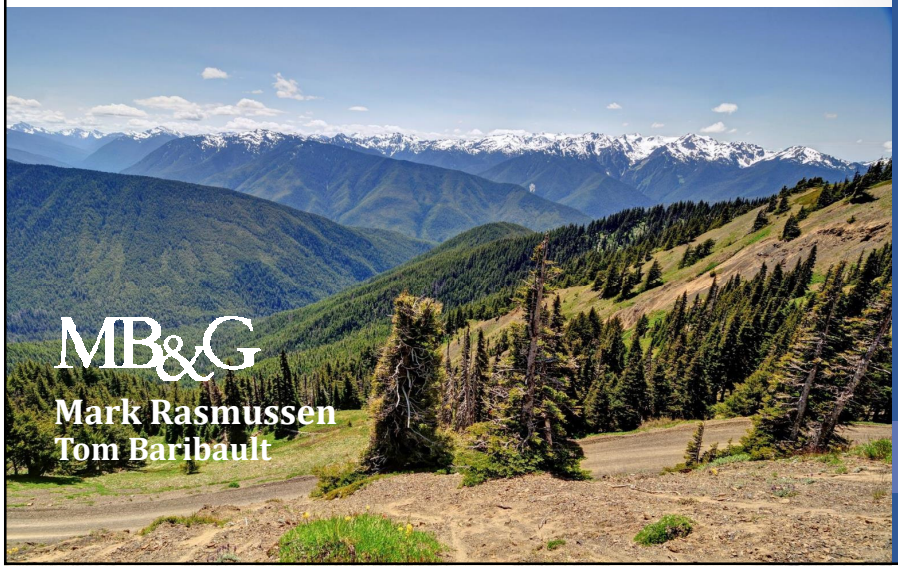
Eastern Oregon: Small Diameter Wood Study

Oregon Department of Forestry



MB&G

Mark Rasmussen
Tom Baribault

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Study Objectives

Identify market-based options for Eastern Oregon landowners to diversify revenues for small diameter timber:

1. **Quantify small diameter supply and characteristics (MB&G)**
2. **Identify and analyze market opportunities for small diameter material in Eastern OR (BECK)**
3. **Assess concept of integrated processing facility (BECK)**

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Diameter distributions of timber sales

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Annual harvest from Eastern Oregon Forests

Annual harvests (tons) across Eastern Oregon National Forests (2007-2011)						
Sale Type	**Fraction**	**Volume**	**Value**	**Volume/ Acre**	**Value/ Acre**	**Value/ Volume**
Regular	Sawtimber	656,688	$9,953,786	4.34	$65.82	$15.16
	Poles	46	$334	0.00	$0.00	$7.26
	Non-Saw	**170,605**	**$59,234**	**1.13**	**$0.39**	**$0.35**
	Fuelwood	767	$5,125	0.01	$0.03	$6.68
	Subtotal:	828,107	$10,018,479	5.48	$66.25	$12.10
Stewardship	Sawtimber	120,120	$1,995,941	2.45	$40.71	$16.62
	Poles	0	$0	0.00	$0.00	$0.00
	Non-Saw	**89,619**	**$2,789,549**	**1.83**	**$56.90**	**$31.13**
	Fuelwood	20	$75	0.00	$0.00	$3.74
	Subtotal:	209,759	$4,785,566	4.28	$97.61	$22.81
Combined	Sawtimber	776,808	$11,949,727	3.88	$59.67	$15.38
	Poles	46	$334	0.00	$0.00	$7.26
	Non-Saw	**260,225**	**$2,848,783**	**1.30**	**$14.23**	**$10.95**
	Fuelwood	787	$5,200	0.00	$0.03	$6.60
	Total:	1,037,866	$14,804,045	5.18	$73.93	$14.26

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Composition of non-sawtimber

Volume of non-sawtimber, annual average		
Sale type	Size class	Tons / year 2007-2011
All	SED < 6"	199,618
	SED < 8"	234,530
	SED > 8"	25,695
	Total:	260,225
Regular	SED < 6"	130,871
	SED < 8"	153,760
	SED > 8"	16,846
	Total:	170,605
Stewardship	SED < 6"	68,747
	SED < 8"	80,770
	SED > 8"	8,849
	Total:	89,619

SED DIB (")	Fraction of non-sawtimber by species					
	DF	LP	PP	WF	WL	Wt. Avg.
2	0.5%	0.0%	0.8%	0.7%	2.1%	0.8%
3	62.5%	56.4%	34.0%	48.0%	38.1%	41.3%
4	5.4%	12.4%	15.0%	5.9%	32.3%	12.0%
5	15.9%	10.1%	27.1%	19.1%	1.7%	22.9%
6	13.0%	20.0%	15.6%	10.5%	24.9%	14.4%
7	0.9%	0.0%	2.5%	0.0%	0.4%	1.6%
8	1.8%	1.1%	0.0%	0.4%	0.0%	0.3%
9	0.0%	0.0%	3.7%	0.8%	0.5%	2.4%
10	0.0%	0.0%	1.0%	1.6%	0.0%	1.0%
11	0.0%	0.0%	0.2%	6.8%	0.0%	1.7%
12	0.0%	0.0%	0.0%	3.0%	0.0%	0.7%
13	0.0%	0.0%	0.0%	1.1%	0.0%	0.3%
14	0.0%	0.0%	0.0%	0.8%	0.0%	0.2%
15	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
16	0.0%	0.0%	0.0%	1.4%	0.0%	0.3%
<6	**84.3%**	**78.9%**	**77.0%**	**73.7%**	**74.1%**	**77.0%**
<8	**98.2%**	**98.9%**	**95.1%**	**84.2%**	**99.5%**	**93.0%**
>8	**1.8%**	**1.1%**	**4.9%**	**15.8%**	**0.5%**	**7.0%**

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How biomass is used in Eastern Oregon

- Nearly all non-sawtimber is removed from logging sites
  - Roundwood or chips (but only with favorable market)
  - Burned (more with unfavorable market)
- Non-sawtimber volume underestimated by USFS cruise
  - Logging contractor: 20% excess non-sawtimber
  - Mills: 30% - 50% excess non-sawtimber
- Value of non-sawtimber ≈ removal cost: principal benefit to achieve a higher standard of forest management

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Eastern Oregon Small Diameter Wood Study:

Oregon Department of Forestry

Roy Anderson, PhD
Vice President, The Beck Group

THE BECK GROUP

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Delivered Raw Material Costs

Smaller trees are more expensive to process!

Whole Tree – Ground Based	
Tree Size Category	Logging Cost ($/MBF)
5" to 8" DBH	583
8" to 12" DBH	327
12" to 16" DBH	146
Whole Tree – Cable Yarding	
Tree Size Category	Logging Cost ($/MBF)
5" to 8" DBH	877
8" to 12" DBH	577
12" to 16" DBH	289

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Delivered Raw Material Costs

Example: "Typical" sawtimber and Logging Equipment Configuration

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Delivered Raw Material Costs

Example: "Typical" sawtimber and Logging Equipment Configuration

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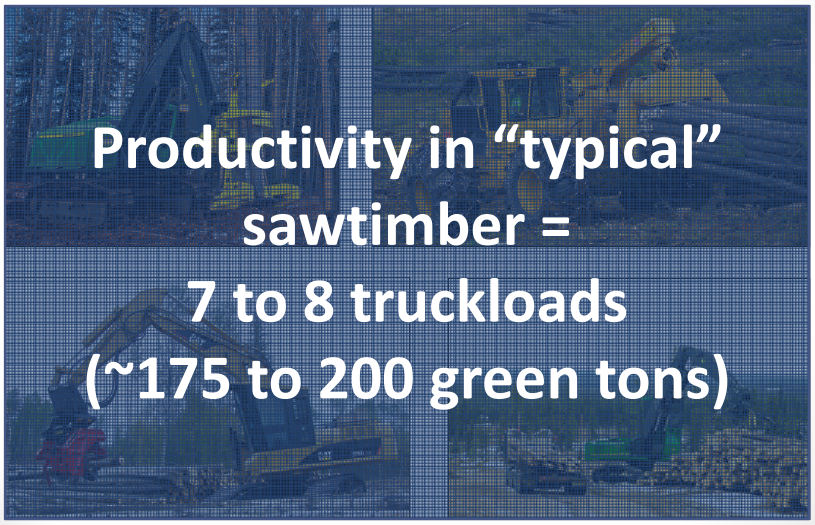
Delivered Raw Material Costs

Example: "Typical" sawtimber and Logging Equipment Configuration



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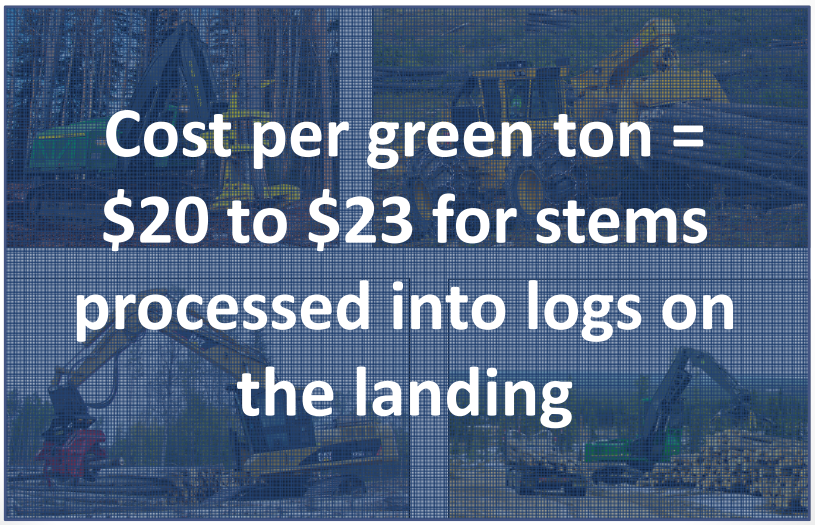
Delivered Raw Material Costs

Example: "Typical" sawtimber and Logging Equipment Configuration



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Delivered Raw Material Costs

Example: "Non-saw" timber and same Logging Equipment Configuration

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Delivered Raw Material Costs

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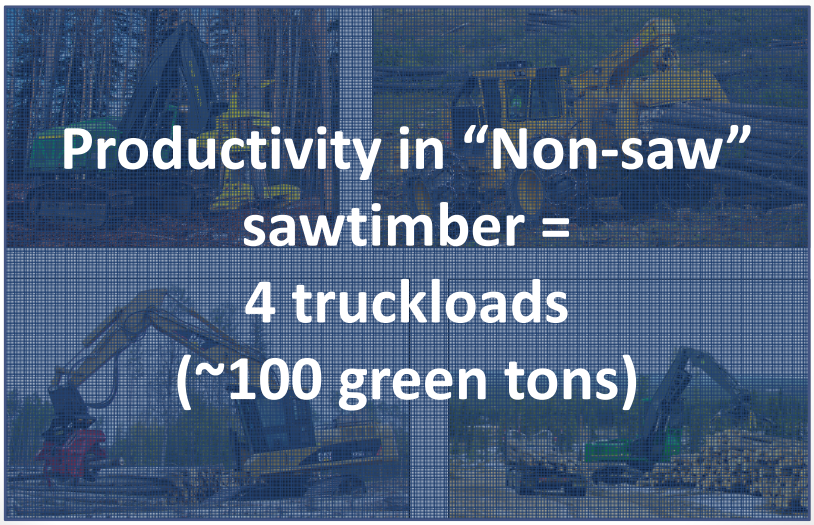

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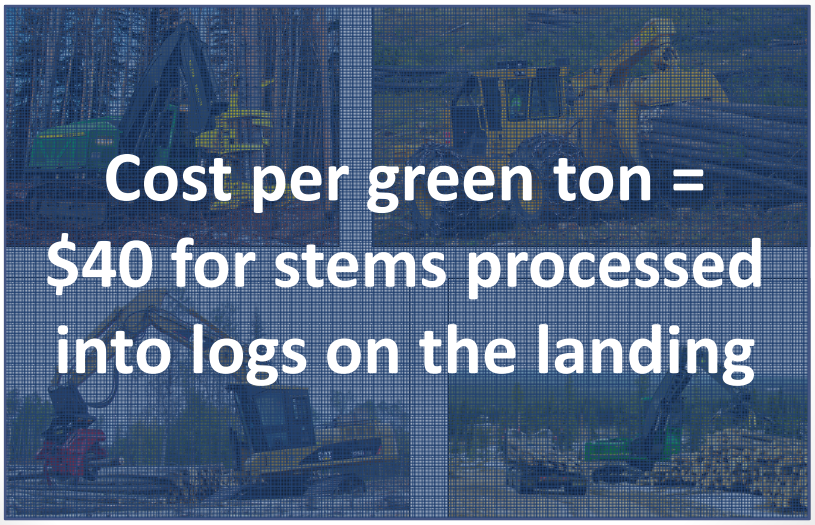
Delivered Raw Material Costs

Example: "Non-saw" timber and same Logging Equipment Configuration



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Delivered Raw Material Costs

Hauling costs

1 way Distance (miles)	Round Trip Time (hours)	Total Cost ($)	Cost per Green Ton ($/GT)
25	2.7	232	9
50	3.7	317	13
75	4.7	402	16
100	5.7	487	19
125	6.7	572	23
150	7.7	657	26

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Delivered Raw Material Costs

Total Delivered Cost (no stumpage value)

Distance (miles)	Sawtimber Logging Cost ($/GT)	Non-Saw Logging Cost ($/GT)	Hauling Cost ($/GT)	Sawtimber Total Delivered Cost ($/GT)	Non-Saw timber Total Delivered Cost ($/GT
25	22	40	9	31	49
50	22	40	13	35	53
75	22	40	16	38	56
100	22	40	19	41	59
125	22	40	23	45	63
150	22	40	26	48	66

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Green Ton vs. Bone Dry Ton

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Green Ton vs. Bone Dry Ton

50% of weight is water

50% of weight is wood

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Green Ton vs. Bone Dry Ton

50% of weight is water

50% of weight is wood. Therefore:
12.5 Bone Dry Tons

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Green Ton vs. Bone Dry Ton

Distance (miles)	Sawtimber Logging Cost ($/BDT)	Non-Saw Logging Cost ($/BDT)	Hauling Cost ($/BDT)	Sawtimber Total Delivered Cost ($/BDT)	Non-Saw timber Total Delivered Cost ($/BDT)
25	44	80	18	62	98
50	44	80	26	70	106
75	44	80	32	76	112
100	44	80	38	82	118
125	44	80	46	90	126
150	44	80	52	96	132

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Residual Value

Log to Lumber (or other product):

Residual Value is the value of the log as determined by estimating value of the products produced and subtracting the manufacturing costs

Value of lumber, chips, shavings, sawdust, & bark

- Less cost of conversion

= Residual Value
(a.k.a. Break-even Delivered Raw Material Cost)

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Residual Value - Various Technologies

	Lumber	Pulp Chips	Shavings	Post and Pole	Briquettes	Pellets	Biomass (CHP)	Firewood	Fuel Chips
Sales Value f.o.b. plant, ($/BDT)	206	76	178	195	167	160	107	95	25
Less Conv. Cost ($/BDT)	109	19	126	144	126	122	72	60	19
Residual Value ($/BDT)	97	56	52	51	41	38	35	35	6
BDT/Year (BDT, 000's)	137	84	10	5	10	47	121	9	84
Cap EX ($ millions)	40	2.5	2.5	1.5	2.0	10	54	0.5	2.0

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Integrated Facility Concept

- The idea of having co-located businesses at a single site so that material can be directed to highest value use
- Integrated Biomass, Wallowa Oregon is a good example (sawlogs, pulp chips, post and pole, firewood, briquettes, power)
- Sawmill and pellet plant or Sawmill in cogeneration plant are probably the best opportunities for co-locating, especially in a region where there is weak demand for sawmill by-products such as (chips, sawdust, shavings, & bark)
- Careful design needed to match the scale of the co-located businesses

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Conclusions

- The high cost of harvesting, processing, and transporting small diameter trees creates a high raw material cost, which in turn makes the economics of conversion technologies difficult
- Therefore, most conversion technologies use by-products of other processes (sawdust, shavings, topwood of sawlogs, etc.)
- Developing an integrated facility can be an option, but requires special circumstances and careful planning

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