

<b>DEIS: (305,017 acres)</b> Comply with PL 113-291 on only 14% acres; Harvest above CMAI on 86% of acres; Harvest above demand volume (46 mmbf/yr)	DEIS acres harvested	DEIS total carbon stored in harvest volume (tons)	Annual DEIS CO2(e) based on carbon emissions in harvest (with 20% carbon emissions recapture for harvest below 95 yrs and 33% carbon emissions recapture for harvest above 95 yrs )	Total CO2(e) emissions in 25 yrs (tons)	Total CO2(e) emissions in 100 yrs (tons)	Multiplier above CEQ annual (25,000/yr) for 25 yr period	Multiplier above CEQ annual (25,000/yr) for 100 yr period
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**Initial harvest CO2(e) loss**

Age class	Estimated above-ground biomass carbon storage by age (tons/ac)	First 25 yrs harvest	Next 75 yrs harvest	DEIS total carbon stored in harvest volume (tons)			Annual DEIS CO2(e) based on carbon emissions in harvest		Total CO2(e) emissions in 25 yrs (tons)	Total CO2(e) emissions in 100 yrs (tons)
		@ 65 yrs and 120 yrs.	@ 120 yrs	First 25 yrs	Next 75 yrs	Total 100 yrs	25 yrs	Next 75 yrs		
SG	55			na						
	65			21,873,150		21,873,150	2,568,783			
	120	37,390		-	174,180,960	174,180,960	-	5,710,581	108,531,523	574,880,360
OG	120	23,223	224,460	18,021,048	-	18,021,048	1,772,478	-		
	120		19,944	-	15,476,544	15,476,544	-	507,404		
	<b>totals</b>					<b>229,551,702</b>			<b>108,531,523</b>	<b>574,880,360</b>

**Plus recapture based on regrowth (minus additional reharvest where applicable)**

	minus Co2(e) sinks
For 37,390 SG acres to be grown and reharvested at age 65	1,491,321
For 224,460 SG acres to be grown and reharvested at age 120	0
For 43,147 OG acres to be grown and reharvested at age 120	1,692,534
<b>totals</b>	<b>3,183,855</b>

	133,811,627	<b>168</b>	<b>175</b>
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**Total CO2(e) loss in 25 and 100 years**

**105,347,668**

**441,068,733**

**168**

**175**

<b>Conservation alt: (85,125 acres)</b> Comply with PL 113-291 on 100% of acres Harvest only demand volume (46 mmbf/yr)	Conservation alt acres harvested	Conserv alt. total carbon stored in harvest volume (tons)	Annual DEIS CO2(e) based on carbon emissions in harvest (with 20% carbon emissions recapture for harvest below 95 yrs and 33% carbon emissions recapture for harvest above 95 yrs )	Total CO2(e) emissions in 25 yrs	Total CO2(e) 100 yrs	Multiplier above CEQ annual (25,000/yr) for 25 yr period	Multiplier above CEQ annual (25,000/yr) for 100 yr period
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**Initial harvest CO2(e) loss**

Age class	Estimated above-ground biomass carbon storage by age (tons/ac)	First 25 yrs harvest	Next 75 yrs harvest	Conserv alt. total carbon stored in harvest volume (tons)			Annual DEIS CO2(e) based on carbon emissions in harvest		Total CO2(e) emissions in 25 yrs	Total CO2(e) 100 yrs
		@ 55 yrs and 120 yrs	@ 55 yrs and 120 yrs	First 25 yrs	Next 75 yrs	Total 100 yrs	25 yrs	Next 75 yrs		
SG	55	23,727	52,273	11,721,138	25,822,862	37,544,000	1,376,530	1,010,879	41,091,634	127,640,655
OG	120	3,500	5,625	2,716,000	4,365,000	7,081,000	267,135	143,108		
	<b>totals</b>					<b>44,625,000</b>			<b>41,091,634</b>	<b>127,640,655</b>

**Plus recapture based on regrowth (minus additional reharvest where applicable)**

	minus Co2(e) sinks
For 76,000 SG acres to be grown and reharvested at age 55	4,260,140
For 9,125 OG acres to be grown and reharvested at age 120	255,086
<b>totals</b>	<b>4,515,227</b>

85,687,123

**58**

**16**

**Total CO2(e) loss in 25 and 100 years**

**36,576,407**

**41,953,532**

Additionality Leighty

DEIS beyond CMAI (224,460 acres) w/harvest at 120 yrs				5	100	
25	100	Additional years needed to reach 120 yrs	Years until regeneration begins	100 years from now, what will regrowth be?	Total CO2e recaptured in the first 100 years	67%

2020 age	2045	2120 age	% allocated according to PCT acreage	Acres distribution by age class (based on GIS PCT)	Current Age	120	yrs to germ (5 yrs)	yrs live tree re-growth at 100 yrs out	tons/ac	additional tons capture based on re-growth at 100 yrs from 2020	additional CO2(e) tons capture based on re-growth at 100 yrs	67% Lost
55	80	180	2.6%	5,836	55	65	70	30	188	1,095,526	4,020,582	2,693,790
50	75	175	9.6%	21,548	50	70	75	25	124	2,661,198	9,766,596	6,543,619
45	70	170	22.5%	50,504	45	75	80	20	99	4,989,746	18,312,367	12,269,286
40	65	165	20.0%	44,892	40	80	85	15	74	3,326,497	12,208,245	8,179,524
35	60	160	19.6%	43,994	35	85	90	10	49	2,173,312	7,976,053	5,343,956
30	55	155	14.1%	31,649	30	90	95	5	25	781,727	2,868,938	1,922,188
25	50	150	11.6%	26,037	25	95	100	0	0	-	-	-
				100.0%	224,460					15,028,006	55,152,780	36,952,363

acres to harvest above CMAI 224,460

Old Growth 25

1st 25 yrs	Acres	yrs to germ (5 yrs)	yrs regrowth after 25 yrs	tons/ac	add'l tons, 25 yrs	additional CO2(e) 25 yrs	67% Lost	Next 75 yrs	Acres	yrs to germ (5 yrs)	yrs regrowth after 100 yrs	tons/ac	additional CO2(e) 100 yrs	67% Lost
2020	4,645	10	15	74	344,165	1,263,085	846,267	2045	4,645	35	65	585	9,978,372	6,685,509
2025	4,645	15	10	49	229,443	842,057	564,178	2050	4,645	40	60	538	9,178,418	6,149,540
2030	4,645	20	5	25	114,722	421,028	282,089	2055	4,645	45	55	492	8,378,464	5,613,571
2035	4,645	25	0	0	-	-	-	2060	4,645	50	50	445	7,578,510	5,077,602
2040	4,645	30	-5	-	-	-	-	2065	1,366	55	45	380	1,906,370	1,277,268
<b>23,223</b>							<b>1,692,534</b>	<b>19,944</b>						<b>24,803,490</b>
								<b>43,167</b>						
								<b>26,496,024</b>						

100 year Old Growth CO2e total 26,496,024

Additionality Leighty

DEIS below CMAI (37,390 acres) w/harvest at 65 yrs										5	100											
										Additional years needed to reach 65 yrs	Years until regeneration begins	100 years from now, what will re-growth be?										
										65	yrs to germ (5 yrs)	In 100 yrs: yrs live tree re-growth after harvest at 65 yrs	tons/ac	additional tons capture based on re-growth to 65 yrs	additional CO2(e) tons capture based on re-growth to 65 yrs	80% lost	yrs live tree growth - re-harvest	@ 100 years	tons/ac	add'l tons after re-harvest	add'l CO2e tons after re-harvest	80% Lost
										25												
										Current Age												
										Acres distribution by age class (based on GIS PCT acres)												
55+	15.0%	5,609	55	80	10	15	65	585	3,283,160	12,049,197	9,639,357	20	99	554,120	2,033,620	1,626,896						
50-54	25.0%	9,348	50	75	15	20	65	585	5,471,933	20,081,994	16,065,595	15	74	692,650	2,542,025	2,033,620						
45-49	30.0%	11,217	45	70	20	25	65	585	6,566,320	24,098,393	19,278,714	10	49	554,120	2,033,620	1,626,896						
40-44	30.0%	11,217	40	65	25	30	65	585	6,566,320	24,098,393	19,278,714	5	25	277,060	1,016,810	813,448						
		100%							21,887,732		64,262,381											
		37,390								Grand total	70,363,240											

		25		
		Current Age	in 25 yrs: yrs live tree re-growth for harvest at 65 yrs	tons/ac
	55	10	49.4	277,060
	50	5	24.7	230,883
	45	0		
				1,491,321

Additionality Leighty

Conservation Alternative (44,636 acres) w/harvest at 55 yrs										5	100				
										Additional years needed to reach 55 yrs	Years until regen. begins	100 years from now, what will regrowth be?			
Acres distribution by age class (based on GIS PCT acres)	Current Age	25	55	yrs to germ (5 yrs)	In 100 yrs: yrs re-growth after harvest at 55 yrs	tons/ac	additional tons capture based on re-growth to 55 yrs	additional CO2(e) tons capture based on re-growth to 55 yrs	80%		@ 100 years				
									80% lost	yrs growth re-harvest	tons/ac	add'l tons after re-harvest	add'l CO2e tons after re-harvest	80% lost	
55+	8,480	55	80	0	5	55	492	4,168,174	15,297,200	12,237,760	40	316	2,681,037	9,839,405	7,871,524
50-54	4,790	50	75	5	10	55	492	2,354,429	8,640,753	6,912,603	35	252	1,206,793	4,428,929	3,543,143
45-49	3,485	45	70	10	15	55	492	1,712,982	6,286,644	5,029,315	30	188	654,204	2,400,929	1,920,744
40-44	3,485	40	65	15	20	55	492	1,712,982	6,286,644	5,029,315	25	124	430,398	1,579,559	1,263,647
35-39	3,485	35	60	20	25	55	492	1,712,982	6,286,644	5,029,315	20	99	344,318	1,263,647	1,010,918
30-34	3,485	30	55	25	30	55	492	1,712,982	6,286,644	5,029,315	15	74	258,239	947,735	758,188
25-29	3,485	25	50	30	35	55	492	1,712,982	6,286,644	5,029,315	10	49	172,159	631,824	505,459
20-24	3,485	20	45	35	40	55	492	1,712,982	6,286,644	5,029,315	5	25	86,080	315,912	252,729
15-19	3,485	15	40	40	45	55	492	1,712,982	6,286,644	5,029,315					17,126,352
10-14	3,485	10	35	45	50	50	445	1,549,431	5,686,412	4,549,129					
5-9	3,485	5	30	50	55	45	380	1,325,624	4,865,041	3,892,033					
44,636	44,636							21,388,533		62,796,732					
	78,816	Total w/ re-harvest							Grand total	79,923,084					
						25									
				Current Age	in 25 yrs: yrs re-growth for harvest at 55 yrs		tons/ac	additional tons capture	Add CO2(e) at 25 years growth	80% lost					
				55	20		99	837,824	3,074,814	2,459,851					
				50	15		74	354,939	1,302,626	1,042,101					
				45	10		49	172,159	631,824	505,459					
				40	5		25	86,080	315,912	252,729					
										4,260,140					

**Assumptions**

Acres	Age Cla	Leighty Mg/ha	Cumulative tons/ac added
Second growth in DEIS scenario to be harvested at CMAI:	0	0	0
Total acres: 224,460	5	10	25
Split between age groups 25-55 based on percentage splits of USFS PCT acres	10	20	49
Since all to be harvested over 100 years, assumed youngest stands were at least 25 years old.	15	30	74
(25 + 100 = 125; may be harvested in year 95)	20	40	99
Second growth in DEIS scenario to be harvested below CMAI (65 years):	25	50	124
Total acres: 37,390	30	76	188
Split between age groups 40-55 based on approximate ratios of USFS PCT acres	35	102	252
Since all to be harvested over 25 years, assumed youngest stands were at least 40 years old.	40	128	316
Old Growth in DEIS scenario:	45	154	380
23,223 acres harvested over first 25 years	50	180	445
Assumed a consistent number of acres harvested each period	55	199	492
19,944 additional acres harvested next 75 years	60	218	538
Assumed a consistent number of acres harvested each period until acres run out	65	237	585
Second growth, Conservation Alternative:	70	256	632
44,636 acres total without re-harvest	75	275	679
At least 70,000 acres harvested including re-harvest, over 100 years	80	278	687
Split according to our projections of acres needed for harvest to sustain 46 mmbf/yr after 2025	85	281	694
Old growth, Conservation Alternative:	90	284	701
3,500 acres harvested over the first 25 years	100	290	716
Assumed a consistent number of acres harvested each period	110	302	746
5625 additional acres harvested next 75 years	120	314	776
Assumed a consistent number of acres harvested each period until acres run out	130	326	805
	140	338	835
	150	350	865

**Carbon**

Used Leighty et. Al. 2006. Figure 2 to estimate Carbon emissions by age class.  
See table to right

**Carbon lost to durable goods**

Second growth less than 100 years of age:  
    Assumed 20% of carbon retained in durable goods, 80% lost  
Old growth and second growth over 100 years of age:  
    Assumed 33% of carbon retained in durable goods, 67% lost

**Conversion: Carbon to CO2(e)**

Multiply tons carbon by 3.67

**Regeneration**

Assumed stands take 5 years after harvest to germinate and begin regeneration



Additionality Leighty

1st 25 yrs				Next 75 yrs										
Acres	25	67%	tons/ac	add'l tons, 25 yrs	additional CO2(e) 25 yrs	67% Lost	Acres	25	67%	tons/ac	additional CO2(e) 100 yrs	67% Lost		
	yr to germ (5 yrs)	yr regrowth after 25 yrs						yr to germ (5 yrs)	yr regrowth after 100 yrs					
2020	700	10	15	74	51,870	190,363	127,543	2045	700	35	65	585	1,503,867	1,007,591
2025	700	15	10	49	34,580	126,909	85,029	2050	700	40	60	538	1,383,304	926,814
2030	700	20	5	25	17,290	63,454	42,514	2055	700	45	55	492	1,262,741	846,036
2035	700	25	0	0	-	-	-	2060	700	50	50	445	1,142,177	765,259
2040	700	30	-5	-	-	-	-	2065	700	55	45	380	977,196	654,721
	<b>3,500</b>						<b>255,086</b>	2070	700	60	40	316	812,215	544,184
								2075	700	65	35	252	647,234	433,647
								2080	700	70	30	188	482,253	323,109
								2085	25	75	25	124	11,331	7,592
								5,625					<b>5,508,953</b>	
				100 year Old Growth CO2e total								<b>5,764,039</b>		

**Conservation Alternative!!!!**  
**OLD GROWTH**

**Conservation Alternative**

Acres according to our ALL PCT Analysis at 46 mmbf/year

Age Class	Annual	5-yr
55+	1696	8480
50	958	4790
45	697	3485
40	697	3485
35	697	3485
30	697	3485
25	697	3485
20	697	3485
15	697	3485
10	697	3485
5	697	3485