

Pre-commercial Thinning and Fuels Reduction

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Biologically, why pre-commercial thinning

- Growth on higher quality, faster growing trees.
- Reduces rotation or increases tree size at end of rotation
- Increases tree vigor (ability to withstand drought, insects etc.)
- Removes trees that will die anyway

Generally

- Same wood volume across a broad range of # tree per acre
- But if fewer trees, the individual trees grow faster
- If these fewer trees are the best quality, we are better able to market them at end of rotation
- Sawlogs are usually more valuable than pulp and larger pulp is easier to harvest

Why it isn't done

- Costs with no immediate benefit
- Time
- Some species do not self-prune when stand in low number (maple)

Goals

- Look at the potential yield from a couple of stand types
 - Aspen
 - Oak
 - Red pine with balsam midstory

Aspen

Example Aspen Coppice 15 year old

- 1362 TPA
- 43 sf BA
- 2.4 QMD

- This is a fairly normal stand of aspen

Potential Pre-commercial Thinning

- Bulldozer
- Brush cutter
- Crusher
- ???

Precommercial thinning

- First thin to 550 stems per acre (10 year to now)
- Second thin at age 30 to 200 stems per acre
- Research shows that thinning can increase total rotation yield by 40% (Perala 1978)

Species: ALL Year: 2006 Mgmt Id: NONE Stand: s

LIVE TREES							HARVESTED TREES					
DIAM. CLASS	TREES PER ACRE	AVG HT	BASAL AREA	TOTAL CU FT	MERCH CU FT	MERCH BD FT	TREES PER ACRE	AVG HT	BASAL AREA	TOTAL CU FT	MERCH CU FT	MERCH BD FT
2	916.7	20.3	20.0	0.0	0.0	0.0	812.4	20.3	17.7	0.0	0.0	0.0
4	445.6	28.7	23.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	1362.4	23.0	43.3	0.0	0.0	0.0	812.4	20.3	17.7	0.0	0.0	0.0

Biomass in the Aspen

Number	Size	kg	lbs	Total
812	2 inches	5.113302	11.24927	9134.403

This stand had about 4.5 tons dry weight of total pre-commercially removed biomass all too small for pulpwood

Formula used is =EXP(-2.2094+2.3867*LN(5))

Precommercial thinning

- First thin to 550 stems per acre (10 year to now)
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Thin 15 years later

Number	Size	kg	lbs	Total
98.6	4 inches	26.74052	58.82913	5800.553
267.7	6 inches	70.3796	154.8351	41449.36

This stand had about 23.5 tons dry weight removed of which a portion is small pulpwood

Formula used is $=EXP(-2.2094+2.3867*LN(5))$

Species: ALL Year: 2051 Mgmt Id: NONE Stand: s
-----LIVE TREES-----

DIAM. CLASS	TREES PER ACRE	AVG HT	BASAL AREA	TOTAL CU FT	MERCH CU FT	MERCH BD FT
2	2184.1	7.9	3.1	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0
8	1.6	40.5	0.7	9.9	0.0	0.0
10	31.9	49.6	19.8	393.5	0.0	0.0
12	132.8	51.5	96.0	1996.8	752.6	3754.2
Total	2350.5	10.9	119.2	2400.3	752.6	3754.2

60 year old stand

Thinned

Species: ALL Year: 2051 Mgmt Id: NONE Stand: s
-----LIVE TREES-----

DIAM. CLASS	TREES PER ACRE	AVG HT	BASAL AREA	TOTAL CU FT	MERCH CU FT	MERCH BD FT
2	0.0	0.0	0.0	0.0	0.0	0.0
4	34.7	28.1	4.3	0.0	0.0	0.0
6	97.8	28.6	14.9	0.0	0.0	0.0
8	70.9	44.5	29.6	468.5	0.0	0.0
10	230.4	45.7	114.5	1876.3	0.0	0.0
12	1.7	50.7	1.1	23.3	8.3	41.6
Total	435.5	40.3	164.5	2368.1	8.3	41.6

Not Thinned

Benefits and Problems

- At end of rotation, may have about the same amount of wood
- But this wood is larger (more saw logs and larger pulp)
- Part of the 30 year thinning is pulp
- May have increase issues of sunscald
- Will have fewer trees to “hedge bets”
- May be able to “capture mortality”

Questions

- Could this 15 year old material be economically harvested for biomass?
- The 30 year thinning is “commercial” but at least half of the material would normally be slash or too small
- Could this be more easily harvested for biomass?

Oak

Two to think about

- Thinning in quality oak stands to remove undesirable species or quality
- Thinning/primary market for low grade oak stands on outwash sands (scrub oak)

Concerns

- Releasing oak too early may promote branchiness
- Do not want to thin until has developed 1.5 clear logs (app. 6 inches diameter)
- At this size, this is potential pulp
- Price is still low for oak pulp but would be potentially competitive with pulp industry
- At 24 mmbtu per cord, could this be a resource?
- The slash?

What do you think?

Red Pine with Balsam Understory

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Species: RP      Year: 2005      Mgmt Id: NONE      Stand: r1
-----LIVE TREES-----
DIAM. | TREES  AVG  BASAL  TOTAL  MERCH  MERCH
CLASS | PER ACRE HT  AREA  CU FT  CU FT  BD FT
-----|-----|-----|-----|-----|-----|
2 | 0.0  0.0  0.0  0.0  0.0  0.0
4 | 0.0  0.0  0.0  0.0  0.0  0.0
5 | 0.0  0.0  0.0  0.0  0.0  0.0
8 | 0.0  0.0  0.0  0.0  0.0  0.0
10 | 57.8  57.0  34.2  814.8  551.7  2324.3
12 | 98.3  57.0  75.0  2055.2  1447.3  6397.9
14 | 6.9  57.0  6.7  185.2  144.5  571.3
-----|-----|-----|-----|-----|-----|
Total | 162.0  57.0  115.8  2055.1  2142.3  9292.5
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Species: BF      Year: 2005      Mgmt Id: NONE      Stand: r1
-----LIVE TREES-----
DIAM. | TREES  AVG  BASAL  TOTAL  MERCH  MERCH
CLASS | PER ACRE HT  AREA  CU FT  CU FT  BD FT
-----|-----|-----|-----|-----|-----|
2 | 75.0  19.0  1.6  0.0  0.0  0.0
4 | 315.8  28.8  18.1  0.0  0.0  0.0
5 | 26.8  42.9  4.2  35.2  0.0  0.0
8 | 3.1  51.5  0.8  13.1  0.0  0.0
-----|-----|-----|-----|-----|-----|
Total | 421.8  28.1  24.7  48.3  0.0  0.0
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Biomass in the Balsam

Number	Size	cm	each kg	each lb	total
75	2	5	4.285594	9.428307	707.1231
317	4	10	23.93243	52.65136	16690.48
27	6	15	65.45453	144	3887.999
3.1	8	20	133.6481	294.0258	911.4799
					22197.08

This stand had about 11 tons dry weight of total balsam (needles and all)- about half a cord of this is potential pulpwood (maybe)

Formula used is =EXP(-2.5384+2.4814*LN(G20))

Does it make sense?

- Reduces fire risk (ladder fuel)
- What percent would be harvestable?
- How much would this fuel treatment cost (\$300??)?
- Would this defer cost of fuel treatment

Conclusion

- The benefits of pre-commercial thinning are well known
- A lot of foresters leave the thinning “until it is commercial”
- This may be fine, but biomass pushes the window of a “commercial thinning” earlier in the rotation
- Questions still remain as to economic potential