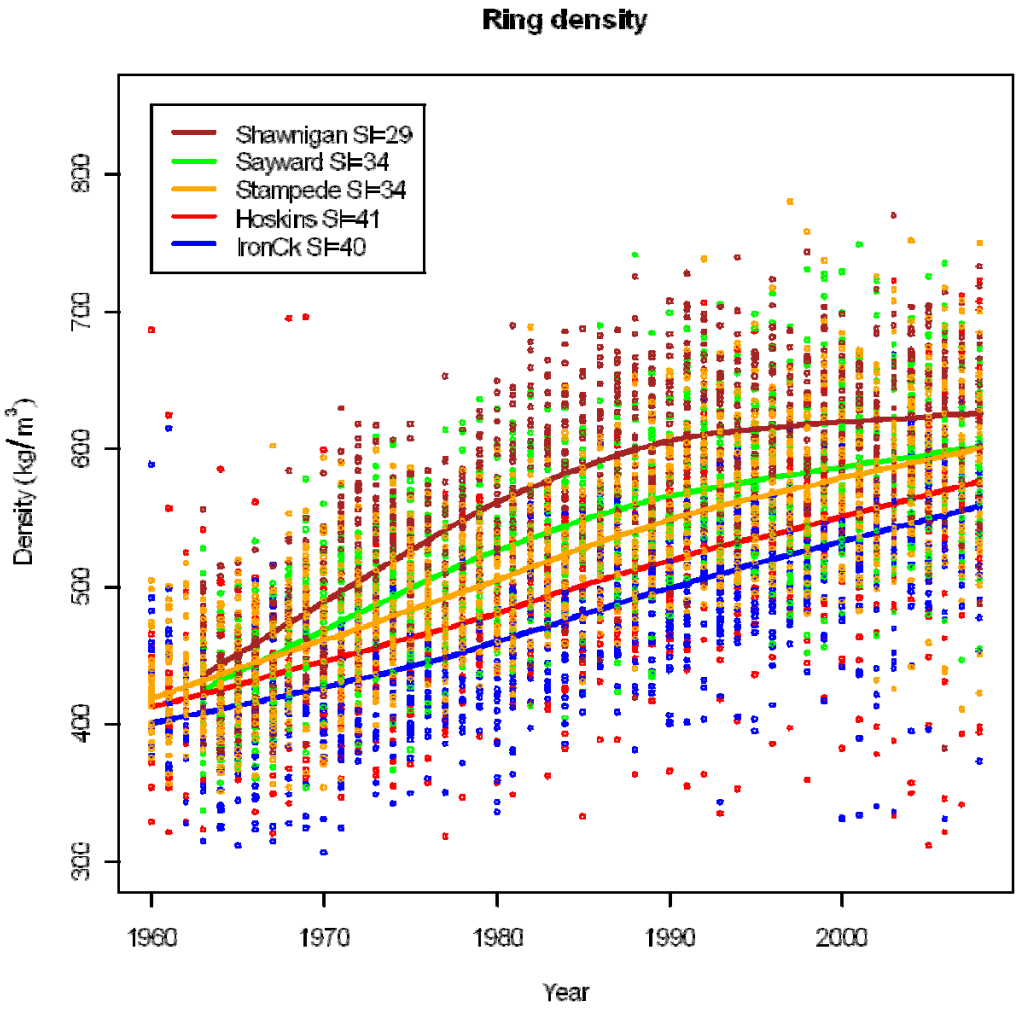
LIGHT THIN (70%)

424-642 sph

HEAVY THIN (30%)

202-272 sph

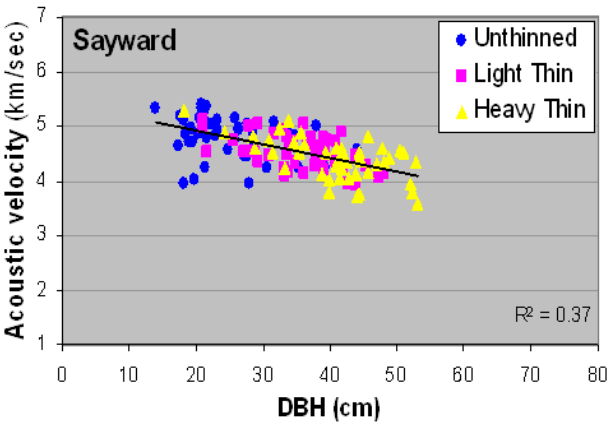
Wood density – Site

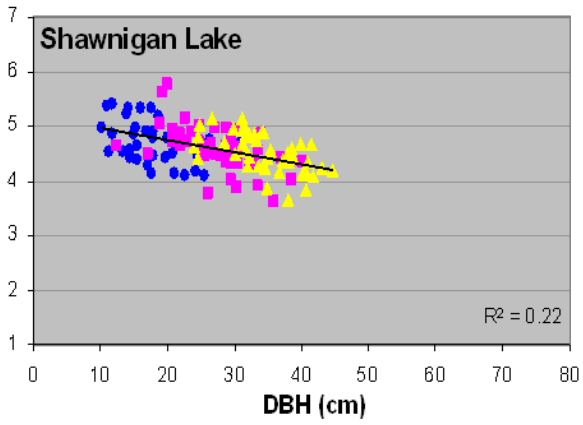


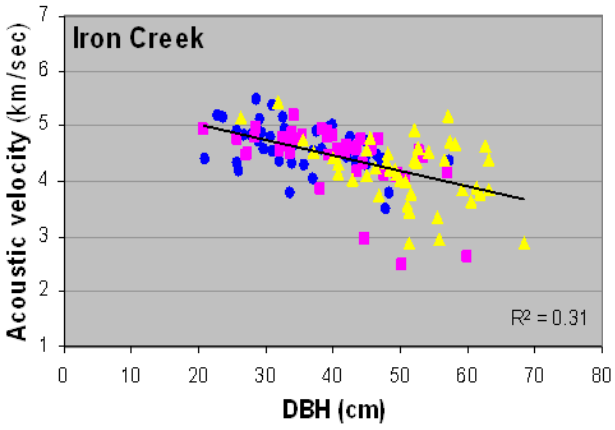
Ring density ↓ with SI ↑

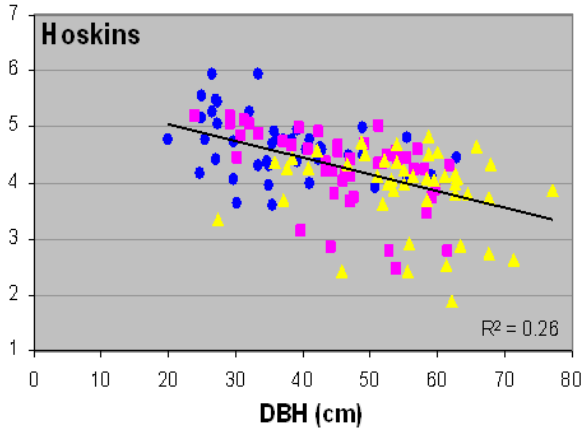
Summer moisture? Latewood % ↓?

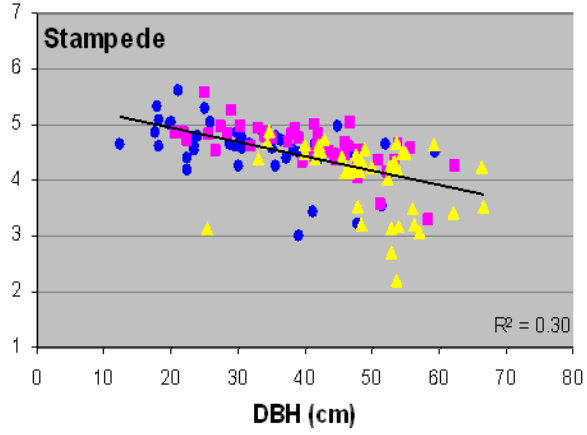
Diameter effect on acoustic velocity (stiffness)







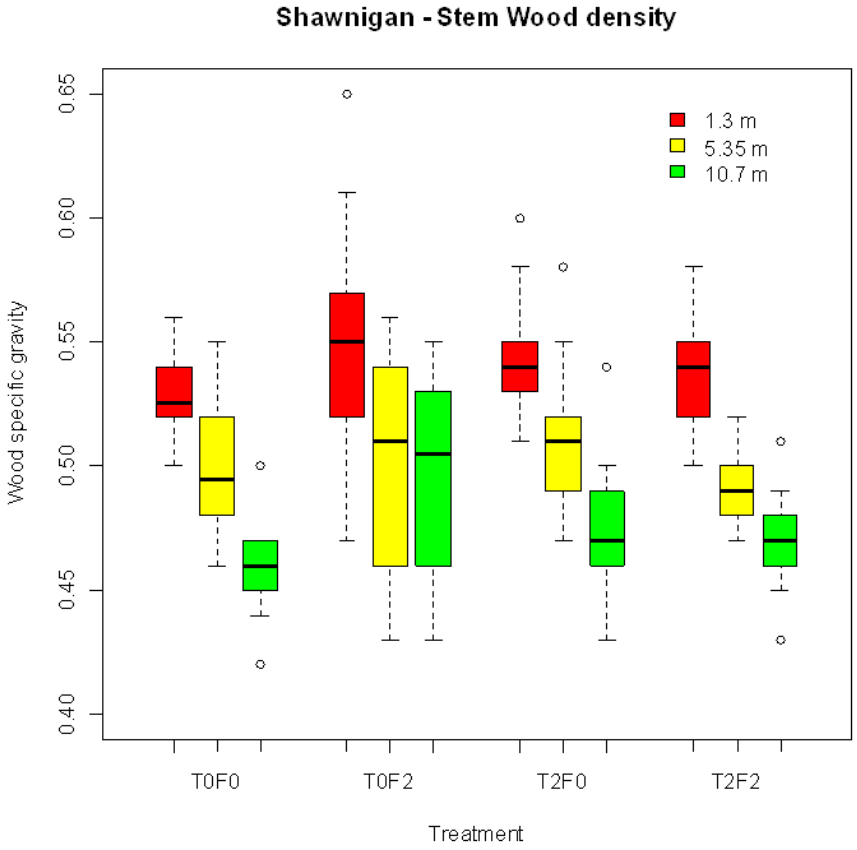


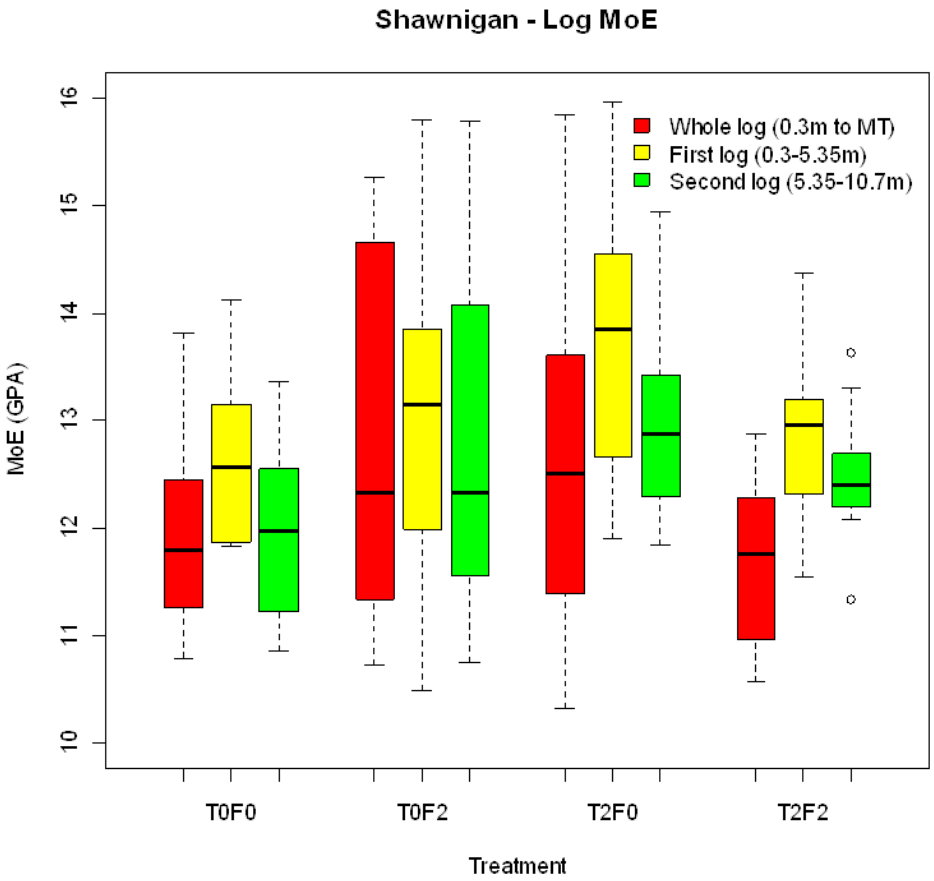


Shawnigan Lake – Thinning and Fertilization

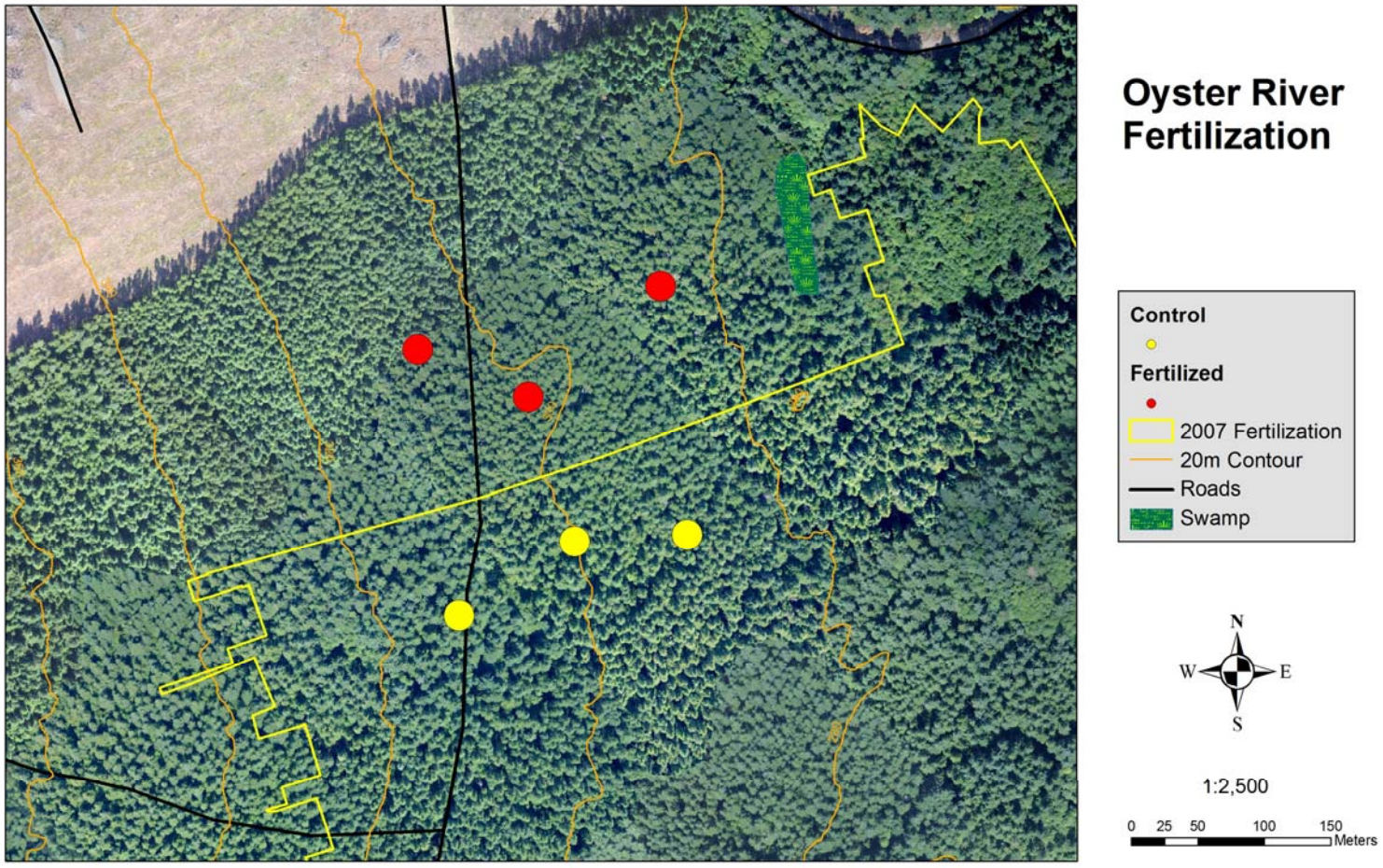
- 2nd growth Douglas-fir
- CWHxm1 (moderately dry, nutrient-poor to medium)
- Thinned and fertilized 1971 @ age 24
- 2011 – destructive sampling of 40 trees
- Treatments 2x2
  - T0 control,
  - T2 (2/3 BA removed),
  - F0 control,
  - F2 448 kg N/ha
- T0F0, T0F2, T2F0, T2F2

Shawnigan Lake – Treatment effects

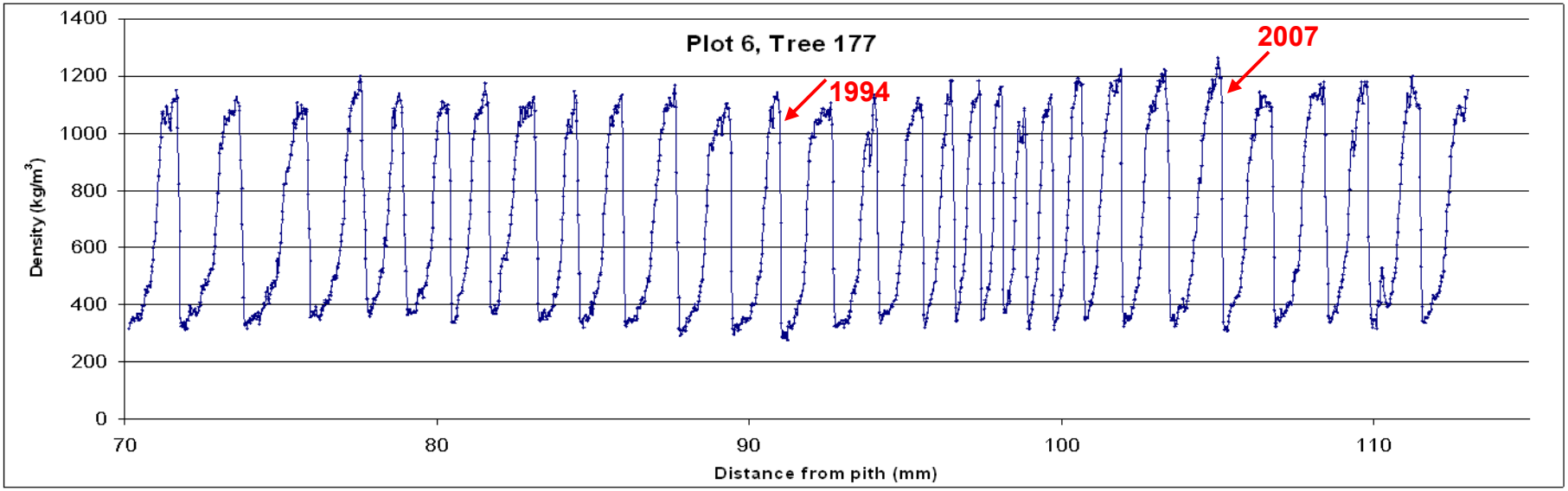


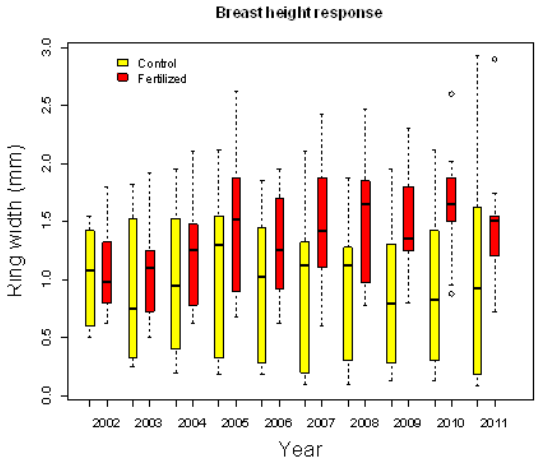


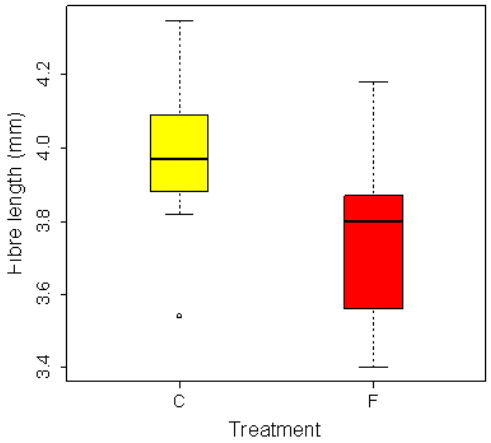
Late rotation fertilization



Oyster River – preliminary findings







Does the market care about wood quality?

- Anecdotal evidence: Yes, Maybe, No
- Lack of hard data (track costs, sale value)
- Need for a comprehensive approach (volumes, costs, recovery, range of grades/products)
- Visual assessment of attributes - quality logs
  knots (< 3 cm), grain (> 4-5 rings/inch), taper/form
- Proxy for log premium: domestic vs. Japanese export, last decade Fdc second-growth **$15-50, 26-65%** ; trend expected to continue

Other considerations – wood quality

- Composites and engineered wood products: OSB, MDF, LVL, CLT, glulam, finger-jointed
- Link between basic and incremental silviculture
- Attributes for emerging biomaterials, bioenergy
- Diversify markets vs. products
- Value-added – technology alone? Role for IS?

Concluding remarks

- IS as a toolbox: do not be afraid to use it as such
- Be bold, be patient, be bold – in this particular order
- Size and stiffness
- Best sites, largest trees? “Law of averages”
- Site-specific silviculture; seek and use local knowledge

Concluding thoughts

- **HAVE A PLAN**

  "*If you don't know where you're going, any road will take you there*" (Anon., 2012)

- **ACTION**

  "*If you do nothing, how do you know when you're done?*" (Car Talk, NPR, 2011)