US Timberland Investment Forecast Variables; and their impact on Net Present Value (discount rates)

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Introduction:

As a forester, appraiser and timberland investment manager providing services to over one million timberland acres in the southeastern United States (Texas to the Carolinas); my primary skill set is to identify, process and manage variables influencing timberland investment return rates.

There are two categories of variables, internal and external:

Internal Variables involve silvicultural practices of forestry influencing supply; silviculture is to forestry as agronomy is to row-crop; and includes soil type, genetic selection, tillage, competition control, fertilization, growth/yield models, cash-flow, access and others.

External Variables involve timber marketing and demand factors; and includes new housing starts, vacant housing supply, imports, exports, debt, deficit, GDP, tariffs, mill capacity, timber prices, land values, discount rates, net present values and others.

This presentation covers primary external variables influencing timberland investments returns and discounts on intensively managed pine plantations in the southeastern United States of America.

1) Primary domestic variables influencing US timberland investment returns:

New housing starts, vacant house supply and renovations.

When US new housing starts (single and multifamily) are a sustainable 1.5 million units per year, sawlog prices are approximately *$40 per ton*. Due to the current surplus of vacant homes on the market, new housing starts are approximately 600,000 annually and timber prices subsequently dropped to $25 per ton.

Due to renovations, the bottom of the pine sawlog market it approximately $20/ton. As a rule of thumb, every 100,000 new housing starts up or down influences the price of stumpage sawlogs by approximately $2 per ton, with a 6 month to 1 year lag time.

In a healthy US market, the supply of vacant homes are typically below 1 million. Due to overbuilding in the years preceding 2007 there are approximately 3.5 million vacant homes on the market, which caused the drop in new housing starts to their current low.

Over the next five years, if vacant home sales average 600,000 per year, the number of vacant homes will drop below the one million mark; at which time new housing starts should simultaneously reach 1.5 million.

2) Primary international variables influencing US Timberland investment returns:

Canadian Lumber imports into the US, Asian exports and Mountain Pine Beetle.

When annual US new housing starts are above 1 million, the US domestic demand is increasingly dependent on Canada for one-third of its lumber supply. Historically the US has been Canada's largest lumber customer consuming over 90% of its supply. Since new home building in the US collapsed in 2007, Canada began developing its Asian markets, primarily China. Since 2007, Canadian exports to China have increased from 1% to 15%.

The growing Asian export levels are primarily long term in nature due to capital investments in transportation infrastructure, shipping, and export agreements. Canada will not turn away from this important new destination once US housing starts recover in the US; as Canada has learned an important lesson of nurturing a diversified customer base from the US housing collapse.

When the US housing market returns in 5 years over 60 percent of British Columbia's Lodgepole pine trees will have been consumed by the mountain pine beetle infestation and consequently will have been prematurely harvested or decayed reducing Canada's future timber supply for decades.

And when new housing starts in the US rise back to normal sustained levels, this will result in the inability of the US's historical reliance on Canada for one-third of its lumber needs.

3) Five year forecast for US timberland investment returns:

Over the next 5 years their combined influence (vacancies, new starts, mountain pine beetle, Asian exports) will create greater reliance on US lumber production; primarily in the US Southern 13 pine belt states (southeastern states from Texas to the Carolinas), as the US Pacific NW will also be responding to Asian markets and continued regulation. The US will also look to South America and Europe for alternative lumber sources.

Consequently, real rates of return, after costs and before taxes, for intensively managed pine plantations will remain at 8-9% in the short term, and rise back above 10% within five years.

Bareland values (land underneath the trees) are not blended in with the above plantation return as they have independent return rates and risk levels with an abundance of comparable sales. Currently bareland is invested between US$600 - $800/acre. For the past 30 years bareland has provided a steady annualized compounding return of 4-5% independent of timber. Values above US$800/acre for bareland are typically in transition to higher and better uses influenced by urban sprawl.

In short, when you currently acquire timberland you have two investments, the pine plantation yielding 8-9% (low risk) and the bareland yielding 4-5% (basically no risk).

Pre-2007 return rates were 11-12% after cost and before taxes for intensively managed pine plantations (pine pulpwood at $10/ton; chip-in-saw at $30/ton; sawtimber at $50/ton), and bareland returns at 4-5%. Post-2007 return rates dropped to 8-9% (pine pulpwood at $10/ton; chip-n-saw at $15/ton; sawtimber at $25/ton), and bareland returns 4-5%; Post-recovery 2016 return rates projected at 10-11% (pine pulpwood at $10/ton; chip-n-saw at $25/ton; pine sawtimber at $40/ton); *refer to attached "Pre-2007 Timber Prices & Returns" and "Post-2007 Timber Prices & Returns" and "Post-Recovery-2016 Timber Prices & Returns".*

Pre and Post 2007 average real discount rates for landowners investing in pine plantations at various ages are listed below. Discount rates within the same time era adjust to plantation age which corresponds to investment term. The discount rates from pre-2007 to current dropped due to an increase in competing investors responding to return margins. Keep in mind discount rates take into account the product price fluctuations and reflect the real changes in return between Pre-2007 and Post-2007.

Age (years)	Pre-2007	Post-2007
1 – 5	12%	10%
6 – 10	10%	9%
11 – 15	9%	8%
16 – 20	8%	7%
21 – 25	7%	6%
26 – 30	6%	5%

As the slide began in 2007 several institutional investors dropped their average discount rates to 4% for last minute investment to avoid the ensuing drop in equities and fixed market.

Keep in mind, when landowners establish pine plantations yielding 10% return and trade prior to maturity to investors who are discounting at 6% then the seller's return jumps from 10% to 14%.

4) Primary assumptions in forecast:

The primary assumptions are: 1) Russia maintains similar tariffs on its timber exports; 2) British Columbia decreases its annual allowable cuts in response to timber losses from the mountain pine beetle infestation; 3) the US gains control of its $1.3 trillion annual deficit spending and begins reducing its total debt of $15 trillion; 4) unemployment rebounds encouraging more homeowners to continue paying their mortgages.

Notation:
Refer to attached supportive analysis:
1) _Pre-2007 Financial Timber Prices & Returns_
2) _Post-2007 Financial Timber Prices & Returns_
3) _Post-Recovery-2016 Timber Prices & Returns_
4) _US Historical New Housing Start Cycles_

If you have any questions or would like to discuss any of the aforementioned variables or supporting analysis, please feel free to email teddy@reyoldsforestry.com or call 870-234-0200 ext 6.

US Historical New Housing Start Cycles Above and Below 1.5 Million
single and multi-family combined

2012 World Timberland Investment Summit, New York, NY

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Points based on 1.5 million annual new housing starts being sustainable:

1) The housing surplus of 2,341,000 created between 1998 - 2007 has already been offset by underbuilding between 2008 - 2011 of 3,518,000 units (refer below); historical data supports resurgence following similar underbuilding. Since 1959 underbuilding below 1.5 million was never more than -145% of the preceeding surplus overbuilding above 1.5 million; and currently underbuilding below 1.5 million is -150% (historical data and derivations included below).

2) A healthy market has less than 1 million vacant homes. Current vacant homes are 3.5 million and more forcasted to join the ranks. The previous overbuidling surplus is no longer the contributing factor to rising vacant homes and new contributing factors are emerging.

3) Emerging contributing factors are: a) number of graduating students returning home (risen to 85%); b) emerging minority culture with multiple generations living together; c) bank's past participation in risky home loans because at that time they could sale to eager secondary market floated by quasi government agencies; d) homeowner realization that in a geniune market, homes are long term with low returns; e) growing national debt due to import/export deficit; f) rising cost of energy; and perhaps most importantly g) an increasing unemployemet close to 11% including those not filing.

Cycles (above & below 1.5 million)	Year	Units (single & multifamily)	Sustainable	Surplus	Sustainable	Offset Underbuilding	10 Year Unit Average Per Year
1	1959	1,535,000					
1	1960	1,256,000					
2	1961	1,312,000	not applicable as dependent on pre-1959 data				
3	1962	1,459,000					
1	1963	1,588,000	1,500,000	88,000			
2	1964	1,540,000	1,500,000	40,000			
1	1965	1,469,000		128,000	1,500,000	(31,000)	
2	1966	1,167,000			1,500,000	(333,000)	
3	1967	1,285,000			1,500,000	(215,000)	
1	1968	1,504,000	1,500,000	4,000		(548,000)	
1	1969	1,487,000			1,500,000	(13,000)	
2	1970	1,435,000			1,500,000	(65,000)	1,419,750
1	1971	2,036,000	1,500,000	536,000		(78,000)	
2	1972	2,361,000	1,500,000	861,000		-19.5	
3	1973	2,044,000	1,500,000	544,000			
1	1974	1,332,000		1,941,000	1,500,000	(168,000)	
2	1975	1,160,000			1,500,000	(340,000)	
1	1976	1,535,000	1,500,000	35,000		(508,000)	
2	1977	1,962,000	1,500,000	462,000		-26%	
3	1978	2,001,000	1,500,000	501,000			
4	1979	1,717,000	1,500,000	217,000			
1	1980	1,300,000		1,215,000	1,500,000	(200,000)	1,697,500
2	1981	1,096,000			1,500,000	(404,000)	
3	1982	1,057,000			1,500,000	(443,000)	
1	1983	1,705,000	1,500,000	205,000		(1,047,000)	
2	1984	1,766,000	1,500,000	266,000		-86%	
3	1985	1,741,000	1,500,000	241,000			
4	1986	1,812,000	1,500,000	312,000			
5	1987	1,631,000	1,500,000	131,000			
1	1988	1,488,000		1,155,000	1,500,000	(12,000)	
2	1989	1,382,000			1,500,000	(118,000)	
3	1990	1,203,000			1,500,000	(297,000)	1,491,500
4	1991	1,009,000			1,500,000	(491,000)	
5	1992	1,201,000			1,500,000	(299,000)	
6	1993	1,292,000			1,500,000	(208,000)	
7	1994	1,446,000			1,500,000	(54,000)	
8	1995	1,361,000			1,500,000	(139,000)	
9	1996	1,469,000			1,500,000	(31,000)	
10	1997	1,475,000			1,500,000	(25,000)	
1	1998	1,621,000	1,500,000	121,000		(1,674,000)	
2	1999	1,647,000	1,500,000	147,000		-145%	
3	2000	1,573,000	1,500,000	73,000			
4	2001	1,601,000	1,500,000	101,000			
5	2002	1,710,000	1,500,000	210,000			
6	2003	1,854,000	1,500,000	354,000			
7	2004	1,950,000	1,500,000	450,000			
8	2005	2,073,000	1,500,000	573,000			
9	2006	1,812,000	1,500,000	312,000			
	2007	1,341,000		2,341,000	1,500,000	(159,000)	
	2008	903,000			1,500,000	(597,000)	
	2009	553,000			1,500,000	(947,000)	
	2010	585,000			1,500,000	(915,000)	1,466,833
	2011	600,000			1,500,000	(900,000)	
						(3,518,000)	
						-150%	

Pre-2007 Timber Prices & Returns for intensively managed pine plantations in the Coastal Plains of Southeastern US

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Return Summary (real):		Net	Gross
Internal Rate of Return (real IRR after all cost before taxes):		**11.6%**	na
Term of Investment (years in rotation from planting to maturity)		25	25
Gross Revenue Per Acre Per Year		$ 192	$ 254
Gross Revenue Per Acre		$ 4,791	$ 6,341
Gross Revenue Per Year for Tract		$ 84,322	$ 111,595
Gross Revenue Total over Rotation for Tract		$ 2,108,057	$ 2,789,875

Investment Summary:	Total	Per Acre
Direct Reforestation (1st year)	$ (131,338)	$ (298)
Release Spray (2 or 3 year; may not be needed 50% of the time)	$ (26,400)	$ (60)
Fertilization after 1st Thin (10 - 15 years)	$ (26,400)	$ (60)
Fertilization after 2nd Thin (16 - 22 years)	$ (88,000)	$ (200)
Cumulative Investment	$ (263,338)	$ (598)

Investment Breakdown:	Total	Per Acre	Year(s)	Per Unit
Shear & Offset	$ (80,288)	$ (182.47)	0	na
Chemical Site Preparation Application	$ -	$ -	0	na
Burn	$ (7,460)	$ (17)	0	na
Seedling Cost (including pickup, storage, & delivery)	$ (29,744)	$ (68)	1	$ (0.143)
Planting Cost	$ (13,846)	$ (31)	1	$ (0.07)
Grass Spray	$ (17,600)	$ (40)	1	na
Release Spray	$ (26,400)	$ (60)	2	na
Mid Fertilization	$ (44,000)	$ (100)	11	na
Late Fertilization	$ (44,000)	$ (100)	18	na
Total	$ (263,338)	$ (598)		

Tract Information:		Planted	Total
Acres to be planted		440	627
Tract		Taylor 440 (pine sale)	
Contact		Nancy, Sally & Dennis	
Date	12/07/10	Beginning Investment Year	2010

Seedling Purchase:		
Atlantic Coastal 2nd Generation Loblolly (mass control pollinated)	450	208,000
Mortality first year	10%	
Mortality between thinning (after 1st Thinning)	10%	

Thinning Variables:	
Years between final harvest and planting	1
First Thinning Year	11
After thinning dbh increase (smaller trees removed; inches)	0.5
Regular Thinning Target Basal Area	70

Annual Tree Growth:	
Diameter growth after first thinning (inches)	0.36
Merchantable height growth after first thinning (feet)	1

Administration Overhead:	
Management Overhead (timber sale amounts shown reduced by this amount)	15%

Detailed Analysis by Year Below:

Year	Age	Description	Trees	Thinned Trees	Dbh inches	Height Merchantable feet	Logs 16 feet	Per Tree Cubic Feet	Per Tree Tons	Per Acre Cubic Feet	Per Acre Tons	Ton Rate	Harvest Per Acre	Harvest (less overhead) Total	Investment Per Acre	Investment Total	Net IRR Per Acre
2010	0	Harvest Year (jan - may)											$ -	$ -			$ -
2010	0	Site Prep Spray											$ -	$ -			$ -
2010	0	Shear & Offset Subsoil													$ (182)	$ (80,288)	$ (182)
2010	0	Burn													$ (17)	$ (7,460)	$ (17)
2011	1	Seedlings	450												$ (68)	$ (29,744)	$ (61)
2011	1	Planting	450												$ (31)	$ (13,846)	$ (28)
2011	1	Grass Spray	450												$ (40)	$ (17,600)	$ (36)
2011	1	Seedling Survival	405	45													
2013	3	Release (50%)	405												$ (60)	$ (26,400)	$ (43)
2021	11	Thinning #1	177	228	8.5	33	2.06	3.5	0.12	797	27	$ 10	$ 268	$ 118,111			$ 68
2022	12	Fertilization	177		8.9	34	2.13								$ (100)	$ (44,000)	$ (27)
2023	13		177		9.2	35	2.19										
2024	14		177		9.6	36	2.25										
2025	15		177		9.9	37	2.31										
2026	16		177		10.3	38	2.38										
2027	17		177		10.7	39	2.44										
2028	18	Thinning #2	96	73	11.5	40	2.50	12.2	0.41	889	30	$ 30	$ 899	$ 395,632			$ 106
2029	19	Fertilization	96		11.9	41	2.56								$ (100)	$ (44,000)	$ (12)
2030	20		96		12.2	42	2.63										
2031	21		96		12.6	43	2.69										
2032	22		96		13.0	44	2.75										
2033	23		96		13.3	45	2.81										
2034	24		96		13.7	46	2.88										
2035	25	Final Harvest	96	86	14.0	47	2.94	29.0	0.98	2,506	84	$ 50	$ 4,222	$ 1,857,652			$ 232
											Total (real)		$ 5,390	$ 2,371,394	$ (598)	$ (263,338)	$ 0
															IRR (real)		11.6%

Note:
1) Land treated as a separate vehicle of investment for return (timberland averages 4-5%).
2) Analysis was after all costs, before taxes, and with no appreciation or inflation added (real).
3) Timber sales reduced 15% for management overhead and administrative costs.
4) IRR = Internal Rate of Return; Dbh = Diameter at 4.5 feet above ground; Real = no appreciation or inflation included (today's dollar value).
5) Seedlings cost rounded to 1,000 and 5% added for culls.
6) If the harvest is completed before June 1st a chemical site control spray may be more advantageous than a release which negates the release spray and costs approximately $80/acre during the summer before planting.

Post-2007 Timber Prices & Returns for intensively managed pine plantations in the Coastal Plains of Southeastern US

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Return Summary (real):

	Net	Gross
Internal Rate of Return (real IRR after all cost before taxes):	8.2%	na
Term of Investment (years in rotation from planting to maturity)	25	25
Gross Revenue Per Acre Per Year	$ 89	$ 133
Gross Revenue Per Acre	$ 2,230	$ 3,328
Gross Revenue Per Year for Tract	$ 39,257	$ 58,577
Gross Revenue Total over Rotation for Tract	$ 981,415	$ 1,464,415

Investment Summary:

	Total	Per Acre
Direct Reforestation (1st year)	$ (131,338)	$ (298)
Release Spray (2 or 3 year; may not be needed 50% of the time)	$ (26,400)	$ (60)
Fertilization after 1st Thin (10 - 15 years)	$ (26,400)	$ (60)
Fertilization after 2nd Thin (16 - 22 years)	$ (88,000)	$ (200)
Cumulative Investment	$ (263,338)	$ (598)

Investment Breakdown:

	Total	Per Acre	Year(s)	Per Unit
Shear & Offset	$ (80,288)	$ (182.47)	0	na
Chemical Site Preparation Application	$ -	$ -	0	na
Burn	$ (7,460)	$ (17)	0	na
Seedling Cost (including pickup, storage, & delivery)	$ (29,744)	$ (68)	1	$ (0.143)
Planting Cost	$ (13,846)	$ (31)	1	$ (0.07)
Grass Spray	$ (17,600)	$ (40)	1	na
Release Spray	$ (26,400)	$ (60)	2	na
Mid Fertilization	$ (44,000)	$ (100)	11	na
Late Fertilization	$ (44,000)	$ (100)	18	na
Total	$ (263,338)	$ (598)		

Tract Information:

		Planted	Total
Acres to be planted		440	627
Tract	Taylor 440 (pine sale)		
Contact	Nancy, Sally & Dennis		
Date	12/07/10	Beginning Investment Year	2010

Seedling Purchase:

Atlantic Coastal 2nd Generation Loblolly (mass control pollinated)	450	208,000
Mortality first year	10%	
Mortality between thinning (after 1st Thinning)	10%	

Thinning Variables:

Years between final harvest and planting	1
First Thinning Year	11
After thinning dbh increase (smaller trees removed; inches)	0.5
Regular Thinning Target Basal Area	70

Annual Tree Growth:

Diameter growth after first thinning (inches)	0.36
Merchantable height growth after first thinning (feet)	1

Administration Overhead:

Management Overhead (timber sale amounts shown reduced by this amount)	15%

Detailed Analysis by Year Below:

Year	Age	Description	Trees	Thinned Trees	Dbh inches	Height Merchantable feet	Logs 16 feet	Per Tree Cubic Feet	Per Tree Tons	Per Acre Cubic Feet	Per Acre Tons	Ton Rate	Harvest (less overhead) Per Acre	Harvest (less overhead) Total	Investment Per Acre	Investment Total	Net IRR Per Acre
2010	0	Harvest Year (jan - may)													$ -	$ -	$ -
2010	0	Site Prep Spray													$ -	$ -	$ -
2010	0	Shear & Offset Subsoil													$ (182)	$ (80,288)	$ (182)
2010	0	Burn													$ (17)	$ (7,460)	$ (17)
2011	1	Seedlings	450												$ (68)	$ (29,744)	$ (62)
2011	1	Planting	450												$ (31)	$ (13,846)	$ (29)
2011	1	Grass Spray	450												$ (40)	$ (17,600)	$ (37)
2011	1	Seedling Survival	405	45													
2013	3	Release (50%)	405												$ (60)	$ (26,400)	$ (47)
2021	11	Thinning #1	177	228	8.5	33	2.06	3.5	0.12	797	27	$ 10	$ 268	$ 118,111			$ 96
2022	12	Fertilization	177		8.9	34	2.13								$ (100)	$ (44,000)	$ (39)
2023	13		177		9.2	35	2.19										
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2026	16		177		10.3	38	2.38										
2027	17		177		10.7	39	2.44										
2028	18	Thinning #2	96	73	11.5	40	2.50	12.2	0.41	889	30	$ 15	$ 450	$ 197,816			$ 92
2029	19	Fertilization	96		11.9	41	2.56								$ (100)	$ (44,000)	$ (22)
2030	20		96		12.2	42	2.63										
2031	21		96		12.6	43	2.69										
2032	22		96		13.0	44	2.75										
2033	23		96		13.3	45	2.81										
2034	24		96		13.7	46	2.88										
2035	25	Final Harvest	96	86	14.0	47	2.94	29.0	0.98	2,506	84	$ 25	$ 2,111	$ 928,826			$ 249
										Total (real)			$ 2,829	$ 1,244,752	$ (598)	$ (263,338)	$ 0

IRR (real) 8.2%

Note:
1) Land treated as a separate vehicle of investment for return (timberland averages 4-5%).
2) Analysis was after all costs, before taxes, and with no appreciation or inflation added (real).
3) Timber sales reduced 15% for management overhead and administrative costs.
4) IRR = Internal Rate of Return; Dbh = Diameter at 4.5 feet above ground; Real = no appreciation or inflation included (today's dollar value).
5) Seedlings cost rounded to 1,000 and 5% added for culls.
6) If the harvest is completed before June 1st a chemical site control spray may be more advantageous than a release which negates the release spray and costs approximately $80/acre during the summer before planting.

Post-Recovery-2016 Timber Prices & Returns for intensively managed pine plantations in the Coastal Plains of Southeastern US

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Return Summary (real):		Net	Gross
Internal Rate of Return (real IRR after all cost before taxes):		**10.5%**	na
Term of Investment (years in rotation from planting to maturity)		25	25
Gross Revenue Per Acre Per Year	$	152	$ 207
Gross Revenue Per Acre	$	3,797	$ 5,171
Gross Revenue Per Year for Tract	$	66,824	$ 91,008
Gross Revenue Total over Rotation for Tract	$	1,670,588	$ 2,275,206

Tract Information:	Planted	Total
Acres to be planted	**440**	627
Tract	Taylor 440 (pine sale)	
Contact	Nancy, Sally & Dennis	
Date 12/07/10 Beginning Investment Year	2010	

Seedling Purchase:

Atlantic Coastal 2nd Generation Loblolly (mass control pollinated)	450	208,000
Mortality first year		10%
Mortality between thinning (after 1st Thinning)		10%

Investment Summary:		Total	Per Acre
Direct Reforestation (1st year)	$	(131,338)	$ (298)
Release Spray (2 or 3 year; may not be needed 50% of the time)	$	(26,400)	$ (60)
Fertilization after 1st Thin (10 - 15 years)	$	(26,400)	$ (60)
Fertilization after 2nd Thin (16 - 22 years)	$	(88,000)	$ (200)
Cumulative Investment	$	(263,338)	$ (598)

Thinning Variables:

Years between final harvest and planting	1
First Thinning Year	11
After thinning dbh increase (smaller trees removed; inches)	0.5
Regular Thinning Target Basal Area	70

Investment Breakdown:		Total	Per Acre	Year(s)	Per Unit
Shear & Offset	$	(80,288)	(182.47)	0	na
Chemical Site Preparation Application	$	-	-	0	na
Burn	$	(7,460)	(17)	0	na
Seedling Cost (including pickup, storage, & delivery)	$	(29,744)	$ (68)	1	(0.143)
Planting Cost	$	(13,846)	$ (31)	1	(0.07)
Grass Spray	$	(17,600)	(40)	1	na
Release Spray	$	(26,400)	(60)	2	na
Mid Fertilization	$	(44,000)	(100)	11	na
Late Fertilization	$	(44,000)	(100)	18	na
Total	$	(263,338)	$ (598)		

Annual Tree Growth:

Diameter growth after first thinning (inches)	0.36
Merchantable height growth after first thinning (feet)	1

Administration Overhead:

Management Overhead (timber sale amounts shown reduced by this amount)	15%

Detailed Analysis by Year Below:

Year	Age	Description	Trees	Thinned Trees	Dbh inches	Height Merchantable feet	Logs 16 feet	Per Tree Cubic Feet	Per Tree Tons	Per Acre Cubic Feet	Per Acre Tons	Ton Rate	Harvest Per Acre	Harvest (less overhead) Total	Investment Per Acre	Investment Total	Net IRR Per Acre
2010	0	Harvest Year (jan - may)													$ -	$ -	$ -
2010	0	Site Prep Spray													$ -	$ -	$ -
2010	0	Shear & Offset Subsoil													$ (182)	$ (80,288)	$ (182)
2010	0	Burn													$ (17)	$ (7,460)	$ (17)
2011	1	Seedlings	450												$ (68)	$ (29,744)	$ (61)
2011	1	Planting	450												$ (31)	$ (13,846)	$ (28)
2011	1	Grass Spray	450												$ (40)	$ (17,600)	$ (36)
2011	1	Seedling Survival	405	45													
2013	3	Release (50%)	405												$ (60)	$ (26,400)	$ (44)
2021	11	Thinning #1	177	228	8.5	33	2.06	3.5	0.12	797	27	$ 10	$ 268	$ 118,111			$ 76
2022	12	Fertilization	177		8.9	34	2.13								$ (100)	$ (44,000)	$ (30)
2023	13		177		9.2	35	2.19										
2024	14		177		9.6	36	2.25										
2025	15		177		9.9	37	2.31										
2026	16		177		10.3	38	2.38										
2027	17		177		10.7	39	2.44										
2028	18	Thinning #2	96	73	11.5	40	2.50	12.2	0.41	889	30	$ 25	$ 749	$ 329,693			$ 105
2029	19	Fertilization	96		11.9	41	2.56								$ (100)	$ (44,000)	$ (15)
2030	20		96		12.2	42	2.63										
2031	21		96		12.6	43	2.69										
2032	22		96		13.0	44	2.75										
2033	23		96		13.3	45	2.81										
2034	24		96		13.7	46	2.88										
2035	25	Final Harvest	96	86	14.0	47	2.94	29.0	0.98	2,506	84	$ 40	$ 3,378	$ 1,486,121			$ 234
											Total (real)		$ 4,395	$ 1,933,925	$ (598)	$ (263,338)	$ 0

IRR (real) 10.5%

Note:
1) Land treated as a separate vehicle of investment for return (timberland averages 4-5%).
2) Analysis was after all costs, before taxes, and with no appreciation or inflation added (real).
3) Timber sales reduced 15% for management overhead and administrative costs.
4) IRR = Internal Rate of Return; Dbh = Diameter at 4.5 feet above ground; Real = no appreciation or inflation included (today's dollar value).
5) Seedlings cost rounded to 1,000 and 5% added for culls.
6) If the harvest is completed before June 1st a chemical site control spray may be more advantageous than a release which negates the release spray and costs approximately $80/acre during the summer before planting.