Benchmarking Sawmill Recovery:

Trends in Sawmill Efficiency over the Years and by Region

Timber Measurements Society
Central Meeting
Portland, OR

Roy Anderson, PhD

April 2017

Agenda

- What is recovery?
- Why recovery?
- Measuring recovery
- Factors affecting recovery
- Financial impacts of recovery
- Recovery data by region

What is Recovery?

"…the amount and type of lumber recovered out of a given quantity of logs…"

The Measurement of Roundwood: Methodologies and Conversion Ratios. M.A. Fonseca. 2005. CABI Publishing

Why Recovery?

Beck Group Industry Benchmarking Results ($/MBM)

	2013 Western Dimension		2012 SYP		2013 Western Studs	
Sales realization	421		332		379	
Log Costs	255	67%	170	57%	202	60%
Conversion Costs	128	33%	129	43%	133	40%
Total Cost	383	100%	299	100%	335	100%
EBIT	38		33		44	
EBITDA	49		45		58	

Logs are the biggest component of cost!

Measuring Recovery:

1. **Recovery:**

   Volume of Lumber

   per

   Board Foot of Logs

2. **Yield:**

   Weight of Logs

   per

   Volume of Lumber

Some regions scale logs on a cubic volume basis so lumber recovery expressed as percent of cubic log volume. Recovery also sometimes called Overrun, or LRF. None of other methods or terms addressed in this presentation.

Measuring Recovery:
Lumber Volume

- May be gross lumber volume (*sawmill output*)
- May be lumber volume net of trim loss (*shippable volume*)
- May or may not include “shorts” sales volumes

Factors Affecting Recovery

- Log mix
- Lumber target size
- Saw kerf
- Lumber product mix
- Technology/optimization
- Operator decisions

Product Mix and Recovery

Lumber Product Net vs. Nominal Volume

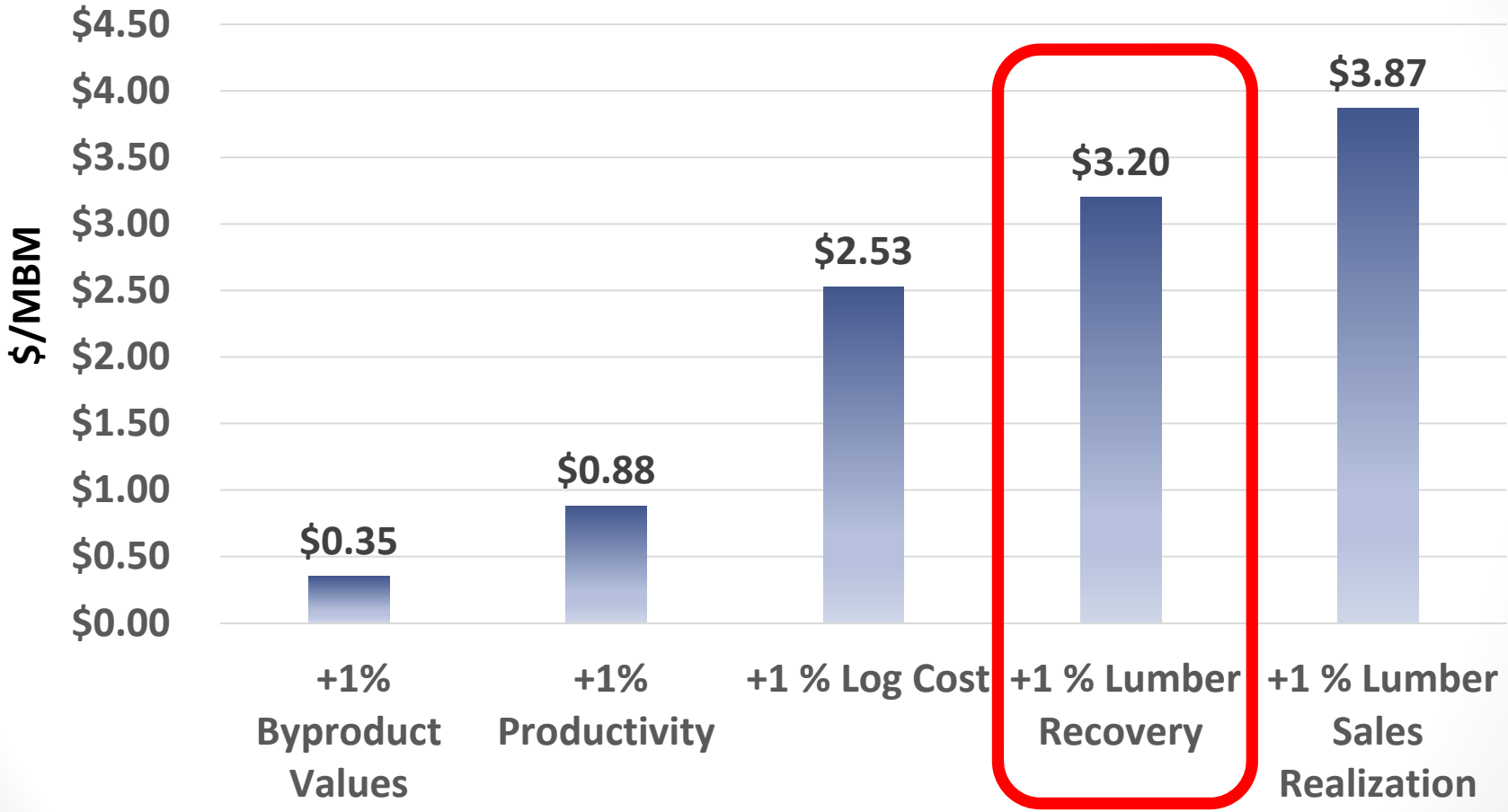
Nominal		Rough Green Target		Nominal	Net		
Thickness	Width	Thickness	Width	Bf/Lf	Bf/Lf	Difference	%
2	4	1.699	3.843	0.667	0.547	0.120	18.4%
2	6	1.699	5.870	1.000	0.834	0.166	16.9%
2	8	1.699	7.751	1.333	1.097	0.236	17.7%
2	10	1.699	9.799	1.667	1.387	0.279	16.8%
2	12	1.699	11.865	2.000	1.680	0.320	16.0%
4	4	3.848	3.848	1.333	1.234	0.096	7.2%
1	4	0.988	3.861	0.333	0.318	0.015	4.6%
1	6	0.988	5.892	0.500	0.485	0.015	3.0%

Product Mix and Recovery

January Market		
Dimension	Price per Nominal BF	Price per Net BF
2x4	375	459
2x6	325	391
2x8	300	364
2x10	355	426
2x12	365	435
4x4	370	399

June Market		
Dimension	Price per Nominal BF	Price per Net BF
2x4	375	459
2x6	335	403
2x8	320	389
2x10	375	450
2x12	400	476
4x4	450	485

Profit Sensitivity Analysis of Typical Northwest Sawmill



Recovery: Log Cost Impact

- Improvements in lumber recovery reduce log cost on a lumber basis
- Example:
  - A mill has a delivered log cost of $650/MBF and a lumber recovery of 2.30. Log cost on a lumber basis is $283/MBM ($650/2.30 = $283)
  - The mill improves recovery by 2% from 2.30 to 2.35. This leads to a log cost on lumber basis of about $277/MBM ($650/2.35 = $277)
  - A reduction of about $6/mbm
  - For a mill producing 100 MMBM per year, the cost savings is $600,000

Recovery: Productivity Impact

- Recovery improvements can impact both the number of pieces of lumber and the average size per piece (wider and/or longer)
- If improvements are made via target size or saw kerf reduction, or improved optimization, most of gain will come in form of larger piece size
- Larger average piece size will improve mill productivity per hour
- More pieces can improve mill productivity if back end (trimmer, sorter, stacker) is not bottleneck

Recovery: Manufacturing Cost Impact

- Some manufacturing costs will increase as the volume of lumber produced increases (packaging, drying costs)
- Many manufacturing costs will remain the same (labor, overhead costs), resulting in decreased manufacturing costs per thousand board feet of lumber
- Example:
  - Through upgraded optimization, a mill improves lumber recovery by 2%, resulting in a 1% improvement in productivity per hour
  - Of the mill's $135/MBM total manufacturing costs, $115 are fixed (independent of volume) while $20/MBM for packaging, drying, and other costs are variable (will rise with production levels)
  - Unit manufacturing costs are reduced by $1.15/MBM (1% x $115)
  - Equal to $115,000 savings at a 100 MMBM/year mill

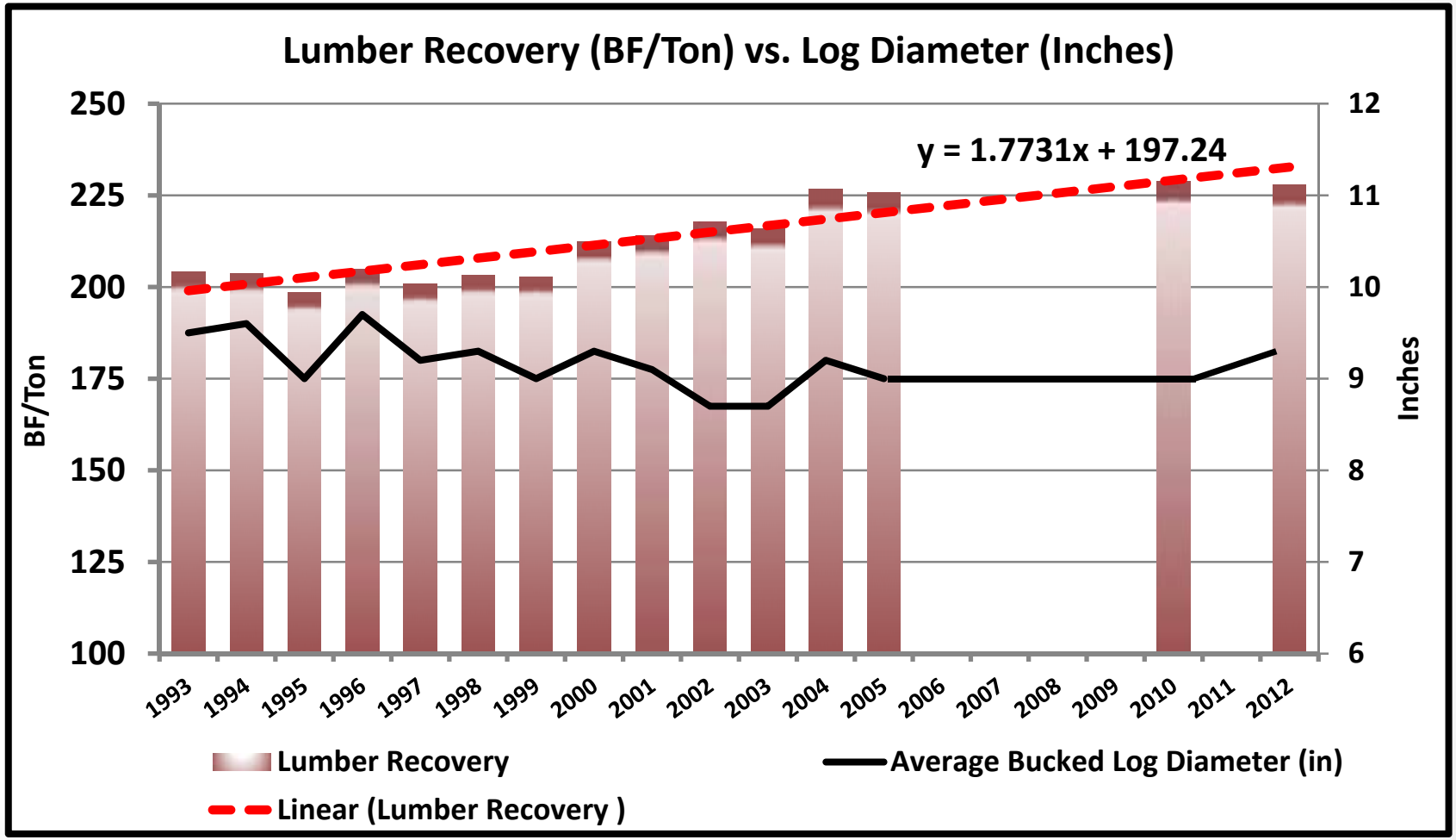
Lumber Sales Impact

- **Improved recovery can result in more lumber sold – big impact on bottom line**
  - **Example:**
  - **Mill buys 50 MMBF logs/year @ 2.5 recovery = 125 MMBM lumber**
  - **1% increase in recovery, but still buys 50 MMBF logs**
  - **Lumber production now equals 50 MMBF x 2.525 = 126.25 MMBM**
  - **"Extra" 1.25 MMBM x $350 = $437,500**
- **If recovery improvement comes at expense of quality/grade, average selling price may be negatively impacted**

Byproduct Yield Impact

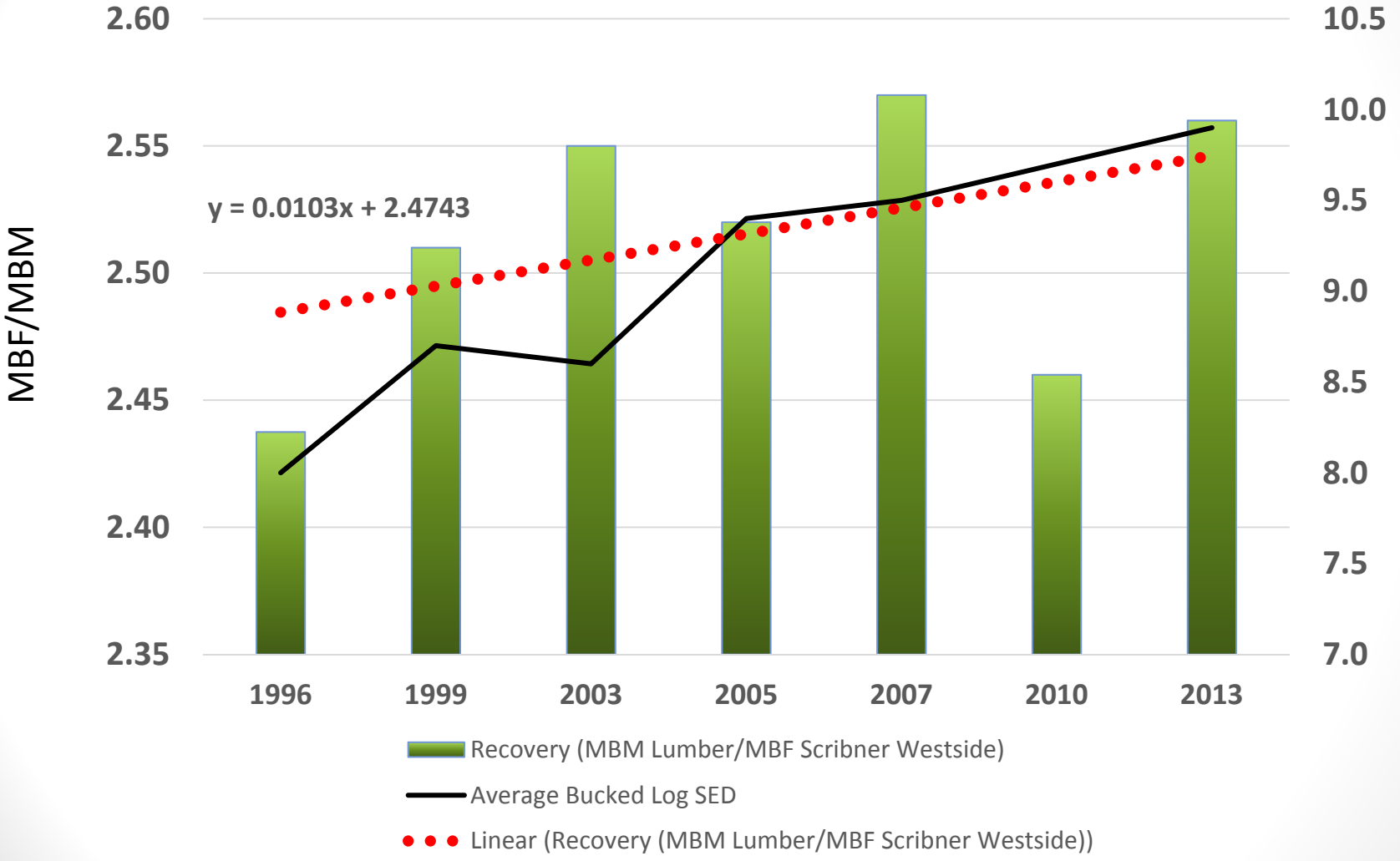
- Improved lumber recovery will often mean reduced chip yields
- Smaller green target sizes will result in reduced shavings yield
- Smaller kerf sizes will result in reduced sawdust yield
- Almost always “worth it” to produce less byproducts in exchange for producing more lumber

Changes in Lumber Recovery in U.S. South



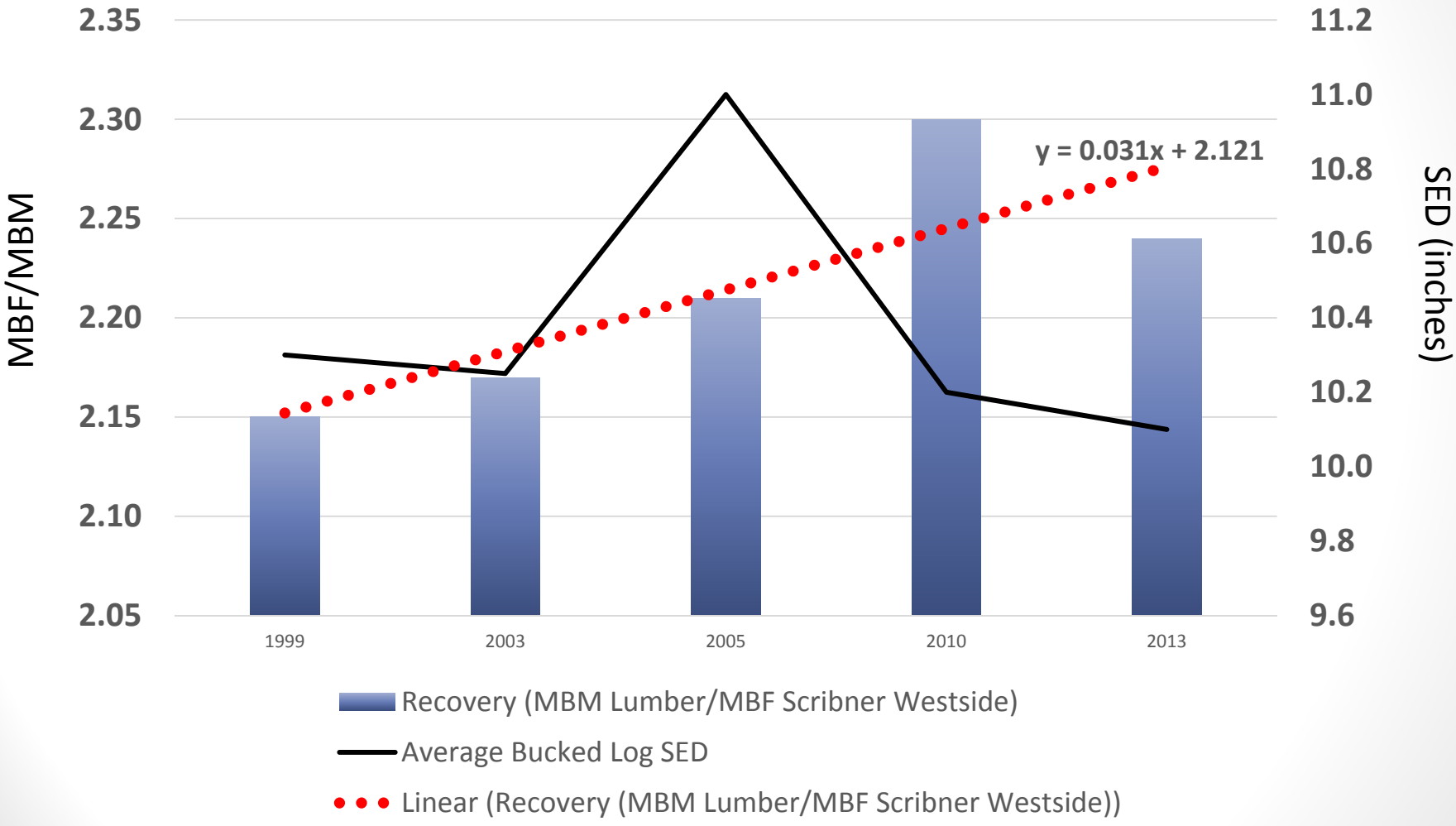
This is about a 0.9% improvement in recovery per year

Changes in Lumber Recovery in Western Stud Mills (DF/Larch only)



This is about a 0.4% improvement in recovery per year

Changes in Lumber Recovery in Western Dimension Mills (DF/Larch only)



This is about a 1.4% improvement in recovery per year

Food for Thought???

- The amount of lumber recovered per unit of log volume has a fixed ceiling
- Are we there yet?