Greenwashing in the Redwoods

A critical look at Cal Fire's management of Jackson Demonstration State Forest

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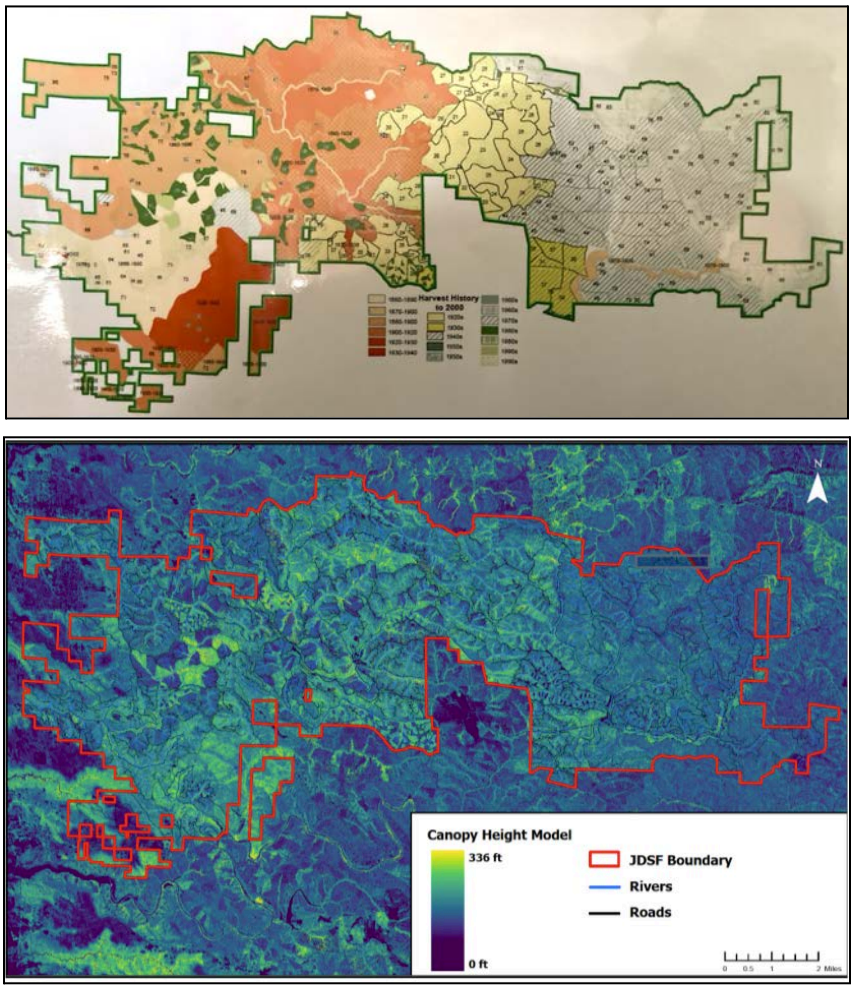

Top: Jackson Demonstration State Forest logging history (each color represents a different era), with the coastline, Highway 1, and Fort Bragg to the west and Highway 101 and Willits to the east. Bottom: Lidar image showing current-day tree height; Note the scarcity of tall trees (very light green to yellow) (Source: O'Brien 2024).

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Synopsis

Overstated or invalidated claims of environmental virtue constitute greenwashing and consequent loss of credibility. Typically expected of private companies, this behavior can also occur in the public sector, often defended with outdated science or pseudo-science. Greenwashing is typically accompanied by language that obfuscates actual practices. The Jackson Demonstration State Forest (JDSF) is an approximately 50,000-acre expanse of state-owned forestland in northern California's coastal range, populated primarily by redwood trees. Per a 1949 mandate, JDSF's operations (and those of thirteen other state forests) must be funded by industrial logging revenues. Ironically, logging is also the organization's primary expense, followed by secondary activities in conservation, research, and recreation. While represented as a model of sustainable practices, throughout its history the forest's health and productivity has been overstated and many environmental harms, downplayed, or ignored outright. This, together with incomplete or otherwise faulty accounting, has led to inflated claims of forest health, and carbon storage. Activities occurring in JDSF also often elevate the risk of destructive wildfire and compromise water quality, with environmental impacts including degrading the habitat of endangered salmon, which are still barely returning following their decimation in earlier eras of logging. These outcomes are closely linked to the high-grading of large trees (Figure 1) which provide distinct environmental services, leaving behind a less diverse and resilient landscape. In some cases, environmentally oriented research and restoration activities can misleadingly legitimate logging projects. Social and cultural harms are often a corollary of greenwashing, as is the case of logging-related damage to archaeological sites and impeding current-day tribal use of the landscape. These issues underpin a far more widespread concern, as Cal Fire is the entity that approves all timber harvest plans throughout the state. Given decades of inertia and conflict with the public and independent experts, the attainment of improved practices would likely require institutional and legislative reforms.

Figure 1. Multiple examples of the felling of large trees in JDSF. Note how the remaining number of far smaller and overcrowded trees in the backgrounds forms a fire-prone understory. Source: O'Brien (2024).

Why the greenwashing of forest practices matters

Greenwashing occurs when deceptive claims of "green" practices are offered to describe actions that in fact degrade the environment. While private companies are thought of as the sole perpetrators of greenwashing, the case of the 50,000-acre Jackson Demonstration State Forest (JDSF) – managed by the California Department of Forestry and Fire Protection (Cal Fire) – demonstrates that public agencies can also be adept at it. Cal Fire's role is all the more important, as their actions in JDSF ostensibly demonstrate best practices for emulation by the timber industry, while the agency oversees approval of logging on private lands throughout the state, under timber harvest plans (THPs) often soundly critiqued on environmental grounds (Battle Creek Alliance 2021).

Forests have distinctive environmental attributes. Redwoods are particularly valuable trees when it comes to carbon storage, fire resilience, ecosystem integrity, and tourism (Save the Redwoods League 2025). Redwood forests hold more carbon per acre than any other forest type on the planet, and for longer thanks to natural chemicals in their tissues that offer protection from fungus and insect damage and their thick fire-resistant bark and ability to regenerate following fire (Yale School of Environment 2016). Coastal redwoods can live more than 2,500 years if undisturbed. Redwoods also create unique ecological landscapes – which can be particularly important to fish such as threatened salmon or endangered steelhead.

These benefits are not trivial. The carbon inventoried in California's coastal redwood forests – self-reported by the USDA and the California Board of Forestry and probably limited to above-ground carbon – equates to the amount of carbon in 1.6 million traincars of coal and the yearly additional absorption during growth equates to the annual emissions of 2.1 million average gasoline passenger vehicles.[2] The retail value of redwood lumber is multiples of other softwoods – which is why logging them is prioritized. California redwoods also provide unique recreational experiences for 31 million visitors annually (Save the Redwoods League 2025). However, the primary uses of redwood (decks, fences, furniture) are among the least durable applications (wooden siding and shingles are no longer recommended due to fire risk).

Touting the enlargement and stewardship of forestlands when actual management methods are impeding such development as well as degrading forests' environmental qualities is an egregious form of greenwashing. Such greenwashing is ultimately ineffective, particularly as remote sensing and other forms of precision data are increasingly available and the science

[2] Based on an inventory of 112,634 million metric tonnes of carbon per (Christensen et al. 2021), average coal car weight of 121 tonnes (BNSF Railway 2025), average carbon content of 57% (weighted average of US bituminous, sub-bituminous, lignite, and anthracite) (USDOE/EIA 2024a and b), a growth increment of 2%/year, and average emissions factor of 4.0 Mt CO_2/year for California passenger vehicles (CARB 2024 and CEC 2025).

based on it is increasingly illuminating and definitive, resulting in the loss of credibility of those who traffic in misinformation. While such practices on the part of private entities are gradually being policed by governments (Cheng et al. 2023), when practiced by self-policing governments it can result in the loss of public trust and social license.

Greenwashing begins with words

The road to greenwashing is paved with enabling language that obfuscates facts. The applicable California Public Resource Code itself is littered with it, calling for "management practices designed to achieve maximum sustained production of high-quality forest products [lumber] while giving consideration to recreation, watershed, wildlife, range and forage, fisheries, and aesthetic enjoyment".[3] The use of the term "sustained" is often construed to mean sustainable in the ecological sense of the word, which is clearly not the case. Rather it reflects the goal of sustaining the greatest possible harvest on, at best, an indefinite basis. Even the more full-fledged formulation "sustainable forest management" is used misleadingly.

To members of the public (and politicians) the notion of sustainable forest management conjures up images of sustainability in the systems-level sense of the word, i.e., something that can be done perpetually without adverse impact on ecosystems and the climate. In actual use, happy talk about sustainable management is code for perpetually growing and then cutting relatively young trees. It can also involve some circumscribed forms of restraint, like refraining from large-scale clearcutting, albeit with work-arounds.

Lumber is often represented as a "far more sustainable" building material than steel or concrete, but when carbon accounting is comprehensive and green manufacturing of alternate materials is considered, together with durability, this is not necessarily the case. One study says that the literature has overstated the benefits of wood by 2- to 100-fold (Harmon 2019). The gap widens when current efforts to decarbonize the manufacturing of non-wood materials are considered.

Logging language is full of euphemisms. Logging methods are referred to as "treatments". Clearcuts are now known as "even-aged logging" or "vista enhancement", more palatable smaller clearcuts (embraced following the discontinuation of unbounded ones in some areas) are called "group selections", and combining fully clear-cut areas with lesser-cut areas is called "variable retention" or "seed tree selection". While the original term "clearcut" is usefully self-explanatory, the general public is hard-pressed to know what any of these jargonistic substitute terms mean.

[3] California Pub. Res. Code 4639

One forest-designation type in JDSF – "Older Forest Development Area (OFDA)" – is applied to 12% (5,631 acres) of JDSF's total forest area (Cal Fire 2021). To any layperson, the name suggests that the goal is reattaining old-growth characteristics. However, while these areas foster "decadent" characteristics (large dead wood, etc), the official management plan makes clear that the primary goal is "harvesting methods aimed at fostering large, mature trees for harvest..." (Cal Fire 2016). It is thus surprising to most that, in fact, the ODFA designation involves removing any trees over 56" in diameter per the "Option A" directive, p. 200). The naming convention thus suggests practices virtually opposite from what are actually occurring. In one closely-watched ODFA cut, other environmental criteria defining OFDA were disregarded (Perkins and Simmons 2021; RT Newswire 2022).

One of the most heavily greenwashed terms – "conservation" – decades ago became a wildcard in environmental politics and policy generally, and as a case-in point in JDSF. While the founders of the modern environmental movements in North America such as John Muir intended a literal meaning for the term, Gifford Pinchot, the first director of the U.S. Forest Service in 1905 (tellingly created under the U.S. Department of Agriculture) defined it in a utilitarian frame of reference to include logging … indeed to prioritize it (Figure 2).

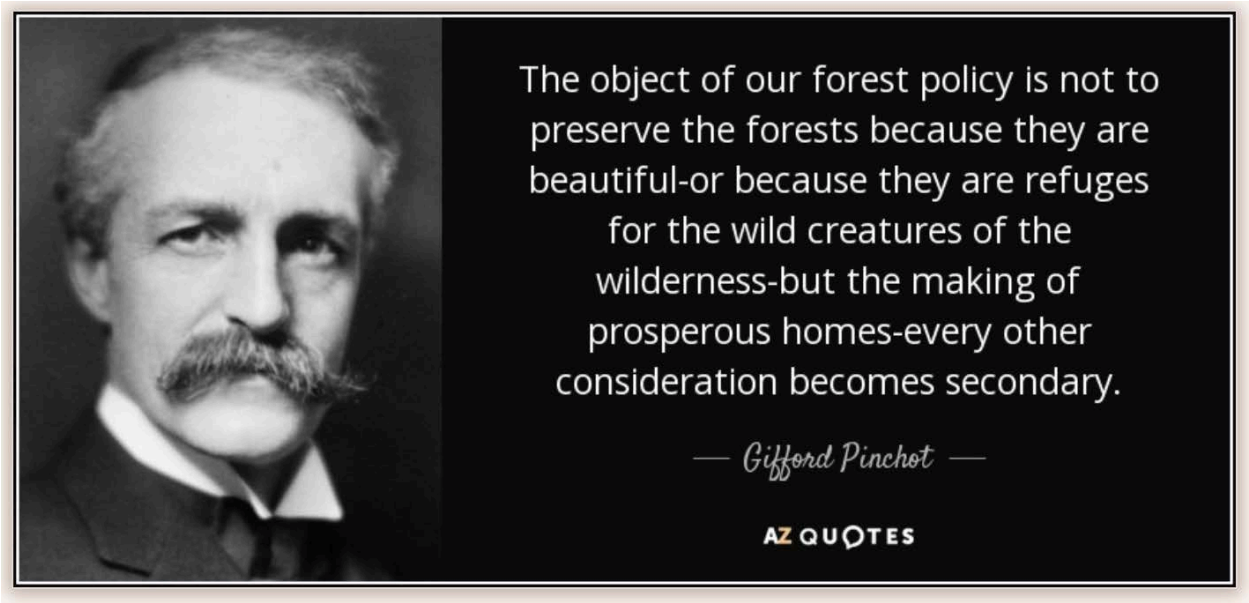


Figure 2. Quote by Gifford Pinchot https://www.azquotes.com/quote/1061494#google_vignette

In the 1930s, a 5246-acre redwood forest in Mendocino county known as the Woodlands was acquired by the National Park Service to provide recreation for lower-income urban dwellers, with development and resource use limited to camping and hiking. It was to be conserved (in Muir's sense) in perpetuity. The land is today designated a National Historic Monument. However, the property was transferred to the California Department of Forestry in 1947 and –

defying an Act of Congress – its "conservation" status was abruptly changed to that of Pinchot and his intellectual descendents. As Taylor (2021) explains, the State accomplished this sleight of hand by strategically substituting an "or" for an "and" in the contract (Taylor 2021).

At times, words reveal greenwashing rather than camouflaging it. For example, the term "tree farm" possesses a rare honesty and transparency about actual goals and objectives.

In other cases, actual practices fall short of written policies. For example, Cal Fire's much hailed "New Vision" exercise (Cal Fire 2022) promised to "halt removal of trees over 48 inches in diameter", yet the practice continued.

In other instances, it is the absence of words that promotes greenwashing. This is rather profoundly evidenced by comparing the current and proposed 10-year JDSF Forest Management Plans, with the former running 177 pages and the latter running 47 pages. Per Cal Fire the proposed plan "... is much less directive than the existing Management Plan, identifying high-level goals and potential future activities within JDSF rather than setting specific land use decisions and activities" (Cal Fire 2025a).

Words matter.

Greenwashing the Jackson Demonstration State Forest's origin myth

"Green" statements are often disregarded or contradicted by actions. In their 2025 draft Forest Management Plan (Cal Fire 2025a) and elsewhere, Cal Fire makes claims that upon first taking possession the entire forest was "cut over" and that "JDSF has demonstrated sustainable management practices since the purchase 1947...".

In reality, the State liquidated virtually all remaining old-growth forest (approximately 28,000 acres, or 60% of the JDSF area) after acquiring the land (see purchase documents c.1947; Eng 2015). Much of this was in the form of massive clear-cuts in the eastern portion of the forest (Figure 3). Cutting of old growth trees continued into the 1980s (Taylor 2002; 2022).

The draft Management Plan also states that only 4% of the forest was clearcut between 1960s and early 1990s, yet the actual management history directly visible in a time-series of satellite images for the period 1984 to 2020 suggests a much higher rate of clearcutting.[4] Today, the 1% of Jackson that is old growth forest (Cal Fire 2021) compares poorly to about 7% statewide (Burns et al. 2018). This is clearly not "sustainable management".

[4] See https://drive.google.com/file/d/1mzlClSfdtuIyuLSFAgsCrxn_rzlpJv8L/view?usp=share_link

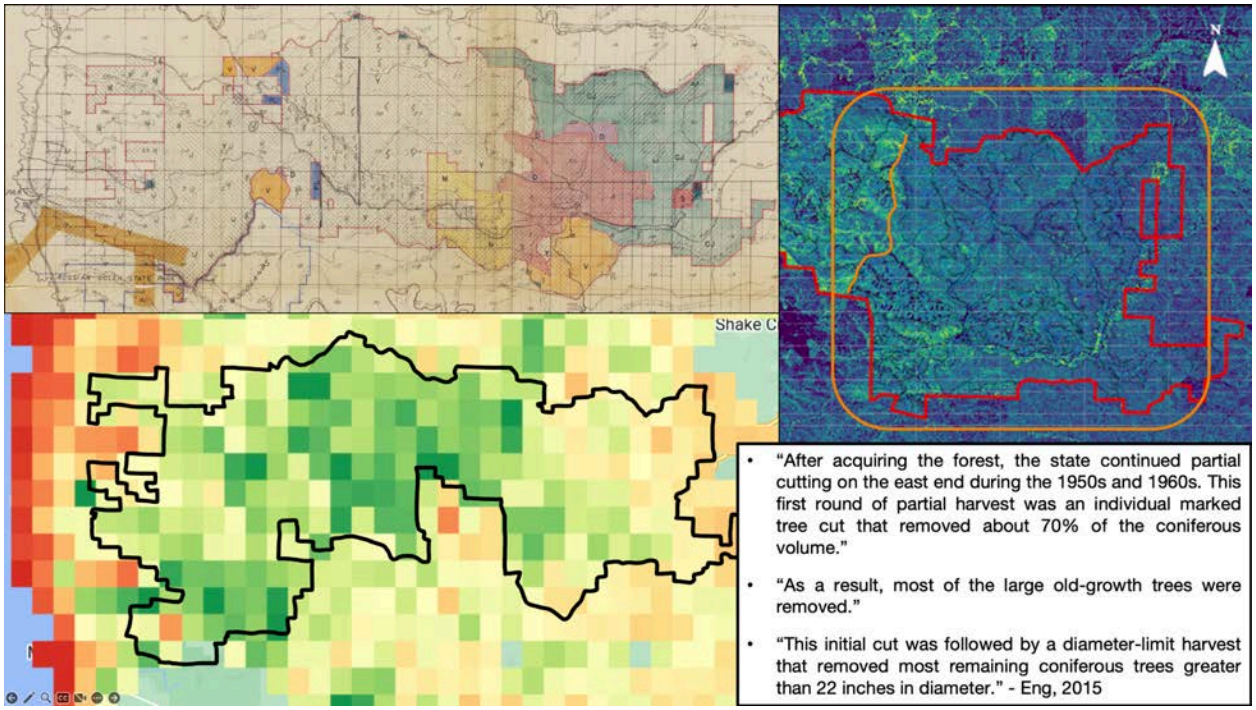


Figure 3. Upper left: the original map from Caspar Lumber Company which accompanied the 1947 sale documents to the state showing that the east end of the forest was old growth virgin timber at the time. Upper right: airborne lidar collected in 2017 showing the east end of the forest is now the shortest forest in JSFD. Lower left: GEDI lidar attached to the International Space Station (ISS) also showing the east end of the forest is now the lowest biomass area in the whole forest. Lower right- excerpts from Eng (2015) further documenting the state's management of the east end of the forest which is the reason it is in such poor shape today.

Accurately determining quantities and qualities of tree "inventories" (standing amounts of timber) and the associated growth rates are key to defining forest sustainability goals. Those wanting to claim both revenue and sustainable practices have a perceived (if not real) conflict of interest in the way they do this accounting.

There has long been considerable ambiguity around JDSF's estimates of forest inventories, with strong indications of systematic errors that overestimate both metrics over long timeframes (Taylor 2002; 2022). In particular, historic large "step increases" in JDSF's reported inventories have occurred at the exact moments when accounting methods change, resulting in claims of growth that are physically impossible over the timeframes involved.

Today, JDSF rhetoric gives their management practices credit for the forest amassing more and more carbon as annual growth exceeds cutting. In their "Option A" documents, JDSF asserts that the maximum sustainable yield is 40 million board feet (MMBF) per year (equating to approximately 8,000 logging trucks). Actual data tell a different story. The upper panel of Figure 4 shows historic cutting (line), and the remaining "inventory" (bars) of timber. One can easily

see that the inventory is approximately constant for four decades with a much lower average than the ostensible sustainable yield and only increased after a logging moratorium went into place during the period of approximately 2000-2010 as a result of five lawsuits against Cal Fire over its forest practices. By the time the moratorium was lifted the forest had added perhaps a third and continued to grow only because timber harvest was subsequently reduced by two-thirds. However, even though logging resumed at a far lower level, growth rates have slowed and forest inventory has declined (Figure 4).

Again, it is precisely the lack of active timber management (logging) by Cal Fire that allowed the forest inventory to increase, not because of it. However, the subsequent slowing of forest growth includes the non-timber management period (moratorium) of 2000-2010 and the less intensive timber management period of 2011-present, suggesting that exogenous factors were at play. Future planning must reflect these realities in terms of both environmental and budgetary implications.

Note also that, per Figure 4, while growth ostensibly doubled per the older CFI method, it increased half as much per the more robust FRI method (~5,000 randomized locations, gold bars in upper panel), a further indication that poor analytics led to overstating the forest's productivity while being logged. The inferior CFI measure – relied upon for 60 years and still in use – overestimates inventory by a very substantial 20-30%. Timber harvesting continues to be significant, often involving reduced-size clearcuts (group selections or variable retentions) (Figure 5).

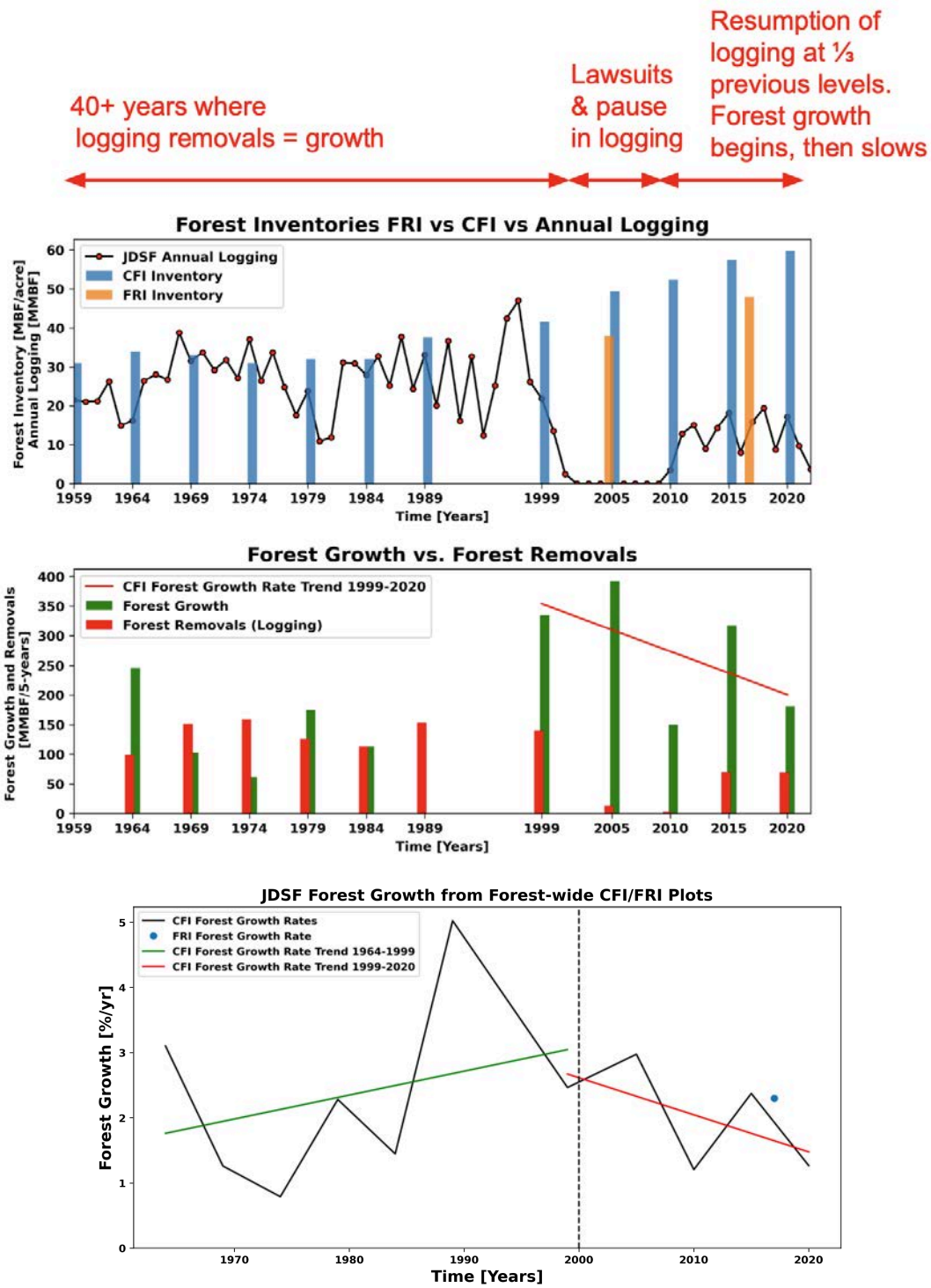


Figure 4. From 1959 to 1999, the earliest period of systematic inventory measurements, logging removals averaged ~27 MMBF/year, during which time the forest-wide CFI inventory (blue bars of ~180 repeat locations remained approximately constant. After 2000, forestwide inventory began to grow as a result of Cal Fire being legally prohibited from managing the forest for timber production. However, during this time period analysis of the CFI inventory also shows that the rate of forest growth declined at an average of 7 MMBF/5-year measurement period. Data provided by Cal Fire.

Caspar: 2017 & 2018

Chamberlain: 2014 & 2017

Parlin: 2019 & 2020

Three Chop: 2019 & 2020

Figure 5. Extensive deforestation in JDSF between 2019 and 2020. Caspar took place near private homes and Three Chops in an area with significant pre-European human settlement. A forest-wide timelapse shown here: https://drive.google.com/file/d/1mzlClSfdtuIyuLSFAgsCrxn_rzlpJv8L/view?usp=share_link

A more granular look at the growth dynamics of individual trees provides an entirely independent corroborating line of evidence indicating a growth slowdown (and corresponding slowdown in carbon capture). Shown in Figure 6 are data from a new study published in the peer-reviewed journal Forest Ecology and Management by Professor Stephen Sillett, one of the world's foremost experts on redwoods (Sillett et al. 2025). This research was sponsored by JDSF.

This unique dataset describes dendrochronological growth reconstructions (tree-ring studies) of JDSF redwood trees spanning forestwide sites and a range of growing conditions. The results (Figure 6) show declining growth rates between 2000 and present. Importantly, this is also true of Los Posadas State Forest and Soquel Demonstration State Forest (same study and methodology), both of which are not managed for timber production, again suggesting factors exogenous to the forest as a root cause for the declining forest growth rates.

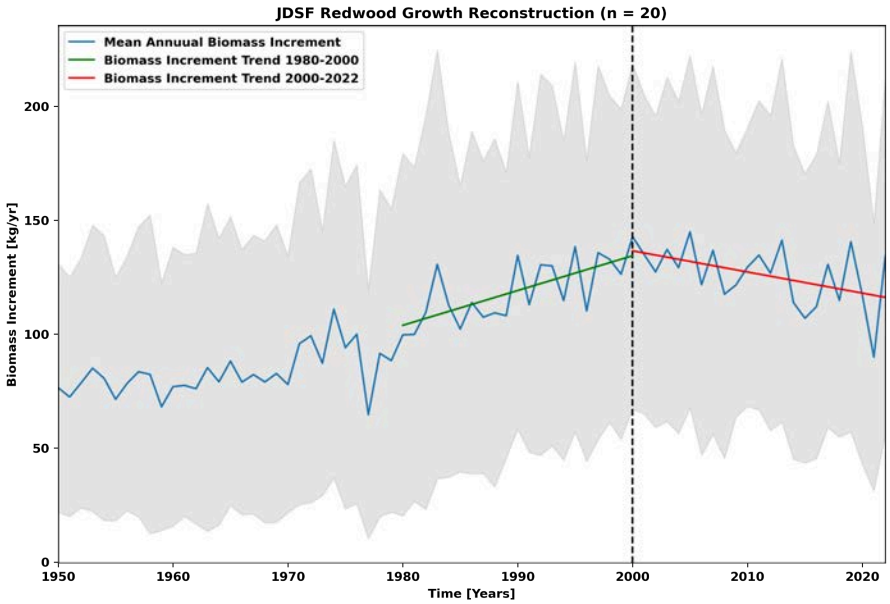


Figure 6. Findings from study funded by Cal Fire. The shaded area represents the standard deviation. Note that these data exhibit the same trend in declining growth rates since around the year 2000 as also indicated by CFI/FRI data. Source: Sillett et al. (2025).

A more extensive examination (see Figure 7) also shows different epochs of growth over a period of 120 years for a larger sample of redwoods across their range (Sillett et al. 2022). The first half of the period is characterized by roughly constant growth rates, followed by a period of increasing growth consistent with the theory of "atmospheric fertilization" as CO_2 levels rise in the atmosphere due to human activity. In the most recent period, however, this growth slows and declines (nearly to zero for the lower 5th percentile of trees), consistent with adverse impacts of climate change overwhelming the short-lived carbon-fertilization benefit (Peñuelas et al. 2017).

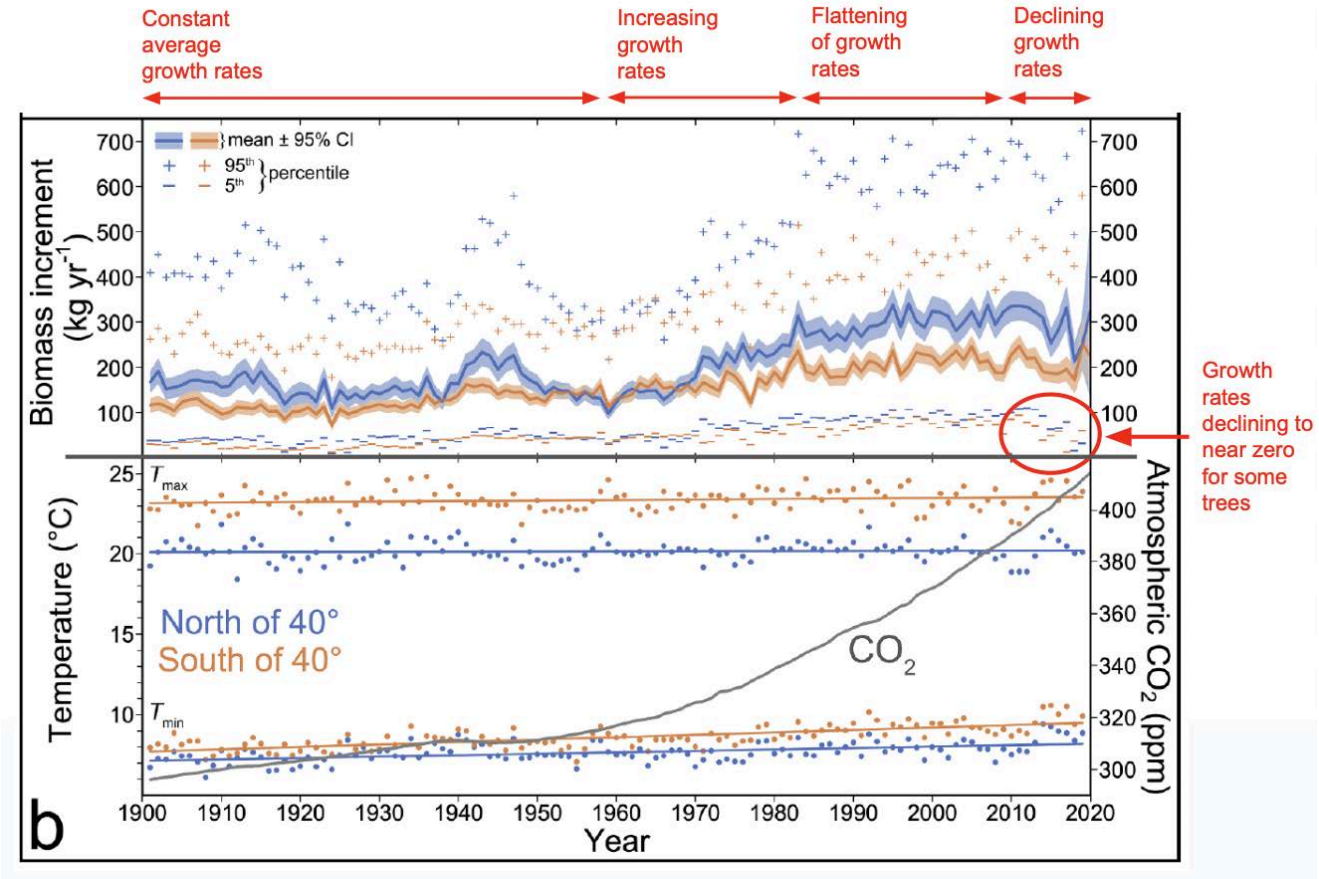


Figure 7. Redwood growth rates over 120 years based on tree-ring analysis for 235 trees in 45 locations across California's redwood range. Source: Sillett et al. (2022), Fig. 6.

The phenomenon is also pronounced in Eastern California (Shao 2021), with similar statistical evidence throughout Europe (Cuff 2025), Africa (Rodríguez-Veiga et al. 2022), the Amazon (Palmer and Feng 2025), and around the globe (Anderegg et al. 2020; Dang et al. 2025).

Tellingly, when these technical concerns were brought to Cal Fire through the public comment process, the response to greenwash with words in saying:

> *"The Guidelines and case law … do not require speculative prediction of future climate conditions, but rather require that the analysis consider whether known or reasonably foreseeable environmental changes could alter the significance of project impacts.* (Cal Fire 2025b)

Not only does this response deny the <u>past</u> growth slowdown, it denies settled climate science by characterizing it as "speculative predictions" and not "reasonably foreseeable".

Carbon: A calculus of smoke and mirrors

Human-caused climate change is the apex environmental issue, compounding many others (drought, fire, air pollution, eroded water quality, and ecosystem disruption). Since trees are about half carbon by dry mass, they play a key role in the storage of carbon in ecosystems and, when cut, in humankind's role in raising atmospheric carbon dioxide levels. Declining growth rates mean that carbon sequestration is slowing in Jackson (and most elsewhere in California (Coffield et al 2021)), making the role of existing trees even more important.

Per JDSF's own reporting, the forest today "contains" 19 million metric tonnes of CO_2 (Christensen et al. 2021).[5] This corresponds to that held in 75,000 coal train cars, with annual additions through growth equal to the emissions of 50,000 passenger cars[6] on an ongoing basis. At current California market prices, the carbon embodied in trees harvested each year is valued at $1,200,000.[7] Jackson suggests that a cessation of logging would reduce the amount of carbon stored in the forest (Cal Fire 2021), but this contradicts analyses in the peer-reviewed scientific literature stretching back at least 35 years (Harmon et al. 1990).

The oldest redwood trees hold the most carbon – adding more each year even after millenia of growth – and hold it most securely. In a recent timber harvest proposal, Cal Fire claims to manage half of Jackson to promote such "old-forest" conditions (Cal Fire 2025c), although other publications (Cal Fire 2021) show it to be about one-third (Cal Fire 2021), of which only 1% is protected old growth, 12% Older Forest Development Areas, and 22% Late Seral Development areas (Figure 8). Logging still occurs in the OFDA in order to harvest "old" trees, as well as in the Late Seral Development areas, with the intention of speeding the growth of the uncut trees and "diversifying forest structure". Meanwhile, routine commercial logging prevails across more than half of the forest (dubbed "Matrix" areas).

Ostensibly protected for the past 75 years, JDSF mind-bogglingly holds less forest biomass per acre today and adds it at a slower rate (and thus stores less carbon) than other California redwood forests (Sillett et al. 2025).

Cooking the books when counting carbon is one of the most blatant and egregious forms of greenwashing. For example, it is tempting to say that the carbon in logged trees is all recovered because the trees regrow. Such statements obscure the outcomes in areas that are logged by comparing estimates of carbon capture across the entire forest to that released by logging

[5] Forests actually contain only carbon. The CO_2 is not created until the carbon enters the atmosphere and oxidizes.
[6] Based on JDSF's self-reported sequestration rate of 0.2 MMT CO_2/year (Cal Fire 2021), corresponding to only 1% of the 19 MMT inventory referenced in the same source document. This appears to be a low sequestration rate compared to other values published for the redwood range.
[7] Assumptions in Footnote 2. Current carbon price is $28/tonne (CARB 2025).

relatively small areas. This is an apples-and-oranges comparison and papers over the considerable carbon losses on lands that are harvested. Other factors include breakage rates during logging resulting in unusable trees left to rot – as is the case with unsold so-called "garbage trees" – ultimately resulting in further carbon releases (Figure 9).

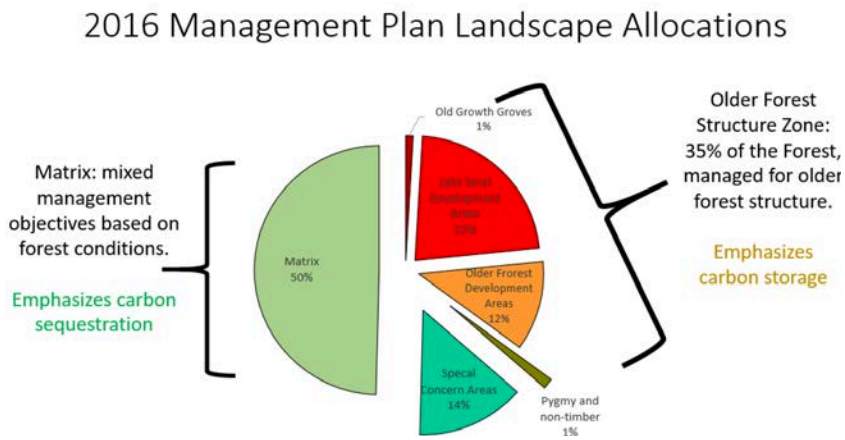


Figure 8. Source: Cal Fire (2021)

Figure 9. Unsold carbon-laden softwood "garbage logs" are cut and left in the forest to rot following Cal Fire timber operations. Photos by Art Mielke. Additional images: https://www.mendocinotrailstewards.org/gallery-of-slash

Moreover, industry standard methods overestimate the amount of regrowth by ignoring the fact that climate change is slowing growth (due to rising temperatures and drought), creating more favorable conditions for tree pests and diseases, and increasing carbon losses due to wildfire (Fernandez et al. 2015), itself exacerbated by logging (Mills and O'Brien 2021).

Also, more than half of a tree's carbon is mobilized soon after cutting (Figure 10), as limbs and needles decay, increasing to two-thirds through the milling process. While mill wastes are sometimes used to make energy, this process immediately releases more carbon per unit of energy derived than the burning of coal.

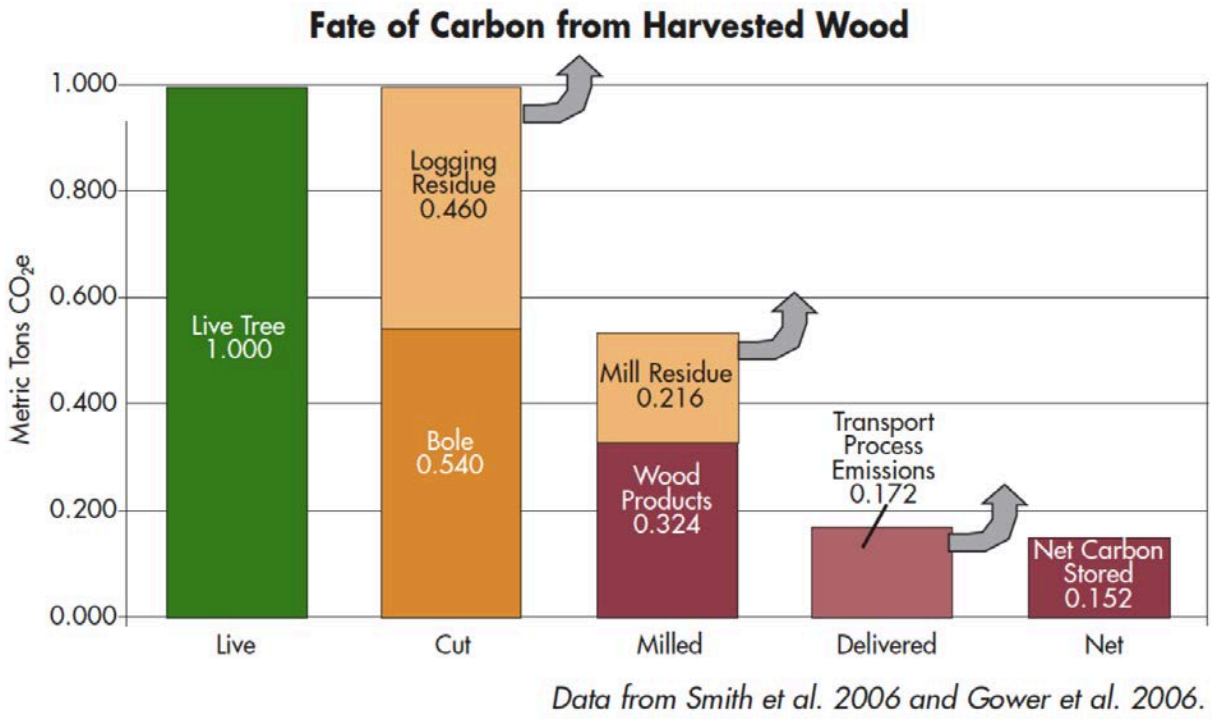
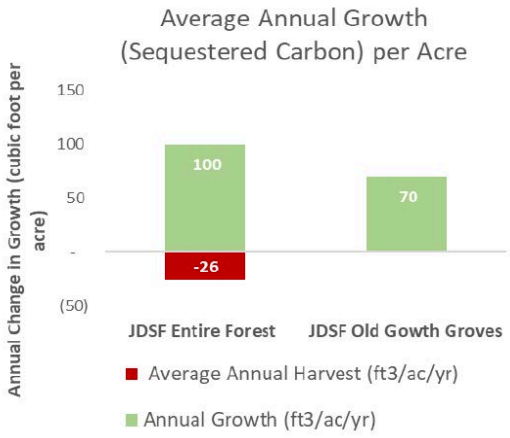


Figure 10. About half the carbon in a live tree is lost to the atmosphere through the process of logging and subsequent decay of debris. Yet more emissions occur from removals and collateral damages to other non-merchantable trees, post-milling transportation energy, etc.

In addition, during construction about 10% of the lumber becomes waste and is landfilled. Many constructed items (fences, decks, etc.) don't last nearly long enough to be given credit for meaningful carbon storage. On top of all these accounting irregularities, timber harvest plans (EPIC 2025a) don't net out the carbon that mature trees would have captured had they not been logged.

All of the caveats to JDSF's carbon-accounting methodology are collected in Figure 11.

Figure 11. Problematic claims about forest carbon dynamics in JDSF



Obfuscation is the first tool of greenwashing, and Cal Fire's description of carbon flows in JDSF is a case in point, as amply evidenced in the above chart (Cal Fire 2021) attempting to demonstrate that more carbon is captured (green) by forest-wide growth than is released (red) by logging.

However, virtually all of the asserted growth occurs on unlogged areas and would have occurred irrespective of the logging, but here it is presented as offsetting emissions from logging in relatively small tracts. This obscures the fact that (per JDSF's numbers) there are 26 more units of carbon emitted (shown in red) than would have been without the logging.

On the footprint where harvest actually occurs, the finding is flipped: emissions vastly exceed carbon capture.

The growth follows a period of ~175 years of logging – much of it during the period of state management – and thus is far less than what occurred each year in the original unlogged forests. Moreover, looking forward, the foregone future growth and corresponding carbon storage potential from trees that are logged is also omitted.

Looking forward, speculative new tree growth is based on past climate conditions. Research (including that on redwoods funded by JDSF (Sillett et al. 2025) shows a marked slowdown in growth, as expected under elevated temperatures together with reduced rainfall and fog.

In terms of fire-resilience and durability, the quality of the carbon in the annual growth increment is vastly lower than that of the timber harvested. It is misleading to compare these as equivalent.

The stated emissions values do not appear to include those arising from:

- *losses from tree breakage or unseen defects during logging*
- *collateral trees cut to make room for logging or ostensibly reduce competition during regrowth*
- *trees removed to make and maintain logging roads, fuel breaks, and utility transmission corridors*
- *below-grade material that may disintegrate and release its carbon following logging operations*
- *soil carbon mobilized as a result of roadbuilding and erosion*
- *emissions of approximately 50% of the tree's carbon stock during conversion to lumber*
- *construction waste and the short lifespan of building materials, much of which ultimately decay*
- *emissions from transportation between forest and retail*

All of these issues aside is the role of climate changes in slowing forest growth (Harmon et al. 1990). A 150-year-old tree will likely take much longer to regrow in today's and tomorrow's degraded climate. Given the current climate emergency, society certainly doesn't have that kind of time. Things have already degraded sufficiently that studies in Europe (Cuff 2025) and Africa (Rodríguez-Veiga et al. 2022) are finding that the situation is so bad that the forests are "flipping" from net carbon sinks (ability to store it) to net emitters due to slowing absorption and more mortality due to climate-related disturbances combined with logging. The shifts are abrupt, e.g. with forest carbon storage in France dropping by half in just 14 years.

For the reasons noted above, the model Cal Fire uses to estimate regrowth over a century-long time horizon (and thus recapturing of the carbon lost during logging and milling) are known to be systematically flawed. A similarly problematic model is described in Battles et al. (2008), finding 75% reductions in Sierra Nevada timber yields when incorporating projected climate changes into predictions. These impacts were for climate alone, excluding knock-on impacts from disturbances such as pests, disease, and wildfire. Coffield et al. (2021) find reductions in coastal forests in each of six climate scenarios bracketing a range of possible futures. Focusing expressly on redwoods – even in a low-emissions scenario – Fernandez et al. (2015) find that the region occupied by Jackson becomes less hospitable under future conditions in which the climate is warmer and dryer.

Where there's smoke there's fire

In contrast to the connotations of "sustainable logging", logging practices common in JDSF actually make the forests more vulnerable to wildfire by excessively opening the canopy and allowing in sunlight that fosters flammable undergrowth including invasive plant species, the abandonment of large slash piles, leaving excessive logging debris on the forest floor, and removing large trees that resist fire and dampen ember-carrying wind speeds (Figures 12-13) (Mills and O'Brien 2021).

A common practice in Jackson is high-grading, in which the largest, most carbon-secure and fire-resilient trees are taken (Figures 1 and 14). This is great for profitability, but runs contrary to many tenets of sustainable forestry in general and Jackson's mission in particular. In the aftermath, the remaining smaller trees grow more densely, increasing competition rather than reducing it, degrading the forest's fire-resilience. In contrast, if undisturbed, redwood forests will self-thin and achieve desirable characteristics – including larger trees and more overall biomass (and carbon) storage (Figures 15-16) (Gerhart (2006).

Figure 12. Left: Common examples of how logging can increase fire risk. In the photo, the timber harvest has allowed for flammable undergrowth to flourish among also-flammable debris left from the logging operation. Center: Slash piles often abandoned for multiple years or indefinitely stand to generate enormous numbers of embers in the event they catch fire. The pile shown is on County Road 409 left after the Porter THP conducted in 2018 (1-16-124-MEN) (Source Lemos 2021). Right: A common scene in JDSF of flammable Ceanothus and invasive Scotch Broom along unmaintained logging roads, blocking regeneration and constituting dense ladder fuels endangering adjacent established trees. These fuels do not grow in material numbers below undisturbed forest canopies.

Figure 13. Excessive abandoned debris after logging operations increases fire risk.

Figure 14. Top: Examples of two generations of high-grading: overly dense redwoods resprouting after removal of old-growth trees in the early 1900s accompanied by unmanaged dense regrowth (left) and high-grading of second-growth (largest tree in group flagged in blue for removal in the 2020s (right). Bottom: JDSF promotional material showing a single large tree marked for harvest while intensely overcrowded forest in the background remains unaddressed. Similar revenue could be obtained – with far greater environmental and fire-safety benefits – by thinning the plot in the rear.

Figure 15. In contrast to "actively managed" groves, this photo shows the scenario as one enters the Fritz Wonder Plot in Mendocino Headlands State Park. The right-hand half of the view has not been logged since 1865. Note the larger and more widely spaced trees, lack of fuel ladder, and healthy forest floor (ferns, sorrel, grasses) compared to the more recently logged area on the left. In only about 80 years, the undisturbed area naturally thinned itself from 273 trees per acre, as measured in 1923, to only 71 in 2005 (Gerhart 2006). Most "actively managed" parts of Jackson become thickets of 300 to 500 mostly young trees per acre.

Figure 16. In most "sustainably managed" redwood forests one of these trees in the Fritz Wonder Plot would have been logged long ago in the name of avoiding "competition" and "overstocking". The absence of logging since 1858 suggests a different calculus

Greenwashing the waterways

Given public ownership and the mandate to identify and demonstrate best practices in Jackson, it is incumbent upon Cal Fire and JDSF to protect and restore waterways. Two primary hazards include degraded water quality and reduced water availability. Impacts of logging on fish were known a century before the initiation of intentional demonstrations of the effect of logging conducted in the Caspar Watershed Study (Figure 17). Water from South Caspar Creek flowing out of an area logged nearly five years earlier runs much more heavily with sediments than the background loads on North Caspar Creek (logged 40 years earlier) (Figure 18). Erosion has been a long-standing outcome of logging in JDSF (Lemos 2021).

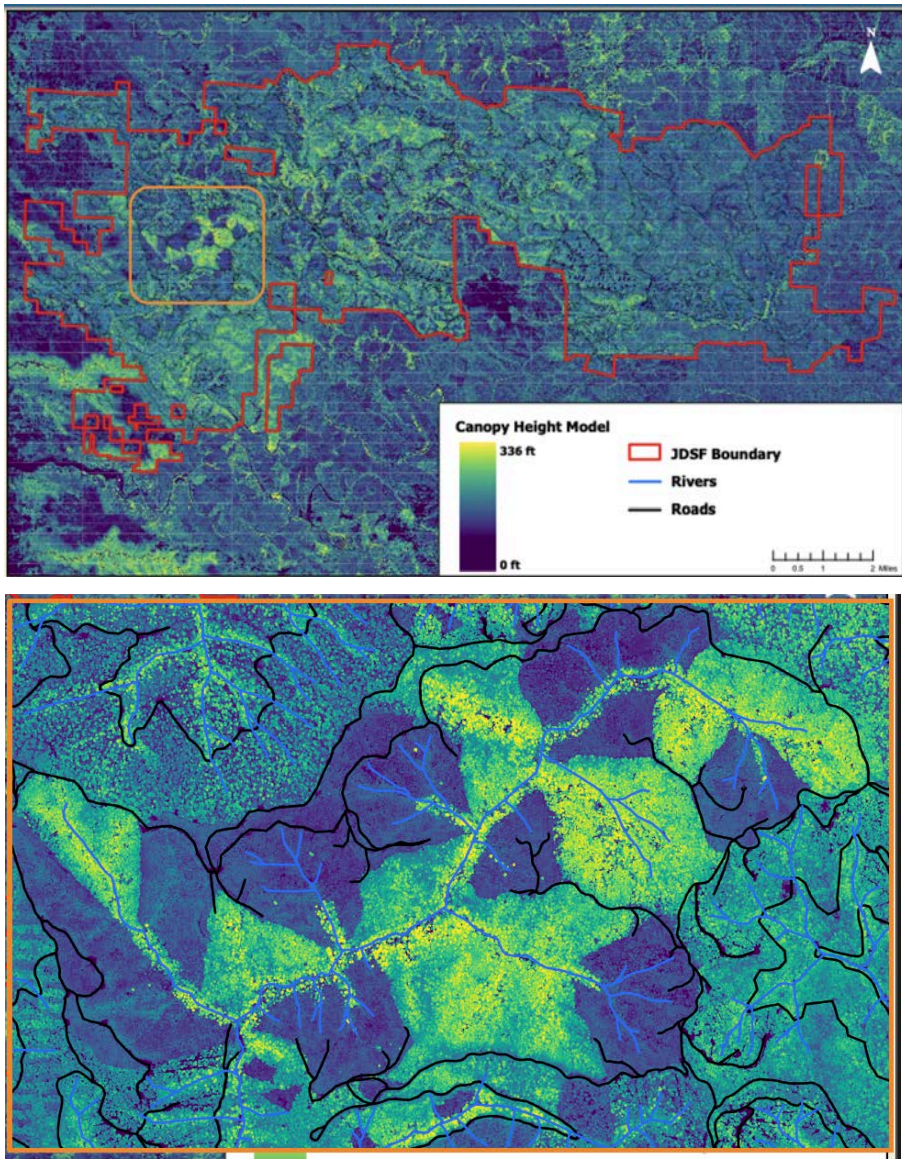


Figure 17. Top: Lidar image of the entire JDSF landscape, with the Caspar Watershed Study area circled in orange. Bottom: The study involved alternating clearcuts and uncut areas adjacent to fish-bearing waterways.

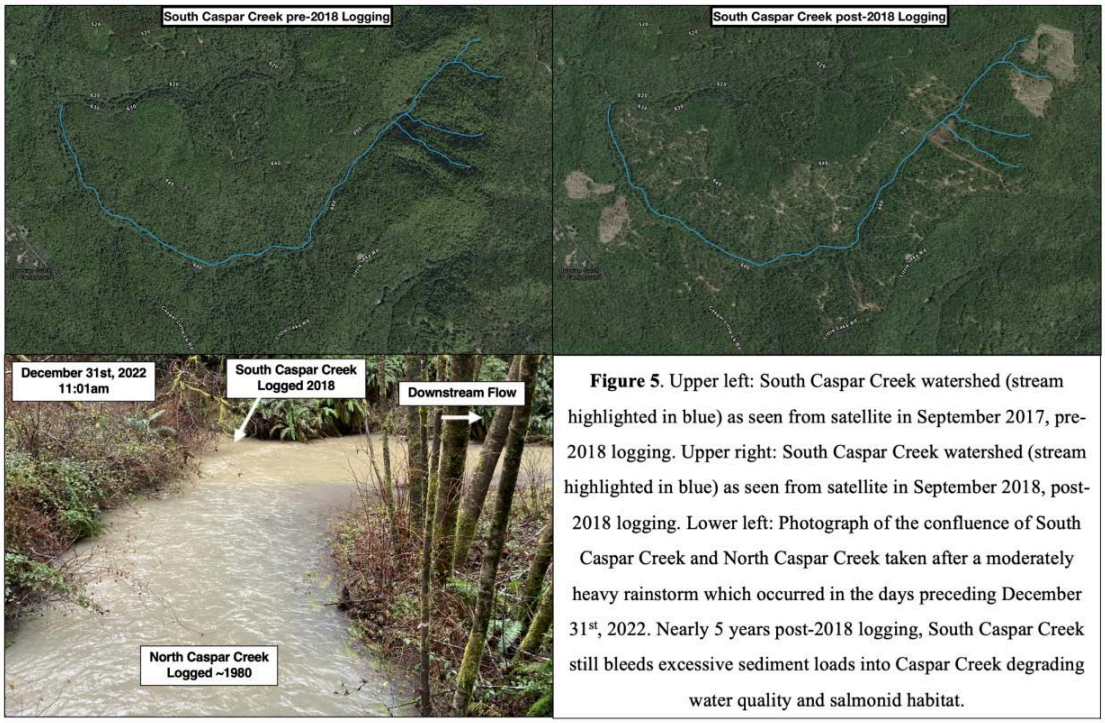


Figure 5. Upper left: South Caspar Creek watershed (stream highlighted in blue) as seen from satellite in September 2017, pre-2018 logging. Upper right: South Caspar Creek watershed (stream highlighted in blue) as seen from satellite in September 2018, post-2018 logging. Lower left: Photograph of the confluence of South Caspar Creek and North Caspar Creek taken after a moderately heavy rainstorm which occurred in the days preceding December 31st, 2022. Nearly 5 years post-2018 logging, South Caspar Creek still bleeds excessive sediment loads into Caspar Creek degrading water quality and salmonid habitat.

Figure 18. Photo location is the confluence of North and South Caspar Creeks (at the western end of the blueline shown in the aerial images). Note greater dilation on the South fork. Source (O'Brien and Sillett 2024).

The Noyo River and its tributaries, to which endangered salmon decimated by early logging are slowly returning, run through much of the western part of JDSF. Counts of threatened salmon and endangered steelhead are still only 1% of those prior to European settlement, and the one-two punch of climate-driven drought and warming waters makes survival all the harder. Despite evidence to the contrary, JDSF continues to bring forth timber harvest plans such as the Camp One THP involving high-disturbance "tractor yarding" in close proximity to the South Fork of the Noyo. NOAA Fisheries has identified logging-related activities as the greatest threat to abate with respect to protecting endangered Coho salmon on the South Fork of the Noyo River. The Camp One THP has been withdrawn due to protest (NOAA 2012).

Cutting new logging roads into steep hillsides above this river (as planned in the proposed Camp 8 South THP) risks mudflows into this already at-risk waterway (North Coast Regional Water Board 2025) (Figure 19), washing away soil carbon and creating yet more challenges for fish that other state agencies are trying desperately to help rebound.

Concerns such as these recently led the State Water Resources Control Board to deny Cal Fire's applications to withdraw precious water from the Noyo for, of all things, controlling dust on logging roads (EPIC 2025b) – a "green" practice. This event is a stark illustration that some activities within JDSF run at cross purposes to the goals of other state agencies.

Figure 19. Low summer water levels (August 2025) in the Noyo River branch immediately below the proposed cut in Camp 8 South. In 2025, CalFire's application to withdraw 40,000 gallons per day from such drainages for dust control on logging roads was declined by the State Water Resources Board on the grounds that it would have adverse effects on fish and other ecosystem impacts. These withdrawals would come during the dry season, after young fish have hatched.

Logging roads are one of the key drivers of erosion. As reported by Lemos (2021), the National Marine Fisheries Service has called for watersheds with over three miles of road per square mile as "not property functioning" with respect to ecosystem health. The Noyo River Basin (within JDSF has values of 6.7 miles per square mile, and is in fact likely even higher (Lemos 2021).

Greenwashing of specific proposed timber harvests

Many of the abovementioned characteristics of greenwashing are evident in public documents associated with specific proposed timber harvest plans (THPs). Following are recent examples.

Camp 8 South Timber Harvest

Multiple coats of greenwashing are being applied to a newly proposed 500-acre harvest known as “Camp 8 South”. This tract contains one of California’s remaining tracts of second-growth redwoods, which range up to 6-feet in diameter and 200 feet tall. Only 2% of second-growth are left in the State (Burns et al. 2018), and Camp 8 South is among the larger occurrences of such trees. Tree-marking already completed in the area indicates high-grading of larger trees (Figure 20).

Figure 20. The two largest, widely spaced, trees in this scene are marked (in blue) for harvest in Camp 8 South, leaving behind far younger and overcrowded trees. Note the very steep slope, below which runs the Noyo River, habitat to threatened and endangered fish. Photo Melodie Meyer

Multiple factors make this particular area among the least suitable for logging in the entirety of JDSF. Chief among these, this forest is already significantly self-thinned with nicely spaced large trees compared to immediately adjacent forests that are highly overgrown but are not being prioritized for restoration (Figure 21). Yet, Cal Fire’s “THP Summary” – the only document released to the public as of the time of writing – states as a primary justification for the

proposed harvest that this area is "overstocked"; however, it is a verifiable fact that the plan area is one of the least overstocked areas in the entire forest. It is also a verifiable fact that the plan area holds among the largest numbers of large trees in all of Jackson. The summary also states that "[s]maller submerch trees … may be removed (emphasis added)." Thus, there appears to be no commitment to doing useful ecologically justified thinning. This runs counter to the stated justification for this THP and suggests a priority of revenues over restoration. These examples of what might be called "alternative facts" are being mobilized contrary to the actual facts of the situation.

An additional concern is that a short river restoration project awkwardly sits steeply downslope from the proposed cut (Figure 19). While those goals are noble and the preliminary results encouraging, protecting the fish in one moment and then increasing the threat in the next moment is dubious management practice. Restoration or greenwashing?

Figure 21. Left: Landscape (near river) of widely spaced older trees with low surrounding fuel loads in the proposed Camp 8 South timber harvest zone. The right-hand photo (taken from the same position) shows adjacent lands immediately across the river with old-growth stumps surrounded by dense, highly flammable vegetation that will remain unaddressed.

Good discussions are being had about how to shift the forest-management paradigm. Among them the eminently sensible argument for designating particularly promising redwoods as Potential Elder Trees (PET), protecting them from logging in perpetuity (Antoine and Sillett 2021). JDSF has latched onto the idea, and somewhat weaponized it to justify dubious logging (including in Camp 8 South). Among other co-optations of the concept, JDSF in some cases appears to be marking effectively already protected first-growth redwoods as PET (Figure 22). This practice basically double-dips into a bucket of greenwash.

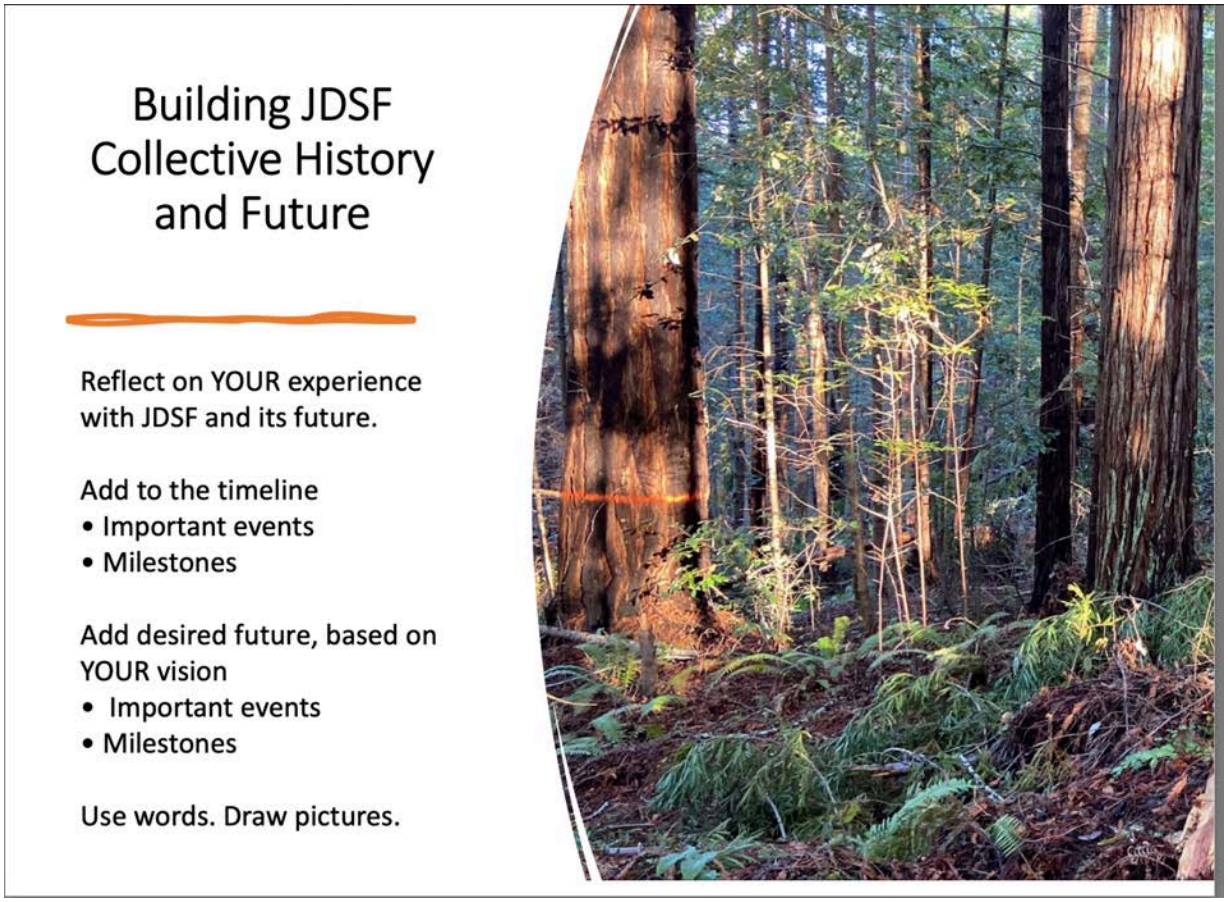


Figure 22. A large tree, likely predating early era logging, marked (in orange) for retention as a Potential Elder Tree (PET) appears to be a relatively young first-growth tree, typically reserved even without such a program. This suggests double-counting of benefits. Source: JDSF presentation.

AMEX Timber Harvest

Cal Fire's recently approved THP in Jackson, dubbed AMEX, targets nearly 500 acres with a patchwork of small clearcuts (euphemistically called "group selection"), painting itself as aligned with the principles of forest restoration and yet silent on tree sizes to be felled. Nondisclosure is a tool of greenwashing.

As pointed out in a legal review, the plan asserts there are no "significant impacts" and yet is silent on applicable "thresholds of significance", defined as "...an identifiable quantitative, qualitative or performance level of a particular environmental effect, non-compliance with which means the effect will normally be determined to be significant by the agency and compliance with which means the effect normally will be determined to be less than significant" (EPIC 2025a). This omission makes it impossible to assess the severity of project impacts until after the fact. While on the one hand the proposal asserts no impacts, and yet it puts forward a set of "mitigations" which clearly imply awareness of undisclosed impacts.

The harvest plan also includes many of the kinds of carbon-accounting irregularities outlined earlier. Cal Fire's use of a "black-box" carbon calculator severely hampers external review while excluding carbon impacts involving soils and fuels on the forest floor and making highly implausible statements that the carbon removed by logging will be recaptured by the forest's growth in only twelve years, while ignoring well-documented adverse impacts of climate change on forest regeneration (EPIC 2025a). The external review states that claimed carbon benefits from regrowth ignore future carbon capture if the removed trees had been allowed to keep growing, and undercounts above- and below-ground carbon sources.

Lastly, the project threatens to shunt sediments into nearby waterways bearing Chinook and Coho salmon, as well as Steelhead. Road-related sedimentation has already been rising in these waterways, yet, as noted above, the harvest plan lacks any evaluation of impacts (EPIC 2025a).

Real research is king: Greenwashed research is the court jester

As a demonstration forest, JDSF is expected to conduct research to identify best practices and disseminate the findings to owners of private timberland. Some of this has genuine value. However, the devil is in the details, and the idea of "scientific research" can be used to greenwash conventional forest-management practices.

- Cal Fire has recently stated that the new draft Forest Management Plan "prioritizes climate change research…" (Cal Fire 2025a). While climate change and the dynamics of carbon in the forest are arguably among the most important research questions, these topics actually play a very minor role in JDSF's actual research portfolio. According to a registry of research maintained by JDSF, as of Fall 2025 or the U.S. Department of Forestry:
    - Of 74 JDSF research projects published or otherwise completed over the past 35 years (Cal Fire 2025e):
        - <u>one</u> (1) mentions climate in its title.
        - <u>six</u> (6) mention carbon,
            - of which only <u>two</u> (2) are dated within the past decade.
    - Of 36 ongoing research projects listed:
        - only <u>one</u> (1) references climate (narrowly, with respect to bats as indicators).
        - <u>one</u> (1, no date given) references carbon.
    - Of thirteen (13) surveys listed:
        - <u>none</u> (0) appear to address carbon or climate.

    - Separately, of 338 research documents listed by the US Forest Service as having to do with the Caspar Creek Experimental Watershed within JDSF (USDA 2025):
        - five (5) reference carbon and three (3) reference climate change.

- JDSF research experiments typically occupy a small part of the area disturbed by a given logging operation (e.g. 10 acres out of 500), but are used to justify/greenwash the entire operation.

- Clearcuts and group selections have historically often been part of the research design. With so many of these done over such a long period of time in JDSF and elsewhere, it begs the question of what more remains to be learned about their impacts. As seen in Figure 18, experiments causing siltation in waterways bearing threatened and endangered fish have many years of adverse impacts.

- To their credit, JDSF is experimenting with low-intensity fire to address fuel accumulation in their forests (typically as a result of logging). One official project was titled the **"**Greenhouse Gas Fire Fuels Mitigation Project" (CEQA 2023; Cal Fire ND). Of concern, the words climate change were stripped from information distributed to the public at tours; It was re-titled "Redwood Fuels Mitigation Research Project" (UCANR 2025). When asked about this, the tour guide said "*Oh that climate stuff is bullshit. We just had to use the words to get the funding for this project.*" The guide was Michael Jones who is both a paid member of the Jackson Advisory Group and recipient of funding to conduct the fire study.

- Research rigor is another area of importance. The official guiding the above-mentioned public tour disclosed that one-third of the aluminum tree-ID labels melted during the prescribed fires, contractors failed to follow guidelines for fuel mastication, and that soil carbon impacts of the fires was not part of the impact evaluation. All of these problems undercut the quality and usefulness of the research project and thus its findings.

The greenwashing of social justice

JDSF is among the native lands of the Pomo people. Logging roads in Jackson have been built directly through village sites dating back as far as 2000 years (Hector et al. 2009), pre-European trails (Lemos 2021), and other features (Betts 1999).

Claims of correcting social- and environmental-justice harms can also be subsumed into the greenwashing process. State legislation (AB 52 and AB 1284)[8] require that tribal co-management of public lands be pursued, and this has been much discussed in the case of Jackson with some tribal engagement (Figure 23). Thus far, discussions with the tribes have been largely kept from the public, as have the identities of participating tribal members, blocking third parties from evaluating the completeness and adequacy of these deliberations. Information is withheld even within tribes, as evidenced by multiple tribal members standing up at Jackson Advisory Council meetings to complain about being kept in the dark about the proceedings.

Figure 23. Michael Hunter, at the time Pomo Coyote Valley tribal leader, stands atop a recently felled large redwood in JDSF. Note the high number of small, overcrowded redwoods remaining in the background, which will compete and pose an elevated fire hazard due to their density and loss of size diversity. The promised tribal co-management process has been slow to materialize, and few details are being shared with the public.

[8] See https://lci.ca.gov/ceqa/tribal/ and https://www.pew.org/en/research-and-analysis/articles/2024/09/27/new-california-law-means-clearer-path-for-tribes-to-co-manage-lands-and-waters

Few signs of progress

As many of the concerns highlighted here trace back decades – some to the very origins of JDSF – it is fair to ask whether progress has been made.

Surely, massive clearcuts of old growth such as those the State conducted in the eastern half of Jackson are no longer possible. Yet, in aggregate, large areas of next-generation trees continue to be clearcut under the rhetoric of "group selection", "variable retention", and "research". JDSF continues to resist calls for consideration of systemwide impacts of its management approach, sometimes referred to as "cumulative" impacts, instead evaluating each timber harvest sale independently from the others, as though implicitly surrounded by pristine forest. Meanwhile, advocacy groups continue to "carry water" for Cal Fire, producing informative maps and aerial studies and analyzing growth trends to make the results of harvest activities more transparent.

In the wake of litigation and massive public outcry, the courts temporarily halted harvests from 2001 to 2008. It is unfortunate that it took that kind of conflict to compel examination and re-evaluation of management practices. With the approval of the California Board of Forestry – Cal Fire created the Jackson Advisory Group in 2008 which was composed of diverse timber, conservation, and recreation interests. The JAG spent 2½ years and 5,000 unpaid person hours developing a remarkable 129-page unanimous consensus report outlining how to realistically shift to an approach for managing the forest, conducting research in a strategic and rigorous manner, and enhancing recreational opportunities that was acceptable to all stakeholders (JAG 2011). The California Board of Forestry – rejecting any collaboration with the authors or key Cal Fire staff – unraveled the report's core recommendations and "...eliminated the key protections that would have ensured that the forest was placed on a path toward restoration of older forest characteristics across the forest landscape" (Taylor 2022).[9] The incident triggered the resignation of JAG member Vince Taylor – a key proponent of the consensus process (Taylor 2011). The disrespect to its advisors and betrayal of public trust has done long-lasting reputational damage to the California Board of Forestry.

Now, many years later, indications of current thinking are evident in a draft Forest Management Plan – updating the version published in 2016 (Cal Fire 2025d). Sadly, the document lacks any assessment of learnings since the prior plan or discussion of what may be new. While "goals and objectives" is the common refrain of Cal Fire when it comes to discussing forest management, this document provides no quantitative or otherwise rigorous articulation of these targets. This is problematic in that it provides no way to track and evaluate progress. Similarly, while a core activity in JDSF is research, the draft plan provides no indication about if and how the past

[9] See also http://www.jacksonforest.com/ (PDF)

decades of research have informed the plan. Consistent with this pattern, discussion of carbon storage is scant and vague. As recently as the year 2020, Cal Fire questioned the human causes of climate change (Caspar 500 Timber Harvest Plan), and, as noted above, currently resists considering and assessing the impact of climate change on the productivity of its forest.

These behaviors provide the conditions in which greenwashing can continue to occur. Of particular concern, the proposed plan persists in conflating "sustainable forest management" with "maximum sustained production" and "continuous sustained yields" with no reconciliation of the intrinsic contradictions among these goals. One notable exception is reference to two new towers that will measure carbon fluxes, one of which was commissioned in late 2025.

A new paradigm: Restoration harvests that are clean and green, but not greenwashed

Some might argue that such a greener paradigm would not be financially sustainable. Yet, a shift towards restoration could be achieved in JDSF while generating the same revenues as today, preserving large trees, and moving the entire forest towards old-growth conditions. As outlined above, this can be accomplished by harvesting more trees of smaller diameters and retaining proportionately larger trees. This approach would more faithfully mimic natural self thinning and mortality due to low/moderate intensity fire, which by and large kills small trees thus concentrating growth into the larger surviving trees and thus accelerating forest maturity.

Most harvest plans in JDSF are touted as reducing inter-tree competition, ostensibly making the forest healthier. A case in point is the proposed 533-acre Caspar 500 THP. However, when the actual numbers are crunched, it is clear that with the originally proposed plan there was actually only a negligible reduction in density: from 498 to 483 trees per acre, or only 3%. Thus the harvest, rather than helping restore the forest, would have further perpetuated and exacerbated the problems with the disproportionate loss of large trees relative to small trees, thus keeping the forest in a young, competitive, and disturbed state.

In Figure 24, we concretely demonstrate a different approach for this same tract of forest that would actually achieve JDSF's stated goals in a similarly profitable way, even assuming a substantially lower "stumpage value" of smaller trees ($/board foot). Not only does the "Restoration harvest" achieve the same total net revenue generated by the conventional approach (approximately $2.3 million), but the diversity of the forest (tree diameters) is vastly improved by eliminating large numbers of small trees for a final density of 275 trees per acre. The resulting forest characteristics would be vastly more fire-resilient than had the official approach been used. Doing so would also have avoided extended protests that halted the THP and adversely impacted JDSF's income and reputation.

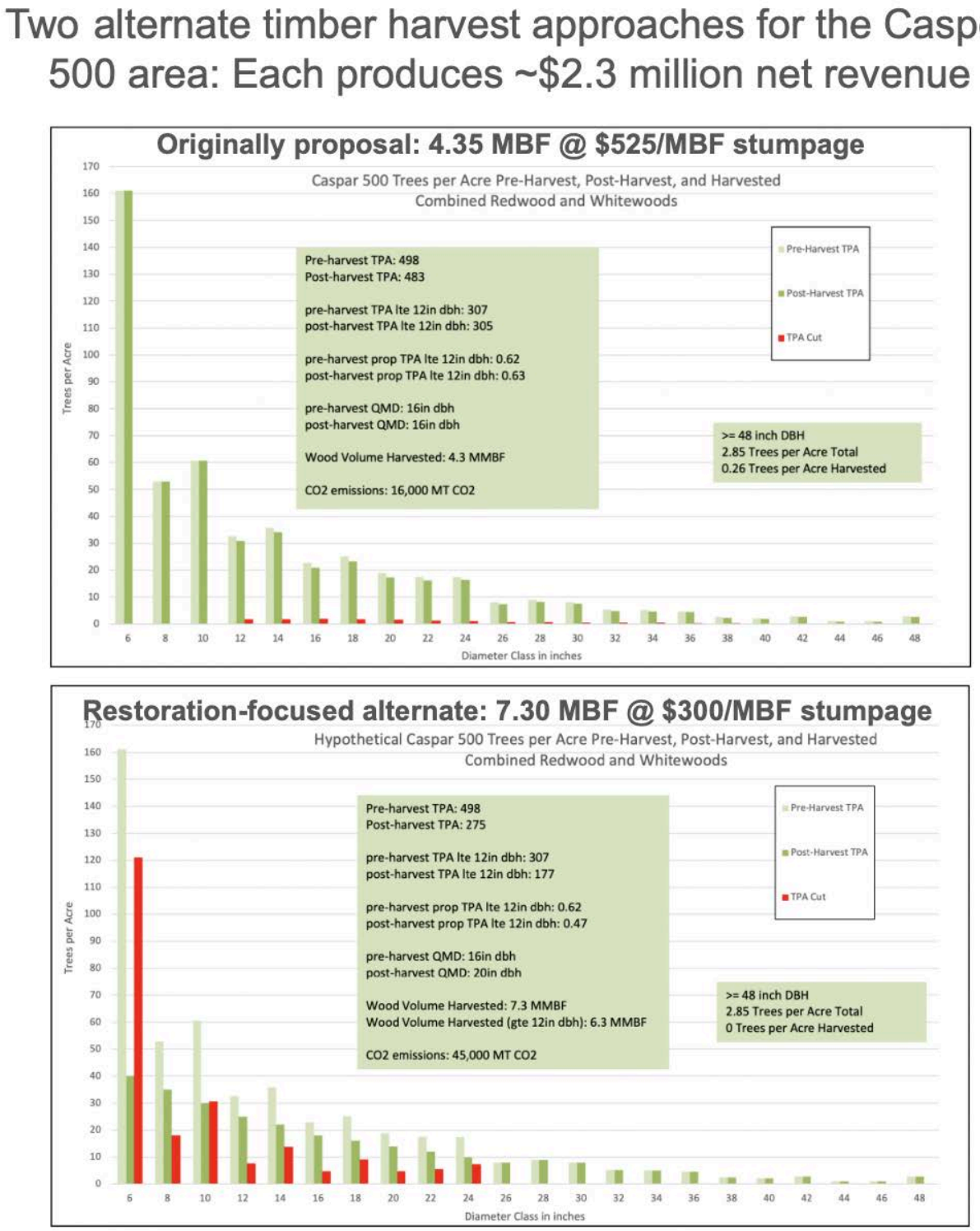


Figure 24. Calculation for the proposed Caspar 500 THP shows that identical revenues could have been achieved by harvesting more board footage (at lower stumpage value per board foot), which would achieve the additional goals of improving forest health while reducing fire risk by decreasing the density of smaller trees. Net revenues ("stumpage") for the proposed THP are drawn from official timber sale documents. Note that a considerably lower value ($300/MBF vs $525/MBF) is assumed to reflect a higher cost of harvesting more, smaller trees.

Closing thoughts

The variety and prevalence of greenwashing techniques employed throughout the 75 years Cal Fire has overseen JDSF suggests the need for a fresh approach to managing this unique forest. Improvement has been slow in some areas and non-existent in others. Even a previous member of the Board of Forestry and Director of Cal Fire has called for fundamental reform, including the removal of Cal Fire from the role of forest management and more fully centering their focus on their primary domain of expertise and excellence: fire fighting (Wilson and Duggan 2020).

Cal Fire is also the messenger of a broader problem insofar as legislation requires them to fund management of the State Demonstration Forests by logging the trees. A sensible legislative reform would be to limit timber revenues to those strictly associated with tree removals conducted in the service of restoration and research. Surely the balance of this modest ~$5-million annual budget for all fourteen Demonstration Forests (a mere 0.1% of Cal Fire's total $4 billion annual budget) could be provided through a more benign mechanism.

Irrespective of funding mechanism, among the higher-level needs is proper consideration of the "cumulative impacts" of management practices, rather than treating each timber harvest as an isolated event. Indeed, this diversion of attention is fully in line with the greenwashing playbook, as it dilutes and minimizes the perception of harm. Cumulative impacts – over space and across time – are relevant in any discussion of carbon, water quantity, and ecosystems.

The issue takes on far broader importance when considering Cal Fire's approval power for timber harvest plans for all private forestlands in California. Moreover, through demonstrations in JDSF that are supposed to be adopted by private timber operators elsewhere, Cal Fire is syndicating its inadequate practices statewide. On the other hand, at present much more intensive logging is conducted on parcels immediately adjacent to JDSF by Mendocino Redwood Company and others (see upper panel of Figure 17), suggesting that even the intended transfer of current practices is not adequately occurring, and certainly not elsewhere in the state were far more egregious activities are approved by Cal Fire (Battle Creek Alliance 2021).

The remedies for greenwashing begin with a genuine desire for accuracy in technical assessment, and external communications that reflect this. This necessitates an institutional culture and mandate that supports such an approach. This in turn requires state-of-the art, evidence-based data and analysis conducted in a transparent fashion free of industry capture.

We have shown that alternative approaches are feasible, generating the same net revenues for Jackson while preserving more carbon, improving forest diversity, and reducing fire risk. Far larger benefits would accrue from the replication of truly improved practices by private industry together via reform in timber harvest plan design and approvals, elevated gathering and analysis of data, and a restoration of public confidence in the management of State Forests.

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