

An aerial photograph of a vast, dense forest landscape. The foreground and middle ground are filled with a thick canopy of trees, showing a mix of green and brownish-red hues, suggesting a mix of tree species or a seasonal change. In the distance, a range of mountains stretches across the horizon under a clear, light blue sky. The overall scene is a wide, open natural landscape.

Lodgepole Pine Epidemic: Utilization & Scaling

Timber Measurements Society
Tacoma, WA
April 2011

Lodgepole Pine Epidemic

Mountain Pine Beetle (*Dendroctonus ponderosae*)

- Host Species: Lodgepole, Ponderosa, Whitebark, Sugar, White, Limber, Scotch Pines



Lodgepole Pine Epidemic

When MPBs attack....



Lodgepole Pine Epidemic

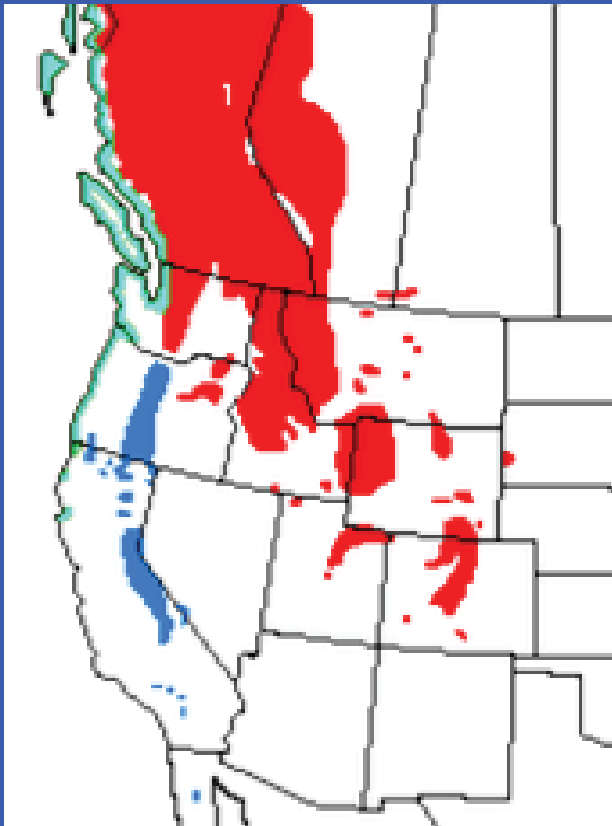
- ▣ Mountain Pine Beetle attack
 - Numerous egg galleries under bark
 - Larvae mine phloem area
 - Eventually girdle the tree
- ▣ Blue stain (*Grosmannia clavigera*)
 - Fungus spread by MPB
 - Spore carried within MPB mouths
 - Rapidly grow along MPB galleries & through tree phloem and sapwood
 - Eventually block tree liquid flow & sticky resins



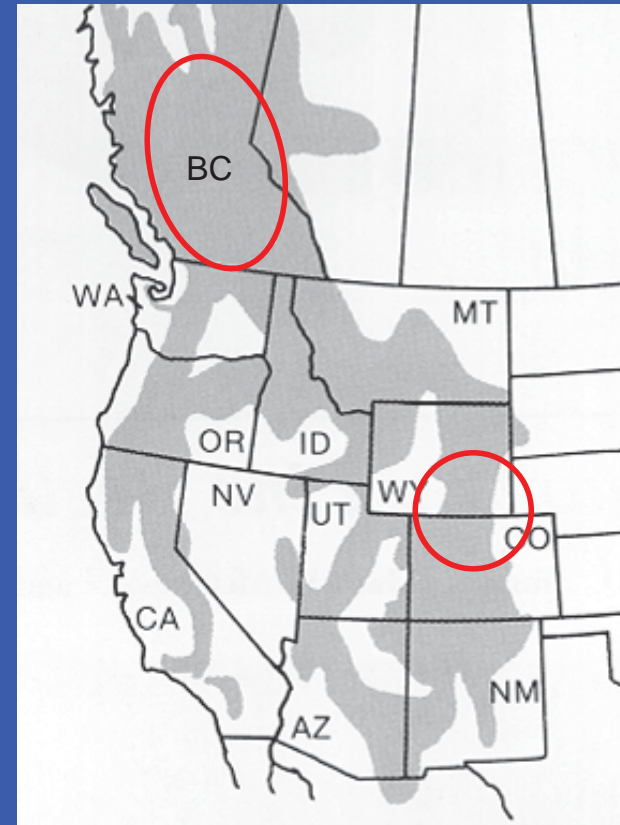


Lodgepole Pine Epidemic

- ▣ Range of LPP



- ▣ Range of MPB



Lodgepole Pine Epidemic

U.S.A.
COLORADO/WYOMING



CANADA
BRITISH COLUMBIA



Lodgepole Pine Epidemic

- ▣ Began in mid-late 1990s, both U.S. & Canada
- ▣ U.S.: Colorado/Wyoming
 - 2006 – 1.0 million acres
 - 2009 – 3.6 million acres
 - Also in South Dakota/Montana/
Utah/Washington/Idaho
- ▣ Colorado/Wyoming/South Dakota
 - 2010 – Continued expansion – 700,000+ new acres
 - MPB – Moving east from Lodgepole Pines to affect Ponderosa Pine forests

Lodgepole Pine Epidemic

- ▣ Most Severe in Canada:
 - 2000 – 0.3 million hectares (~ 741,000 acres)
 - 2010 – 16.3 million hectares (~ 40.3 million acres)
- ▣ British Columbia – 80% mature Lodgepole Pine expected to be affected by 2013
 - BC Ministry of Forests estimates merchantable inventory of LPP at 1.8 billion m³
 - Potentially over 1.4 billion m³ (~590 billion bf)

Lodgepole Pine Epidemic

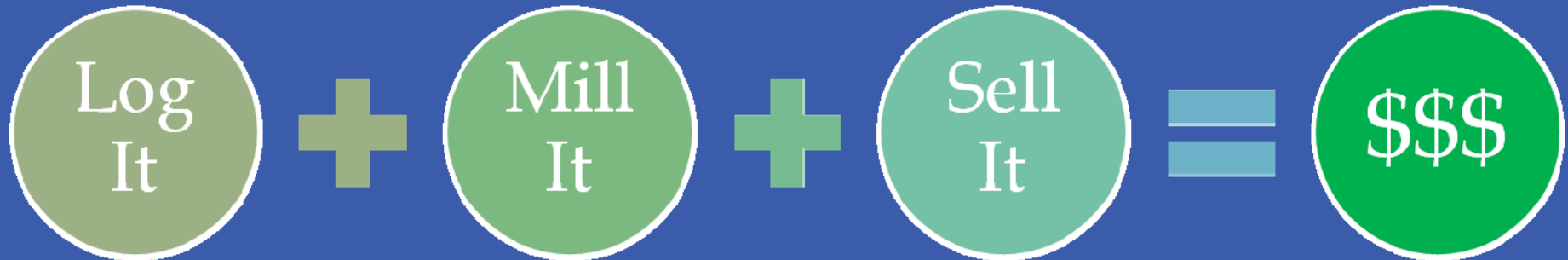
YEAR 2010 ESTIMATES			
Mtn Pine Beetle Impact	Million Hectares	Million Acres	Approx Board Feet *
British Columbia	14.5	39	117,000 mmbf
Alberta	2	5	15,000 mmbf
USA West	2.5	6	18,000 mmbf
Total	19	50	150 billion bf

** Using 3,000 bd ft per acre as a rough estimate*

Utilization



Utilization



▣ *Not quite that simple....*

- Harvesting issues
- Mill Processing issues
- Marketing issues

▣ *MPB killed LPP....*

- Changes in wood characteristics
- "Shelf life" considerations

Utilization – LPP Wood Changes

- ▣ General
 - Significant moisture loss
 - Processing is more time & energy intensive
- ▣ Sapwood – Blue stain
 - No volume loss, “green wood comparable” in strength
 - Increased water permeability
 - Reduced value output – lumber & chip production
- ▣ Heartwood
 - Harder & more brittle

Utilization – LPP Shelf Life

- ▣ Green Stage, 1st year – dead & blued
- ▣ Red Stage, 1 to 2 years
 - Moisture loss
 - Checking
- ▣ Gray Stage, within 2 to 5 years
 - <30% moisture content
 - Significant checking
 - Production costs rise
- ▣ Gray Stage, after 5+ years
 - Basal fungi & insects, trees fall
 - Harvesting challenges increase



Green Stage LPP



Red Stage LPP



Gray Stage LPP



Utilization – LPP Logs

▣ Dimension/Stud Lumber

- Value of “no check” logs similar to non-MPB wood
- Checking affects recovery
 - Depends on number, length, degree of spiral
 - More pronounced in smaller diameter logs
 - Recovery value 9%- 60% lower than non-MPB wood



▣ Plywood

- Low MC results in increased veneer ribbon breakage
- Recovery ~ 8% lower compared to non-MPB wood

Utilization - LPP Logs

- ▣ Wood Chips



- ▣ Biomass





Scaling

Scaling – LPP Logs

Scaling Rules vary....

- ▣ Canada (BC & Yukon)
 - Net Scale – Firmwood cubic (m³) + grade
 - Coastal & Interior grading rules
- ▣ Canada (Alberta)
 - Net Scale – Cubic (m³) + Sawlog recovery ($\geq 1/3$)
- ▣ US
 - Net Scale – Sawlog recovery ($\geq 1/3$) + grade
 - Cubic foot (ft³) & Board foot (bf)
 - Board foot – Eastside & Westside

Scaling LPP Logs



MPB killed LPP has....

- ▣ Blue Stain
 - Grading defect
 - No volume reduction
- ▣ Surface Check(s)
 - Result of moisture loss
 - Common to have one *Prominent* check
 - Defect volume reduction

Scaling LPP Logs

Surface checks, MPB-killed LPP (sawlog sort)....

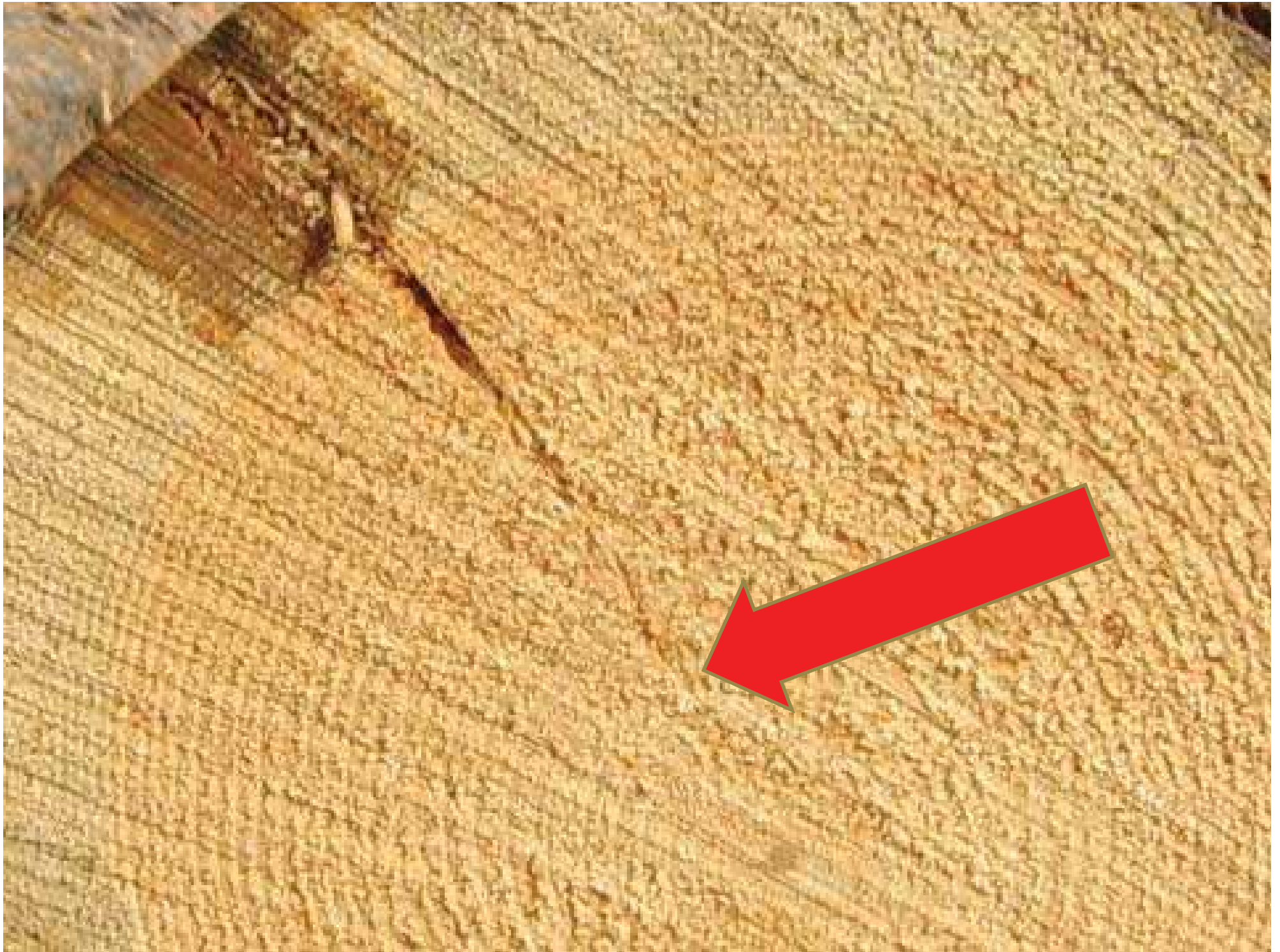
- ▣ Green (early red) stage – blue stain, no checks
- ▣ Red stage – intact bark may obscure checks
- ▣ Gray stage – most have single prominent check
- ▣ Most checks run straight (one log face affected)
- ▣ Occasionally affect only part of log length
 - Check-length extended if lumber recovery <6ft (2m)
- ▣ “Tight checks” can be difficult to recognize, swell almost shut on wet logs

Blue stain, No surface checks



Prominent Surface Checks





“Tight” Prominent Check

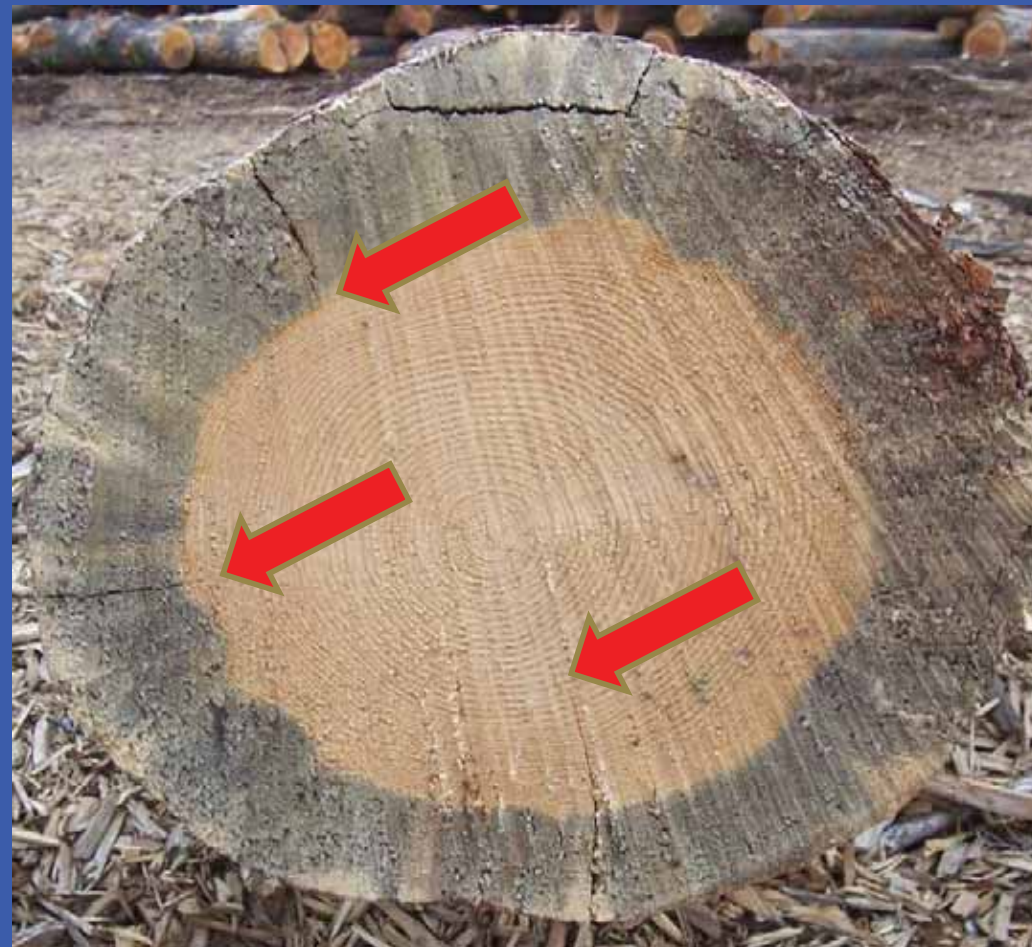


Shallow Surface Checks



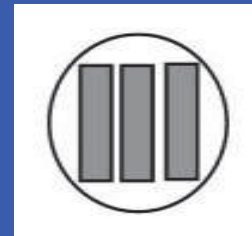


“Hidden” Surface Checks



Surface Check Deduction

- ▣ Based on depth of check + length affected
- ▣ Prominent check (extends into heartwood)
 - Eastside Scribner – deduct by pie-cut (sector)
 - ▣ 6" & 7" diameter – at least 1/3
 - ▣ 8" & 9" diameter – at least 1/4
 - ▣ 10" & 11" diameter – at least 1/6
- ▣ Shallow check (slight or no heartwood affected)
 - Measure a centered, new diameter inside the check(s)
 - deduct by diameter-cut, or portion of a diameter-cut



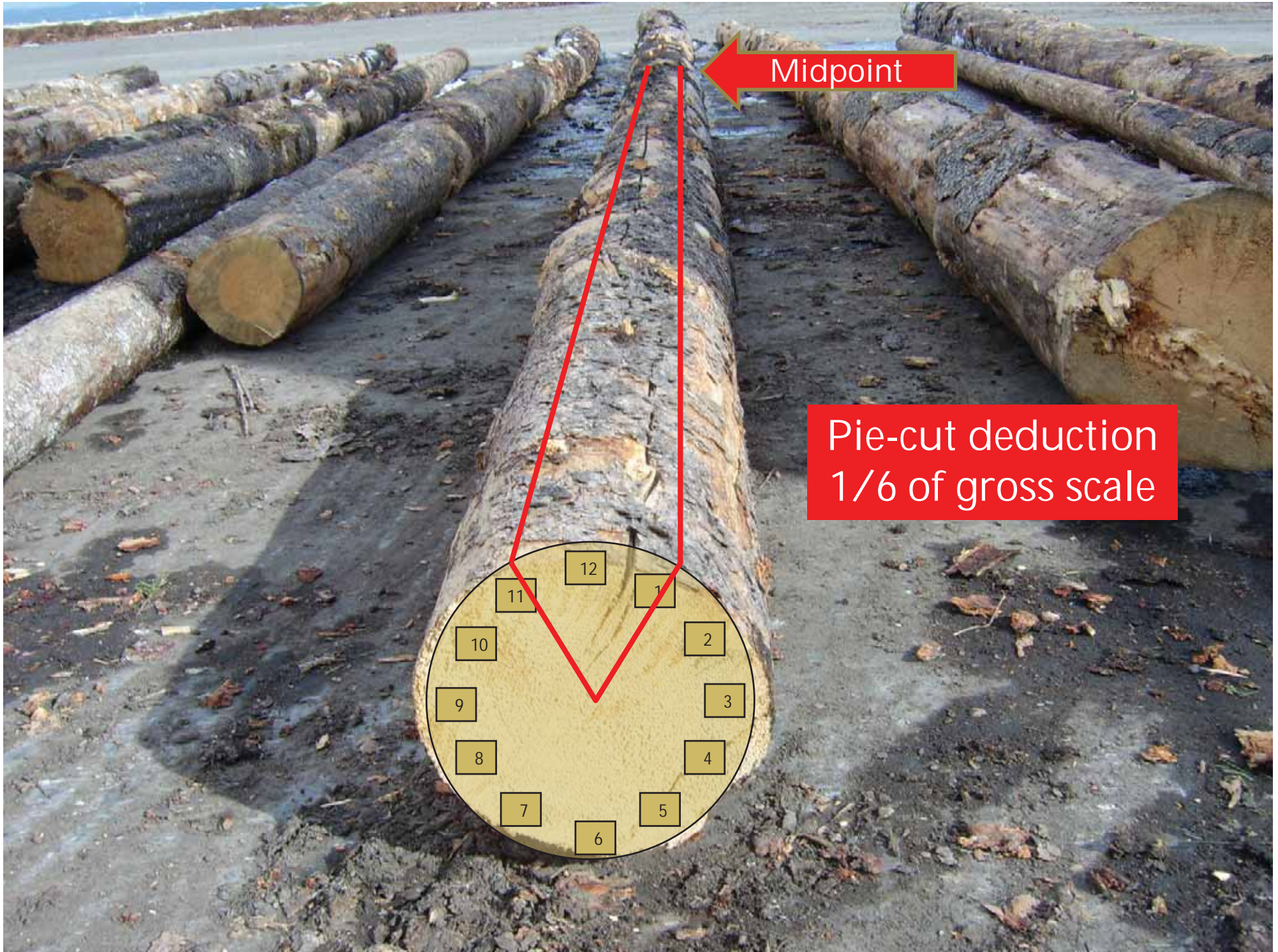


41' 0"
Length

Midpoint







Midpoint

Pie-cut deduction
1/6 of gross scale



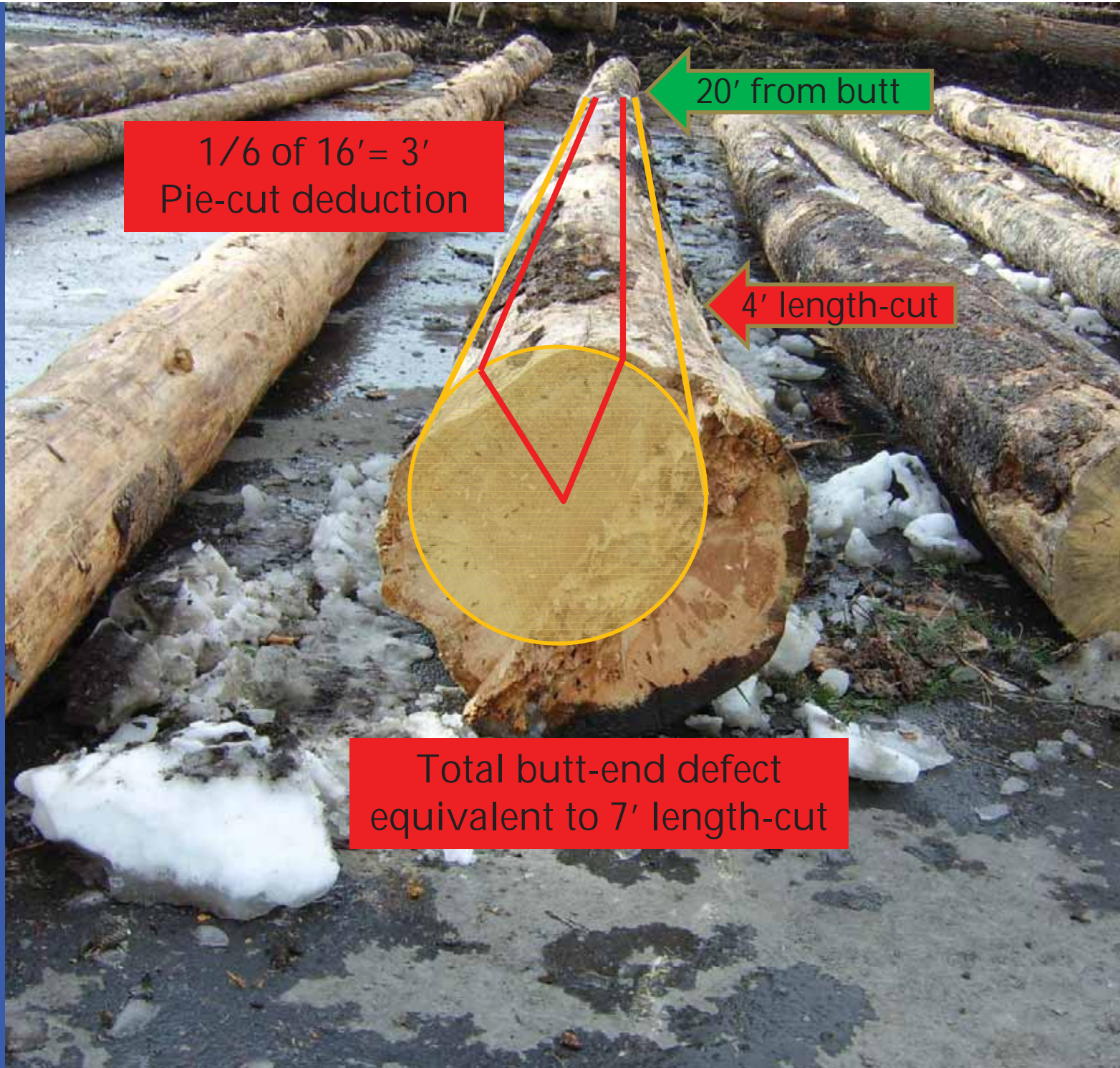
12' from butt

Midpoint



12' from butt





1/6 of 16' = 3'
Pie-cut deduction

20' from butt

4' length-cut

Total butt-end defect
equivalent to 7' length-cut

Eastside (Idaho) Scribner

40' scaling length

SED = 10" LED = 12"

Defect :

Top = 1/6 gross scale

Butt = 4' length-cut

1/6 of 16' = 3' (check)

	top	butt	total
Gross	.07	.08	.15 mbf
Defect	.01	.03	.04 mbf
Net	.06	.05	.11 mbf

Westside Scribner

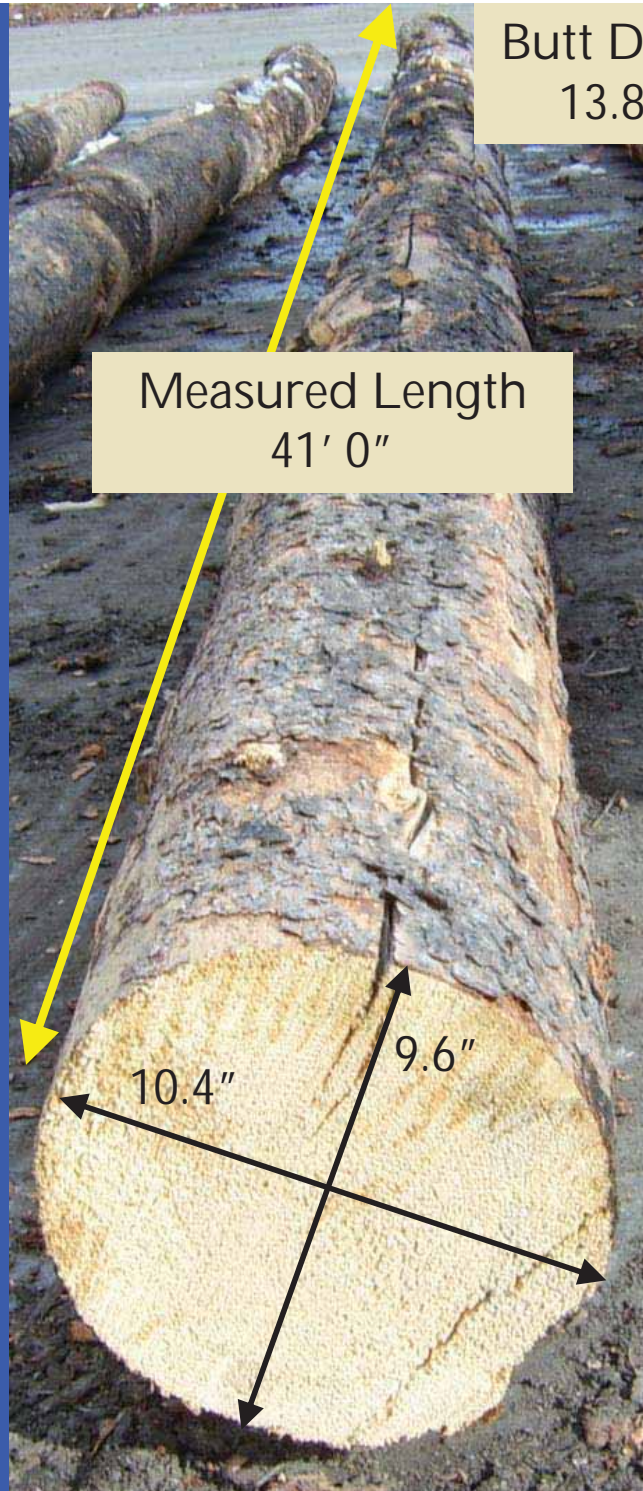
40' scaling length

SED = 9" LED = n/a

Defect: 4' length-cut (butt)

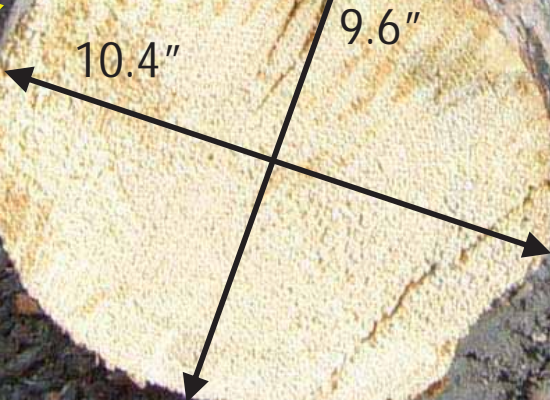
1" diam-cut (check)

Gross	= .12 mbf
Defect	= .04 mbf
Net	= .08 mbf



Butt Diam
13.8"

Measured Length
41' 0"



Cubic Foot

40' scaling length

SED = 10" LED = 14"

Defect:

Top = 4" x 4" x 20' (check)

Butt = 4' length-cut (butt)

4" x 4" x 16' (check)

	top	butt	total
Gross	13.4	18.6	32.0 ft ³
Defect	2.2	5.5	7.7 ft ³
Net	11.2	13.1	24.3 ft ³

Cubic Metres (BC)

12.5m scaling length

SED= 12 rads LED= 18 rads

Defect: 1m (butt)

2 rads (check)

Firmwood Scale = 0.919 m³

Grade defect = 0.276 m³

Grade net = 0.643 m³

(>50%, no downgrade)

Grade 2 Sawlog?