The Financial Benefits of Making Jackson Demonstration State Forest into a Preserve

Present management of Jackson Demonstration State Forest (Jackson Forest) ignores how logging affects the values of carbon in the Forest. An exploratory calculation shows that, when carbon values are taken into account, managing Jackson Forest as a preserve (no logging) is financially superior to continued logging. The carbon sequestration values generated by a preserve exceed the current profits from logging. Halting logging will save the state money and aid its battle against climate change.

The market prices of carbon offsets or allowances in various Cap and Trade programs are a measure of the value of carbon sequestration. For California State, the most relevant price is the market price participants in California's Cap and Trade program pay for an allowance to emit a metric ton of CO2 (MT CO2). This price has escalated dramatically in recent years, rising from $13 per MT CO2 in 2017 to a high of $34 in 2021. As the consequences of global warming intensify, the value of CO2 seems certain to rise.

To provide perspective, I have calculated Jackson Forest carbon values for three prices of a MT of CO2: $32, a recent auction price in California; $51, a preliminary estimate by a Biden task force of the societal value of avoiding a MT of CO2 emissions; and $98, a recent price paid for an allowance in the European Union Cap and Trade program.

As shown in the following charts and tables, halting logging in Jackson Forest would be profitable to the state even at the lowest price considered, and extremely profitable at the higher prices. At a price of $98 per MT of CO2, the state would benefit by $140 million over the next ten years.

Independently of price, halting logging would make a significant contribution to reducing California's carbon emissions. Over ten years, CO2 emissions would be reduced by about 2 million MT, equivalent to 4.8 billion miles of auto travel.[i]

As there are uncertainties in many of the relationships that underlie the projections made here, the results should not be considered definitive, but even allowing for uncertainties, they provide strong support for a halt in logging until a more definitive review based on current science is made. At the least, all cutting of Doug Firs (about 40% of harvests) should immediately halt, because they add CO2 to the atmosphere while being sold at a substantial loss.[ii]

[i] The starting point for the calculations was an estimate of the carbon contained in Jackson Forest prepared for the forest managers by the US Forest Service Pacific Northwest Research Station, the entity that does all of the forest carbon calculations for Cal Fire. The estimate was adjusted to reflect research done in Jackson Forest on carbon density in redwoods. Carbon was projected to grow (without harvesting) at 2% per year, the long-term, stable rate of growth of Jackson Forest. Other parameters used are in *Parameters and Notes for Table 1* on a following page.

[ii] Vince Taylor, 2021-12-30 Carbon Values of Doug Fir in JDSF v3

Figure 1: Jackson Forest Annual Carbon Capture: No Harvest versus Harvest 40% of Growth

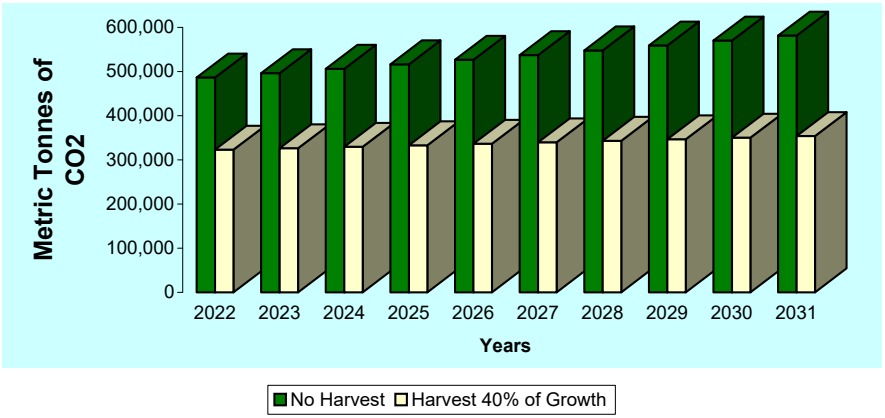

Figure 2: Cumulative Net Gain in Carbon Capture from Halting Logging in Jackson Forest

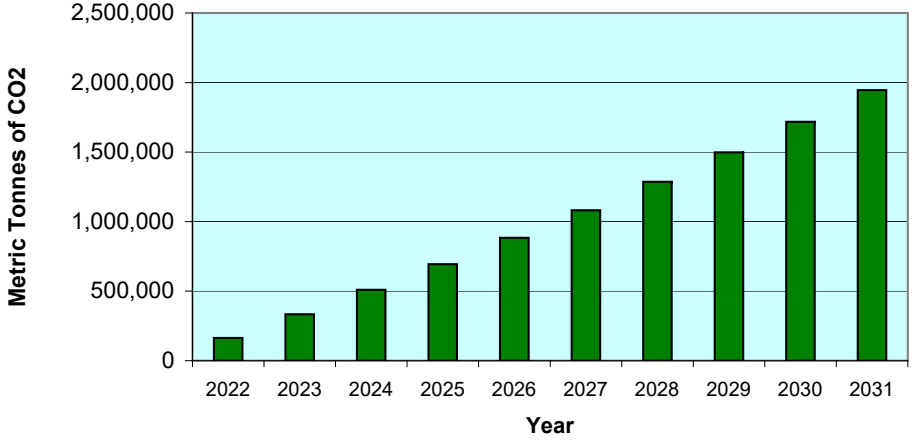

Figure 3: Vehicle Miles Equivalent to Cumulative Net Gain in Carbon Inventory from Jackson Forest Logging Halt

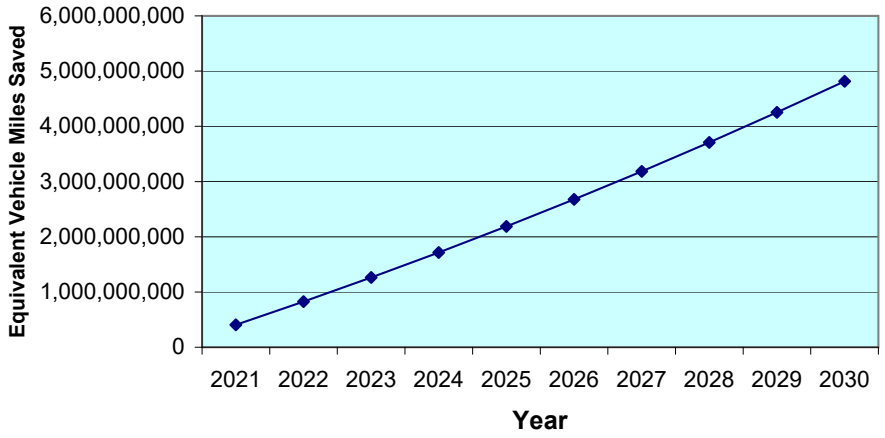

Figure 4: Cumulative Net Gain in Dollar Value to the State from Logging Halt in Jackson Forest for Different Prices of CO2 ($ per tonne)

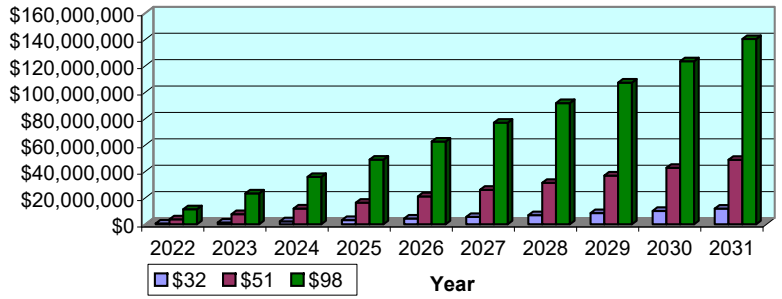

Table 1: Jackson Forest Carbon Capture Amounts and Values

JDSF = Jackson Demonstration State Forest

Carbon Inventory Amounts of JDSF (Metric Tonnes of CO2)								
	No Harvest		Harvest 40% of Growth					
Year	Carbon Inventory with No Logging	Year Carbon inventory Increase	Carbon Inventory 40% of Growth Logged	Wood Products Produced	Cumulative Wood Products	Wood Products Decay	Wood Products Produced minus Decay	Year Net Carbon Inventory Increase
2021	24,327,512		24,327,512					
2022	24,814,062	486,550	24,619,442	31,139	31,139	0	31,139	323,069
2023	25,310,343	496,281	24,914,875	31,513	62,652	623	30,890	326,323
2024	25,816,550	506,207	25,213,854	31,891	94,543	1,253	30,638	329,616
2025	26,332,881	516,331	25,516,420	32,274	126,817	1,891	30,383	332,949
2026	26,859,539	526,658	25,822,617	32,661	159,478	2,536	30,125	336,322
2027	27,396,729	537,191	26,132,488	33,053	192,531	3,190	29,863	339,735
2028	27,944,664	547,935	26,446,078	33,450	225,980	3,851	29,599	343,189
2029	28,503,557	558,893	26,763,431	33,851	259,831	4,520	29,331	346,684
2030	29,073,628	570,071	27,084,592	34,257	294,089	5,197	29,061	350,222
2031	29,655,101	581,473	27,409,607	34,668	328,757	5,882	28,787	353,802
Cumulative 10-yr Increment		5,327,589						3,381,911

Benefits of a Halt in Logging

Year	Year Net gain in Carbon inventory from Logging Halt	Cumulative Net Gain in Carbon Inventory from Logging Halt	Vehicle Miles Equivalent to Cumulative Net Gain in Carbon Inventory from Logging Halt	Cumulative Net Dollar Gain in Inventory from Logging Halt for various CO2 Prices per Tonne (6)			Logging Revenues (7)	Net Profit from Logging 40% of Growth (7)	Cumulative Net Profit from Logging 40% of Growth	Cumulative Net Dollar Gain from Logging Halt after adjusting for lost logging profits for various CO2 Prices per Tonne		
2021				$32	$51	$98	$8,506,800.0			$32	$51	$98
2022	163,481	163,481	404,640,962	$5,231,388	$8,337,525	$16,021,126	$8,676,936.0	$4,598,776.1	$4,598,776.1	$632,612	$3,738,749	$11,422,350
2023	169,958	333,439	825,313,413	$10,670,039	$17,005,374	$32,676,994	$8,850,474.7	$4,690,751.6	$9,289,527.7	$1,380,511	$7,715,847	$23,387,466
2024	176,590	510,029	1,262,402,418	$16,320,930	$26,011,483	$49,982,850	$9,027,484.2	$4,784,566.6	$14,074,094.3	$2,246,836	$11,937,389	$35,908,755
2025	183,382	693,411	1,716,301,515	$22,189,151	$35,363,959	$67,954,274	$9,208,033.9	$4,880,258.0	$18,954,352.3	$3,234,799	$16,409,607	$48,999,922
2026	190,336	883,747	2,187,412,895	$28,279,900	$45,071,090	$86,607,193	$9,392,194.6	$4,977,863.1	$23,932,215.4	$4,347,684	$21,138,875	$62,674,977
2027	197,456	1,081,203	2,676,147,588	$34,598,491	$55,141,345	$105,957,879	$9,580,038.5	$5,077,420.4	$29,009,635.8	$5,588,855	$26,131,709	$76,948,243
2028	204,746	1,285,949	3,182,925,641	$41,150,355	$65,583,379	$126,022,963	$9,771,639.2	$5,178,968.8	$34,188,604.6	$6,961,751	$31,394,774	$91,834,359
2029	212,209	1,498,158	3,708,176,316	$47,941,042	$76,406,036	$146,819,442	$9,967,072.0	$5,282,548.2	$39,471,152.8	$8,469,890	$36,934,884	$107,348,289
2030	219,849	1,718,007	4,252,338,281	$54,976,223	$87,618,356	$168,364,684	$10,166,413.5	$5,388,199.1	$44,859,351.9	$10,116,872	$42,759,004	$123,505,332
2031	227,671	1,945,678	4,815,859,807	$62,261,694	$99,229,575	$190,676,438	$10,369,741.7	$5,495,963.1	$50,355,315.0	$11,906,379	$48,874,260	$140,321,123

Parameters and Notes for Table 1

Fraction of biomass in harvested trees converted to wood products (1)	0.16
U.S. tons per metric ton (tonne)	0.907
lbs per metric ton	2204.623
Logging Rate (percent of growth) (2)	0.4
Forest Growth Rate (2)	0.02
Wood product annual decay rate for half-life of 35 years (3)	0.02
C02 emitted per mile for average car (lbs/mi) (4)	0.891
Jones and O'Hara JDSF carbon correction factor for redwoods(5)	1.26
Net profit as a percent of revenue, average 2015-2020 (7)	0.53
FIA JDSF Carbon Estimate 2017 (tonnes of CO2) (2)	19,000,000
Fraction JDSF carbon in conifers	0.83
2017 JDSF Carbon adjusted by applying Jones and O'Hara correction factor to conifer carbon (83% of total carbon)	23,100,200
Carbon Inventory grown to 2021 (see Table 1a: Growth to 2021)	24,327,512

Notes

(1) Based on 84% of carbon in harvested trees going into atmosphere. John Battles, *California Forest and Rangeland Greenhouse Gas Inventory Development FINAL REPORT* , December 30, 2013; Minor revision Jan 30, 2014. No allowance for decay over time.

(2) JDSF Presentation to Jackson Advisory Committee, August 2021.

(3) Note on wood decay: Over time, wood products decay and release of C02 to the atmosphere. Current redwood products are mostly used for decks and fencing, and they have low resistance to decay, unlike old-growth redwood. A reasonable half-life seems like 20 years. Doug Fir, which comprises about 40% of JDSF harvests is used in housing construction. A reasonable half-life for Doug Fir is 50 years. For a 60/40 mix of redwood/Doug Fir, a half-life of 35 years seems reasonable.

(4) https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle#driving

(5) Jones, D and O'Hara, K *Carbon density in managed coast redwood stands: implications for forest carbon estimation,* Forestry, Vol. 85, No. 1, 06/12/2011 Advance Access Date

(6) CO2 prices: 1.). $32 /tonne value is recent price for California Carbon Credit, https://carboncredits.com/carbon-prices-today/, 01/11/2022; 2) $51/tonne value from Interagency Working Group on Social Cost of Greenhouse Gases, “Technical support document: Social cost of carbon, methane, and nitrous oxide, interim estimates under executive order 13990” (US government, February 2021); 3) $98 recent price for EU Carbon Credit, https://capital.com/carbon-emissions-trading-prices-and-global-temperatures-rise, January 11, 2022.

(7) Net profit as a percentage of revenues 2015-2020 averaged 53%. Revenues are projected to increase from 2020 at the projected growth rate of the forest: 2% per year. 2020 starting revenue is set at the average annual revenue from 2015-2020: $8.34 million

Note on methodology. Generally, when timber harvests are reduced in one place, they increase in others (leakage), but this is not the case for redwood harvests. Redwood is only grown in an area of California. There are no outside sources to make up for a loss in redwood production. Producers' decisions to sell their timber are not affected by the decisions of others, but by their own production capacity, with timing depending upon the market.

A review of redwood harvest quantities in Mendocino County within and outside of JDSF from 2008 to 2018 shows a positive relation between the two, whereas if there were leakage, the relation would be negative: a fall in JDSF harvests would be associated with an increase in outside harvests.