Butt Log Taper in Lodgepole Pine

100% live crown

50% live crown

35% live crown

open-grown   700 stems/ha   2000 stems/ha
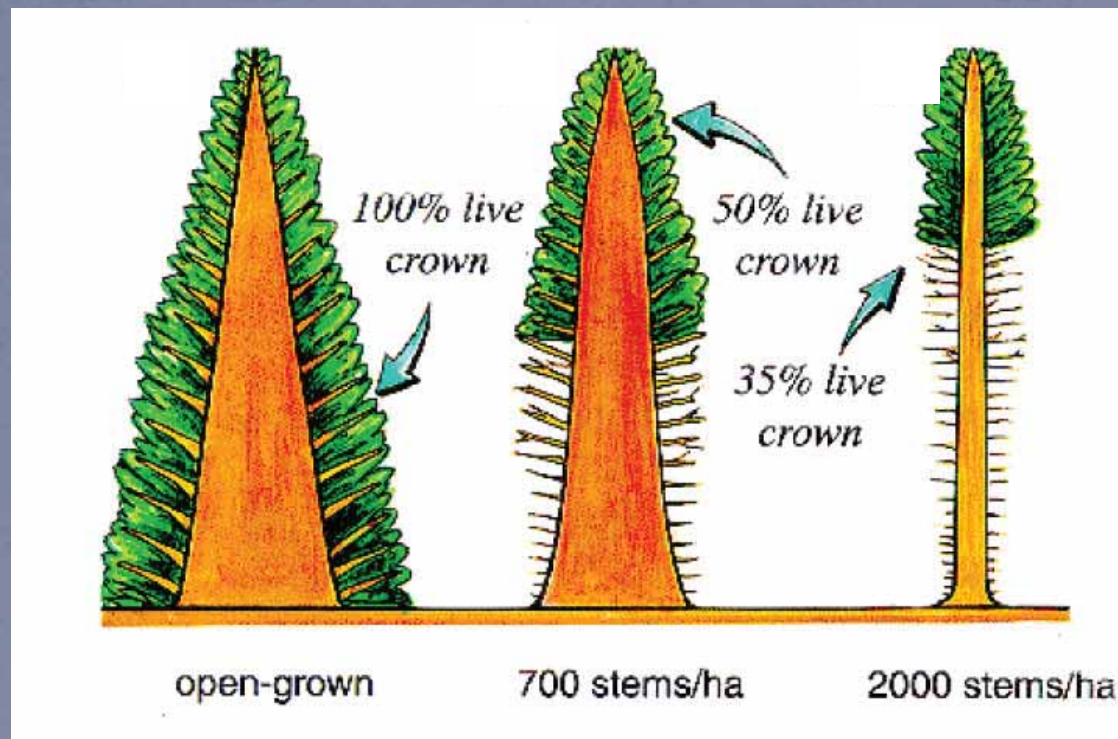
Josza and Middleton 1994

What is the current scaling issue given the changing resource?
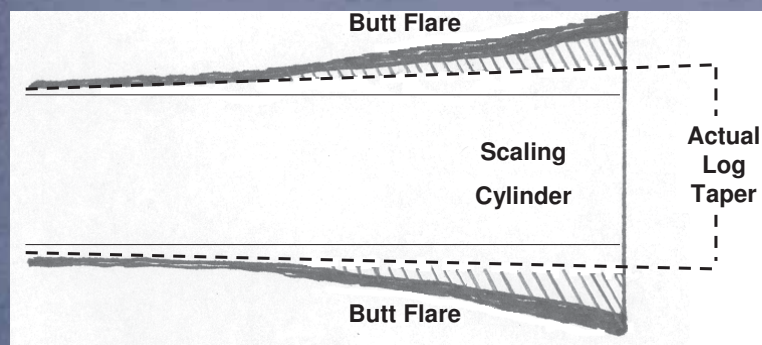
Taper rule for butt log of lodgepole pine

The taper in long logs which have the butt cut at one end of the log will be determined as follows:

- Logs with a scaling length of 21 through 40 feet:
  Use R6-2400-28, "Taper Log Rule-Scribner Decimal C".

- Logs with a scaling length of 41 plus feet: Actual taper will be determined by measuring the diameter of both ends using procedures outlined in 17.3 - Log Diameters and computing total taper. On butt logs, the butt diameter is measured by projecting the actual taper of the log through the flared butt area

Butt Diameter Measurement of Log with Scaling Length of 41 Plus Feet.

Butt Flare

Scaling Cylinder

Actual Log Taper

Butt Flare

Butt Flare

Average Two Measurements
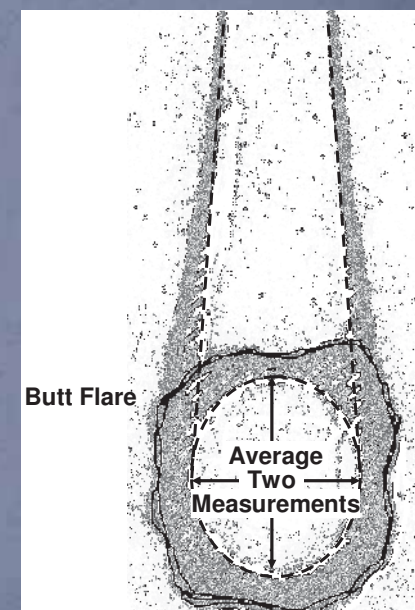
Use R6-2400-28
"Taper Log Rule-Scribner Decimal C"

Butt Log Taper Table R-6
20 ft – Max
All species except western larch

Total Taper	Lengths	Taper Diameter (Applied to each segment)
1"/2"	21' – 31'	D + 1"
3" / 4"	32' – 40'	D + 2'
	41"	
	42' – 50'	
4"	41' – 46'	D + 2" + 1"
5" / 6"	47' – 54'	D + 2" + 2"

What does that 1"
in scaling diameter
mean to you?

If you decrease taper to 1"….

….then Scribner scale is reduced 10 or more board feet depending on log size and log length

Dia	5	6	7	8	9	10	11	12	13	14	15	16
Lgth												
32	30	50	60	70	90	120	140	160	190	230	280	320
33	40	50	60	70	100	130	150	160	200	240	290	330
34	40	50	60	70	100	130	150	170	210	240	300	340
35	40	50	60	80	100	130	160	170	210	250	310	350
36	40	60	60	80	100	140	160	180	220	260	320	360
37	40	60	70	80	110	140	170	180	220	260	330	370
38	40	60	70	80	110	140	170	190	230	270	340	380
39	40	60	70	90	110	150	180	190	240	280	350	390
40	40	60	70	90	120	150	180	200	240	290	360	400

What's the problem?

* Scaled sales

* Oregon and Washington (eastern)

* Logs between 32 and 40 feet

What are some things

that confound the issue?

Not only how trees are grown….
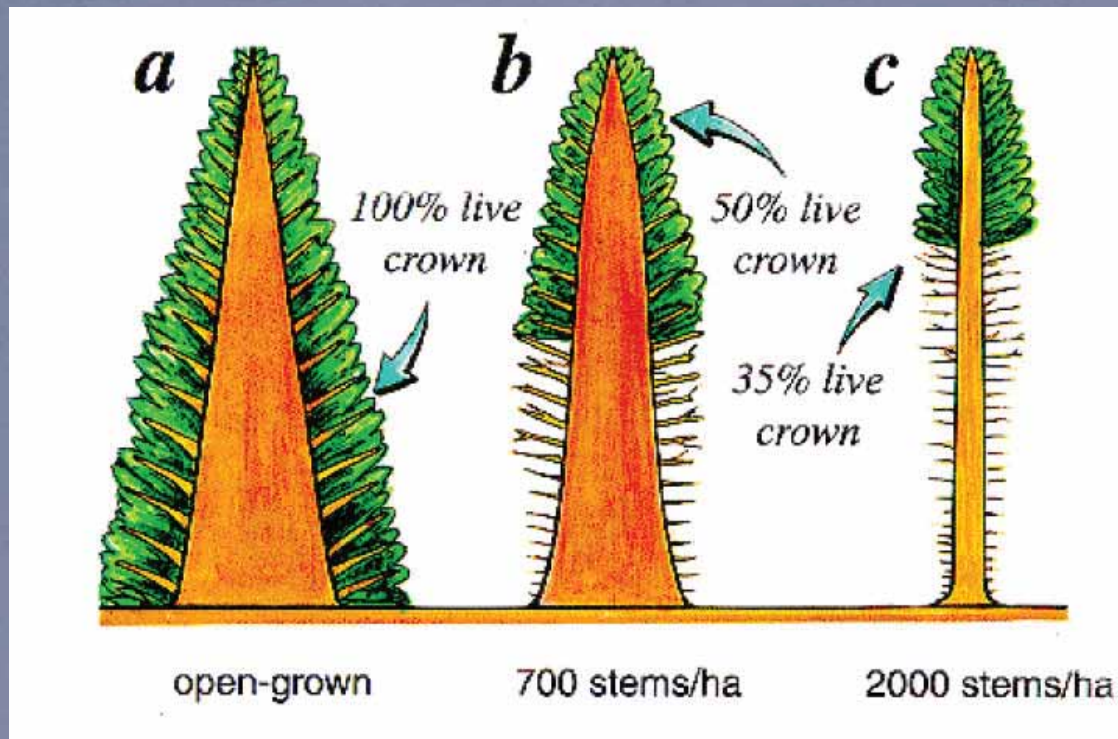
.... but where......

2004 North American average sawlog diameters by region, measured at small end in centimeters and inches (Spelter and Alderman, 2005, FPL-RP-630)

Region	Centimeters	Inches	Number of mills
BC [a] Coast	42.1	16.6	7
Pacific Northwest	30.7	12.1	35
Interior BC	24.1	9.5	24
Interior West	24.1	9.5	23
Maritime[b]	25.1	9.9	33
U.S. Midwest	21.3	8.4	9
U.S. South	22.5	6.3	74
Boreal [c]	15.9	6.2	63

[a] BC, British Columbia.
[b] Includes Canadian Provinces and parts of Quebec east of St. Lawrence River and states north of Massachusetts.
[c] Includes Canadian Provinces east of British Columbia to the St. Lawrence River.

Lodgepole pine: western Wyoming and eastern Idaho
(PNW historical data, Plank 1984)

Area and Condition	DBH Range	Average DBH	Height Range	Average Height
	----------inches----------		---------feet---------	
Area 1				
Live	7.2 – 13.9	10.1	67 – 86	78
Dead	8.0 – 16.4	11.4	58 – 89	74
Area 2				
Live	8.0 – 17.2	13.0	61 – 95	78
Dead	9.1 – 22.3	13.6	60 – 102	80
Area 3				
Live	7.0 – 13.3	9.6	52 – 84	68
Dead	8.4 – 20.9	12.9	44 – 101	70

….and how the logs are processed….
(local capacity)

….. and what the wood will be used for.

Let's look at some data....

1995 : Priest River, Idaho

20 lodgepole pine trees from densely stocked stand

Statistic	Dbh (inch)	Age	Ht (feet)
Mean	10.6	56	73
Minimum	6.4	48	59
Maximum	14.4	62	86

Log length	Average taper	Segment taper
16.3 – 29.0	1.06	
32.6 – 33.3	2.6	1.3

2004: Usk, WA

Mixed conifers,
established after fire in 1940s
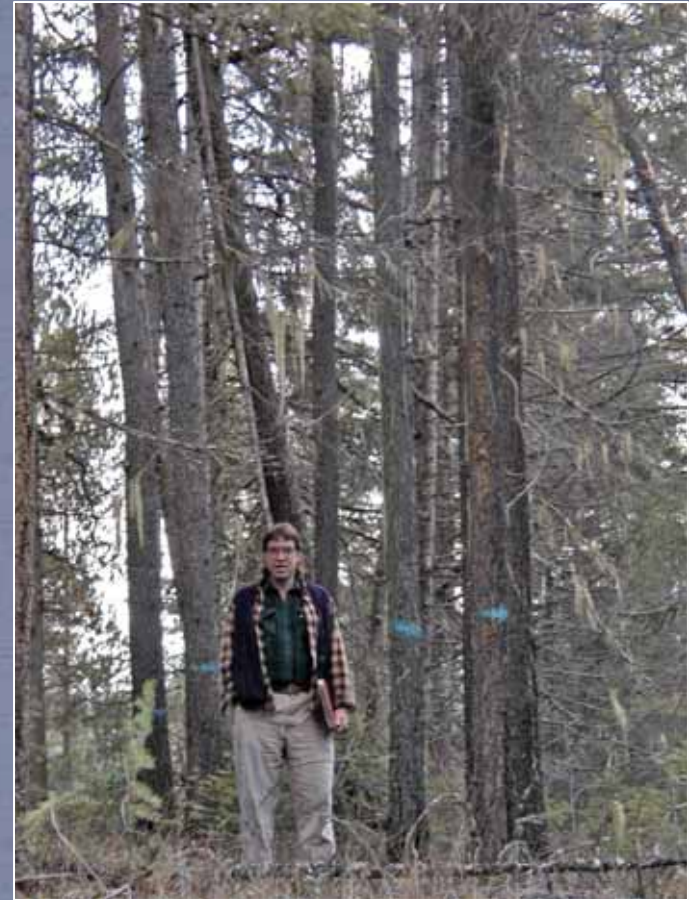
50 lodgepole pine trees from existing FS sale

Statistic	Dbh (inch)	Age	Ht (feet)
Mean	9.1	65	76
Minimum	6.5		61
Maximum	12.6		87

Log length	Average taper	Segment taper
18.7 – 28.8	0.65	
35.5 – 39.9	1.94	0.82

Vaagen Brothers (Scott Dodsen)

Log length	SED	Segment taper
32 – 40	3 – 8+	1.15

From Ernie Bauer (IBSP)

Northern ID (n=224)
Southern ID (n=61)

Average taper = 1.27"

INGY database equations

Used for validating cruise data, not scale data

Just for fun…..

INGY Profile Data comparison

Study	INGY Height from ground	INGY dib	Empirical height from ground	Empirical dib
Usk, WA	4.5	8.6	4.5	8.0
	18.8	7.6	18.8	7.4
	40.2	6.2	37.7	6.2
Priest River, ID	4.5	10.0	4.5	9.7
	18.2	8.8	16.6	8.6
	31.9	7.7	33.0	7.4

Usk
   ave dbh = 9.1"
   ave ht =   76'

Priest River
   ave dbh = 10.6"
   ave ht =   73'

Are additional data needed?   Yes

  ✳   from a variety of stand types

  ✳   broad geographic area

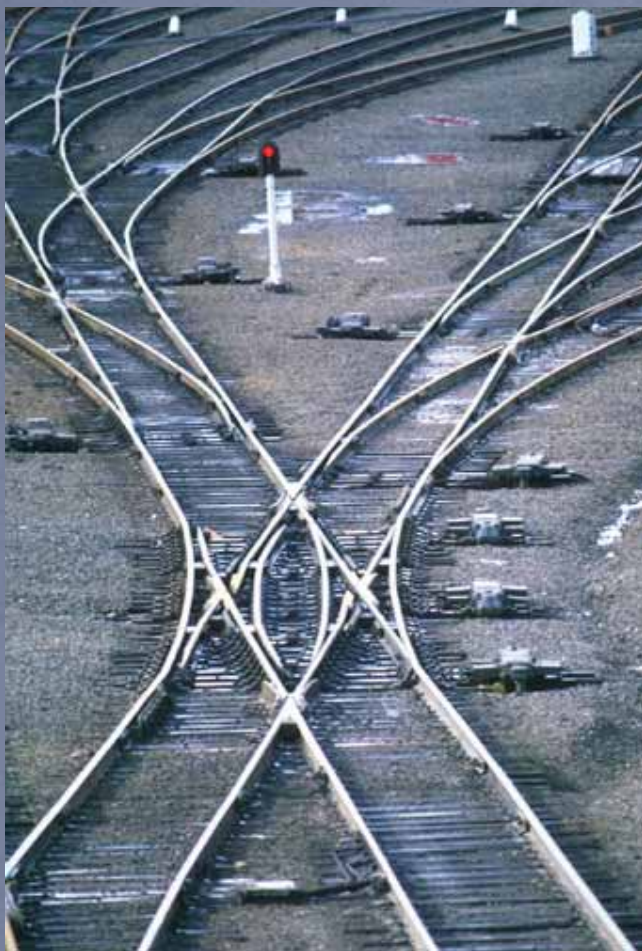# What data would be needed?

✳ butt log with lengths 32 – 40 feet
or
mill length segments that add up to that

✳ inside bark diameter at 4 feet (dbh)

What are the logistics associated with collecting the data?

✶ Following butt log from harvest to mill

✶ Measuring 4 foot dib

✶ Measuring SED (ib) at buck points

Where to from here?

USDA Forest Service
PNW Research Station

Communities and Forest
Management Team

elowell@fs.fed.us

*   thank you   *