May 25, 2016

Board of Forestry and Fire Protection
ATTN: Edith Hannigan, Board Analyst
VTP Draft PEIR Comments
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Subject: Vegetation Treatment Program Environmental Impact Report (VTPEIR)

Thank you for the opportunity to comment.

We hereby incorporate herein the May 24, 2016 comments by the California Chaparral Institute in their entirety by reference. We hereby incorporate herein the April 8, 2016 comments by the Center for Biological Diversity in response to the "California Forest Carbon Action Plan Concept Paper in their entirety by reference. We hereby incorporate herein the February 4, 2016 in its entirety by reference.

Extensive scientific research clearly indicates that the best way to protect lives, property, and the natural environment from wildfire is through a comprehensive approach that focuses on community and regional planning, reducing ignitability of structures, and modifying vegetation within and directly around communities at risk. By focusing exclusively on clearing habitat, the Board is NOT addressing the main causes for loss of life and property from wildland fire.

The Board's proposal will target about 22 million acres (1/3 of the entire state) for "masticating," spraying with herbicides, burning, or grazing. This would increase its existing habitat clearance program five times over current levels. If certified, the programmatic EIR will exempt individual habitat clearance projects from public oversight required by the California Environmental Quality Act (CEQA). Everything from state parks to private lands could be stripped bare without local notice or a chance to appeal.

Every decade we increase funding for habitat clearance operations and fire suppression activities, followed by a decade of even worse fire impacts. The Board's proposal perpetuates and expands this same approach, one that has failed to reduce cumulative wildfire damage and firefighting expenditures over the past century. As a consequence, the proposal is a waste of tax payer money, will cause significant damage to the environment, and will fail to effectively protect Californians from wildland fire.

We hereby incorporate herein, in its entirety, by reference, the February 4, 2016 joint letter from scientists to Governor Brown about his State of Emergency proclamation that the 2015 "die-off is of such scale that it worsens wildfire risk across large regions of the State", is strongly at odds with the best available science.
http://www.sequoiaforestkeeper.org/pdfs/Science_papers/160204_Hansen_Scientist_letter_to_Gov_Brown_re_2015_snags.pdf

> "Based on the best available scientific evidence, the October 2015 emergency proclamation is not scientifically sound and, in fact, is directly contradicted by the overwhelming weight of current science. Further implementation of the proclamation would cause serious harm to numerous imperiled snag-dependent wildlife species, would exacerbate the ongoing deficit of snags in California's forests relative to the minimum needs of the most sensitive wildlife species, would substantially reduce carbon storage in our forests and cause large emissions of greenhouse gases due to increased burning of snags in bioenergy plants, and would not reduce fire intensity or spread."

Letter to Governor Brown from Chad Hanson, Ph.D., Research Ecologist John Muir Project of Earth Island Institute, Dominick DellaSala, Ph.D., Chief Scientist Geos Institute, Monica Bond, M.S., Principal Scientist Wild Nature Institute, George Wuerthner, Senior Scientist Foundation for Deep Ecology, Dennis Odion, Ph.D., Ecologist Earth Research Institute, University of California Santa Barbara, and Derek Lee, Ph.D., Principal Scientist Wild Nature Institute.

There is no scientific dispute that mechanical fuel treatments that remove trees, biomass, and a significant amount of tree canopy increase wind speeds.

Science demonstrates that;

- **Logging is not restoration.**
- **Logging increases fire risk and causes long term damage.**
- **Logging standing dead trees runs contrary to the best available science.**
- **Winds have been a major issue in the fire's spread & an impediment to containment.**
- **Biomass burning will increase atmospheric CO2 levels.**
- **Removing biomass from the forests for generating power will deplete the forest of future soil nutrients and will continue to exacerbate global climate change.**

<u>The EIS Analysis should consider an Alternative Approach to Providing Defensible Space.</u>

The DEIR is proposing to treat the WUI defense and threat zones, supposedly to create defensible space to protect the homes in the adjacent communities from a wild fire. Defensible space is a place where firefighters can be safely stationed in the path of the advancing fire. And although the Forest Service has designated large WUI areas, cutting down trees beyond 200 to 300 feet from homes to create defensible space for firefighters to battle the wall of flames that might be approaching and to protect the homes from the fire will place firefighters in danger and will cause unnecessary resource damage. It will eventually result in areas that will become more flammable because of the subsequent growth of more flammable bushes and grasses than existed prior to leaving the forest canopy intact, including exotic grasses and herbaceous annuals that carry fire quickly to the base of the remaining trees.

Treating the Home Ignition Zone (HIZ), the 200 to 300 feet surrounding homes, and using that treated HIZ as the defensible space from which prescribed fire is anchored and allowed to burn into the surrounding forest would be far less costly and more effective than mechanical treatments beyond the HIZ.

We urge the agency to consider this alternative WUI size, defined by the Home Ignition Zone (HIZ) as a safezone from which firefighters would initiate prescribed fire to burn away from the HIZ and into the WUI.

Science support treatments limited to the Home Ignition Zone. The Forest Service's own Jack Cohen (Jack D. Cohen, Research Physical Scientist, Fire Sciences Laboratory, PO Box 8089, Missoula, MT 59807 406-329-4821 (fax) 406-329-4825 jcohen@fs.fed.us), has shown that the Home Ignition Zone – the 200 to 300 feet immediately surrounding homes, is where mechanical fuel treatments should be implemented to protect homes. The Home Ignition Zone treatments can be the mechanically-treated safezone that anchors prescribed fire treatments that would then be implemented beyond the HIZ and into the WUI to protect homes.

Treating areas for thousands of feet down slope of rural residences will only cause unnecessary changes in the wildlands and not protect the rural residences from the wildfire that could start in the wildland area, if treatments have not been applied to the area within 200 feet of structures (Cohen 1999).

The alternative of using the HIZ as the safezone anchor for prescribed fires into the WUI is reasonable because firefighters have successfully utilized narrower areas than the 200 to 300 foot wide HIZ when prescribed fires or backfires are initiated from roads and trails in forested areas.

Science Indicates the Importance of Fire as a Natural Ecosystem Process.

Wildfire is an essential part of natural ecosystem process. While it is true that fire suppression and logging practices have altered forest structures, it is important to note that this does not eliminate the essential role of fire, including high-severity fire, as a natural ecosystem process in many forest types. In fact, fire can have an essential role in restoring forest structure at larger geographical scales.

Fire is a natural and necessary component of forest ecosystems, with many critical functions for diversity and wildlife. It would be a misunderstanding of the science and nature of forest and fire dynamics to approach these emissions in the same context as those from smokestacks, bioenergy and pile burning, which are discretionary activities that occur under direct human control.

Numerous studies and multiple lines of evidence indicate that the ponderosa pine and mixed-conifer forests of California are characterized by mixed-severity fire that includes ecologically significant amounts of high-severity fire (see review in Odion et al. 2014). Mixed-severity fire includes low-, moderate-, and high-severity effects that create complex successional diversity, high beta diversity, and diverse stand-structure across the landscape. High-intensity fire patches, including large patches, in large fires are natural in California mixed-conifer forests.

California's forested landscapes evolved with fire over thousands of years. This pre-European, forested landscape was shaped by mixed-severity fire, with low, moderate, and high-severity fire types. Plant and animal species in the forest evolved with fire, and many of these plant and animal species depend on wildfires, including high-severity fires, to reproduce and grow. For instance, fire can help return nutrients from plant matter back to soil, the heat from fire is necessary to the germination of certain types of seeds, and the snags (dead trees) and early succesional forests created by high-severity fire create habitat conditions that are beneficial to wildlife. Early successional forests created by high-severity fire support some of the highest levels of native biodiversity found in temperature conifer forests.

Several recent studies provide evidence for a mixed-severity fire regime in California forests, including an important role for high-severity fire, as well as declines in high-severity fire, as summarized here*:*

Beaty and Taylor 2001: On the western slope of the southern Cascades in California, historic fire intensity in mixed-conifer forests was predominantly moderate- and high-intensity, except in mesic canyon bottoms, where moderate- and high-intensity fire comprised 40.4% of fire effects [Table 7].)

Bekker and Taylor 2001: On the western slope of the southern Cascades in California, in mixed-conifer forests, fire was predominantly high-intensity historically [Fig. 2F].

Bekker and Taylor 2010: In mixed-conifer forests of the southern Cascades, reconstructed fire severity within the study area was dominated by high-severity fire effects, including high-severity fire patches over 2,000 acres in size [Tables I and II].

Collins and Stephens 2010: In a modern “reference” forest condition within mixed-conifer/fir forests in Yosemite National Park, 15% of the area experienced high-intensity fire over a 33-year period—a high-intensity fire rotation interval of approximately 223 years.

Nagel and Taylor 2005: The authors found that large high-severity fire patches were a natural part of 19th century fire regimes in mixed-conifer and eastside pine forests of the Lake Tahoe Basin, and montane chaparral created by high-severity fire has declined by 62% since the 19th century due to reduced high-severity fire occurrence. The authors expressed concern about harm to biodiversity due to loss of ecologically rich montane chaparral.

Odion et al. 2014: In the largest and most comprehensive analysis ever conducted regarding the historical occurrence of high-intensity fire, the authors found that ponderosa pine and mixed-conifer forests in every region of western North America had mixed-intensity fire regimes, which included substantial occurrence of high-intensity fire. The authors also found, using multiple lines of evidence, including over a hundred historical sources and fire history reconstructions, and an extensive forest age-class analysis, that we now have unnaturally low levels of high-intensity fire in these forest types in all regions, since the beginning of fire suppression policies in the early 20th century.

Numerous studies show that high-severity fire is beneficial to wildlife. High-severity fire creates very biodiverse, ecologically important, and unique habitat (often called "snag forest habitat"), which often has higher species richness and diversity than unburned old forest.

Bond et al. 2009: In a radio-telemetry study, California spotted owls preferentially selected high-intensity fire areas, which had not been salvage logged, for foraging, while selecting low- and moderate-intensity areas for nesting and roosting.

Buchalski et al. 2013: In mixed-conifer forests of the southern Sierra Nevada, rare myotis bats were found at greater levels in unmanaged high-severity fire areas of the McNally fire than in lower fire severity areas or unburned forest.

Burnett et al. 2010: Bird species richness was approximately the same between high-severity fire areas and unburned mature/old forest at 8 years post-fire in the Storrie fire, and total bird abundance was greatest in the high-severity fire areas of the Storrie fire [Figure 4]. Nest density of cavity-nesting species increased with higher proportions of high-severity fire, and was highest at 100% [Figure 8].

Cocking et al. 2014: High-intensity fire areas are vitally important to maintain and restore black oaks in mixed-conifer forests.

Donato et al. 2009: The high-severity re-burn [high-severity fire occurring 15 years after a previous high-severity fire] had the highest plant species richness and total plant cover, relative to high-severity fire alone [no re-burn] and unburned mature/old forest; and the high-severity fire re-burn area had over 1,000 seedlings/saplings per hectare of natural conifer regeneration.

Franklin et al. 2000: The authors found that stable or increasing populations of spotted owls resulted from a mix of dense old forest and complex early seral habitat, and less than approximately 25% complex early seral habitat in the home range was associated with declining populations [Fig. 10]; the authors emphasized that the complex early seral habitat was consistent with high-intensity fire effects, and inconsistent with clearcut logging.

Hanson and North 2008: Black-backed woodpeckers depend upon dense, mature/old forest that has recently experienced higher-intensity fire, and has not been salvage logged.

Hanson 2013: Pacific fishers are using pre-fire mature/old forest that experienced moderate/high-intensity fire more than expected based upon availability, just as fishers are selecting dense, mature/old forest in its unburned state. When fishers are near fire perimeters, they strongly select the burned side of the fire edge. Both males and female fishers are using large mixed-intensity fire areas, such as the McNally fire, including several kilometers into the fire area.

Hutto, R.L. 1995: A study in the northern Rocky Mountain region found that 15 bird species are generally more abundant in early post-fire communities than in any other major cover type occurring in the northern Rockies. Standing, fire-killed trees provided nest sites for nearly two-thirds of 31 species that were found nesting in the burned sites.

Hutto, R.L. 2008: Severely burned forest conditions have occurred naturally across a broad range of forest types for millennia and provide an important ecological backdrop for fire specialists like the black-backed woodpecker.

Lee and Bond 2015: California spotted owls exhibited high site occupancy in post-fire landscapes during the breeding season following the 2013 Rim Fire, even where large areas burned at high severity; the complex early seral forests created by high-severity fire appear to provide important habitat for the small mammal prey of the owl.

Malison and Baxter 2010: In ponderosa pine and Douglas-fir forests of Idaho at 5-10 years post-fire, levels of aquatic insects emerging from streams were two and a half times greater in high-intensity fire areas than in unburned mature/old forest, and bats were nearly 5 times more abundant in riparian areas with high-intensity fire than in unburned mature/old forest.

Raphael et al. 1987: At 25 years after high-intensity fire, total bird abundance was slightly higher in snag forest than in unburned old forest in eastside mixed-conifer forest of the northern Sierra Nevada; and bird species richness was 40% higher in snag forest habitat. In earlier post- fire years, woodpeckers were more abundant in snag forest, but were similar to unburned by 25 years post-fire, while flycatchers and species associated with shrubs continued to increase to 25 years post-fire.

Sestrich et al. 2011: Native Bull and Cutthroat trout tended to increase with higher fire intensity, particularly where debris flows occurred. Nonnative brook trout did not increase.

Siegel et al. 2011: Many more species occur at high burn severity sites starting several years post-fire, and these include the majority of ground and shrub nesters as well as many cavity nesters. Secondary cavity nesters, such as swallows, bluebirds, and wrens, are particularly associated with severe burns, but only after nest cavities have been created, presumably by the pioneering cavity excavating species such as the Black-backed Woodpecker. As a result, fires that create preferred conditions for Black-backed Woodpeckers in the early post-fire years will likely result in increased nesting sites for secondary cavity nesters in successive years.

Swanson et al. 2010: A literature review concluding that some of the highest levels of native biodiversity found in temperate conifer forest types occur in complex early successional habitat created by stand-initiating [high severity] fire.

Erosion and Sediment Delivery from Harvest Units.

Erosion and sediment delivery into streams in the watershed from harvest units must be considered in the EIS. *An Analysis of Turbidity in Relation to Timber Harvesting in the Battle Creek Watershed, northern California*, September 2014, Prepared for the Battle Creek Alliance, www.thebattlecreekalliance.org Manton, CA by Jack Lewis, Statistical Hydrologist, Arcata, CA, jacklewis@suddenlink.net shows that substantial sediment flows from harvest units is an environmental impact that must be considered. This study found also at http://nebula.wsimg.com/f65f0fa520ec0c113b3e880b52fd565a?AccessKeyId=01B8D7A67C3CF9F65262&disposition=0&alloworigin=1 has documented that clearcutting and post-fire salvage logging is degrading water quality in California. Lewis analyzed data from the 1,700 measurements Battle Creek Alliance has collected for its Citizen's Water Monitoring Project since 2009.

Key findings of the analysis are:

- Increased turbidity (i.e. dirtiness of the water) is strongly associated with the amount of logging taking place in the watersheds that drain into the measurement sites.
- In watersheds that have been 30% cut, the average increase in turbidity is 200%. In watersheds that have been 90% cut, the average increase in turbidity is 3000%.
- These changes are far in excess of the Water Board's turbidity standard for the Central Valley region.

These findings led Lewis to conclude that "turbidity is greatest in tributaries that have experienced the heaviest logging."

Erosion and sediment delivery into streams in the watershed from harvest units must be considered and surveyed during periods of rainfall to assess whether there is and the greatest extent of erosion and delivery of sediments from harvest units. To survey during any other periods of time would fail to assess the full extent of the impact to watersheds from logging.

Rhodes, J.J., and C.A. Frissell. 2015, *The High Costs and Low Benefits of Attempting to Increase Water Yield by Forest Removal in the Sierra Nevada*. 108 pp. Report prepared for Environment Now, 12400 Wilshire Blvd, Suite 650, Los Angeles, CA 90025. http://www.environmentnow.org found environmental damage, including increased sediment flows from logging.

> Intensive forest management aimed at elevating water yield would incur major and enduring environmental costs, due to the frequency and magnitude of forest removal that would be needed to maintain increases in water yield. Together with associated forest removal activities, including roads, landings, and skid trails, frequent and extensive forest removal would permanently degrade soils, riparian areas, aquatic systems, and water quality. The latter would incur significant water supply costs, including increased costs of treatment for elevated sediment and nutrient levels, as well as the likelihood of increased flood damage. Thus, the at best modest benefits for water yield would come at the expense of high environmental and economic costs.

http://www.environmentnow.org/publications.html. The cumulative impacts of the prescription issued in the Board of Forestry and Fire Protection Comprehensive Fire Protection Program

DEIR that enables logging throughout California's forests must be reassessed in an EIR that contains no inaccuracies and misrepresentations of fact and science like those in the DEIR.

<u>Trends in fire behavior.</u>

While climate change will almost certainly alter many forest processes, including fire behavior, in many ecosystems over the coming decades, the current body of science offers a complex range of projections for California forests. Notably, the majority of studies that have analyzed recent trends in fire severity and frequency in California forests have found no significant trends in these metrics. Studies that project trends in fire activity have no clear consensus on how climate change will affect fire behavior in California forests.

Nine studies have analyzed recent trends in fire severity in California's forests in terms of proportion, area, and/or patch size. Seven of nine studies found no significant trend in fire severity, including: Collins et al. 2009 (central Sierra Nevada), Dillon et al. 2011 (Northwest California), Hanson et al. 2009 (Klamath, southern Cascades), Hanson and Odion 2014 (Sierra Nevada, southern Cascades), Miller et al. 2012a (four Northwest CA forests), Odion et al. 2014 (eastern and western Sierra Nevada, eastern Cascades), and Schwind 2008 (California forests). The two studies that report an increasing trend in fire severity – Miller et al. 2009 and Miller and Safford 2012 (Sierra Nevada, southern Cascades) – were refuted by Hanson and Odion (2014) using a larger dataset.

Hanson and Odion (2014) conducted the first comprehensive assessment of fire intensity since 1984 in the Sierra Nevada using 100% of available fire intensity data, and found no increasing trend in terms of high-intensity fire proportion, area, mean patch size, or maximum patch size. Hanson and Odion (2014) reviewed the approach of Miller et al. (2009) and Miller and Safford (2012) for bias, due to the use of vegetation layers that post-date the fires being analyzed in those studies. Hanson and Odion (2014) found that there is a statistically significant bias in both studies ($p = 0.025$ and $p = 0.021$, respectively), the effect of which is to exclude relatively more conifer forest experiencing high-intensity fire in the earlier years of the time series, thus creating the erroneous appearance of an increasing trend in fire severity. Hanson and Odion (2014) also found that the regional fire severity data set used by Miller et al. (2009) and Miller and Safford (2012) disproportionately excluded fires in the earlier years of the time series, relative to the standard national fire severity data set (www.mtbs.gov) used in other fire severity trend studies, resulting in an additional bias which created, once again, the inaccurate appearance of relatively less high-severity fire in the earlier years, and relatively more in more recent years.

Three studies have analyzed recent trends in the number of fires in California's forests and have reported conflicting results for trends in fire frequency. Two studies found no trend in the number of fires -- Schwind (2008) and Syphard et al. (2007) -- while Westerling et al. (2006) reported evidence of an increasing number of fires.

Projection studies have generally not modeled trends in future fire frequency and severity. Instead most studies have projected changes in area burned and the probability of burning. There is no consensus among these studies on future fire activity.

Of seven studies that have projected trends in area burned in California forests, four projected both increases and decreases in total area burned varying by region, including: Lenihan et al. 2003, Lenihan et al. 2008, Krawchuk et al. 2009, and Spracklen et al. 2009. One study projected an overall decrease in area burned (McKenzie et al. 2004), while two studies projected increases: Fried et al. 2004 in a small region in the Amador-El Dorado Sierra foothills and Westerling et al. 2011. The projected increases reported in Westerling et al. (2011) are relatively modest: median increases in area burned of 15% and 19% by 2020 relative to 1961-1990 under a lower (B1) and higher emissions scenario (A2) respectively, 21% and 23% by 2050, and 20% and 44% by 2085.

Three studies have projected changes in the probability of burning or the probability of a large fire occurring, and these studies have projected no change, increases, or decreases varying by region: Krawchuk and Moritz 2012, Moritz et al. 2012, and Westerling and Bryant 2008.

The studies empirically investigating the assumption that the most fire-suppressed forests are burning predominantly at high severity have consistently found that forest areas in California that have missed the largest number of fire return intervals are not burning at higher fire severity. Specifically, six empirical studies that have investigated this question found that the most long-unburned (most fire-suppressed) forests burned mostly at low/moderate-severity, and did not have higher proportions of high-severity fire than less fire-suppressed forests. Forests that were not fire suppressed (those that had not missed fire cycles, i.e., Condition Class 1, or "Fire Return Interval Departure" class 1) generally had levels of high-severity fire similar to, or higher than, those in the most fire-suppressed forests, as found by Odion et al. 2004, Odion and Hanson 2006, Odion and Hanson 2008, Odion et al. 2010, Miller et al. 2012a, van Wagtendonk et al. 2012.

Finally, studies have found that California is experiencing a fire deficit compared to pre-settlement conditions, meaning that there is much less fire on the landscape than there was historically, and this deficit is detrimental to forests (Stephens et al. 2007).

The Carbon Impacts of Forest Thinning.

The DEIS only considered climate change impacts on managing forests and fails to consider the effects from logging, biomass removal, and soil disturbance on climate change. The result is a highly one-sided defense of policy options to promote logging, followed by the burning of those woody materials for biomass energy production. However, studies that have specifically evaluated the carbon implications of this strategy have found that thinning results in increased carbon emissions to the atmosphere for many decades.

Three recently published studies of forests in the western United States suggest that emissions from removal and combustion of forest materials for bioenergy would exceed emissions from even high intensity fires, at least for some period of time. One study examined forest carbon responses to three different levels of fuel reduction treatments in 19 West Coast ecoregions containing 80 different forest types and different fire regimes (Hudiburg et al. 2011). In nearly all forest types, intensive harvest for bioenergy production resulted in net carbon emissions to the atmosphere, at least over the 20-year time frame of the study. Even lighter-touch fire prevention scenarios produced net carbon emissions in most ecoregions. The study shows that at present, across a wide range of ecosystems, thinning for fuels reduction and using the thinnings for bioenergy increases carbon dioxide concentrations, at least in the short term.

A second study similarly found that thinning forests to avoid high-severity fire could actually increase overall carbon emissions (Campbell et al. 2011). Because the probability of a fire on any given acre of forest is relatively low, forest managers must treat many more acres than will actually burn in order to get much of a benefit—removing more carbon during "thinning" than would be released in a fire. The study also found that over a succession of disturbance cycles, models predicting forest growth, mortality, decomposition and combustion showed more carbon storage in a low-frequency, high-intensity fire regime than in a high-frequency, low-intensity fire regime. The study concluded: "we found little credible evidence that such efforts [fuel-reduction treatments] have the added benefit of increasing terrestrial C stocks" and "more often, treatment would result in a reduction in C stocks over space and time."

A review by Law and Harmon (2011) concluded that "Thinning forests to reduce potential carbon losses due to wildfire is in direct conflict with carbon sequestration goals, and, if implemented, would result in a net emission of CO2 to the atmosphere because the amount of carbon removed to change fire behavior is often far larger than that saved by changing fire behavior, and more area has to be harvested than will ultimately burn over the period of effectiveness of the thinning treatment."

Furthermore, scientific studies have found that old forests store up to ~10 times more carbon in biomass per unit ground area than young forests, and old forests continue to have large carbon stores for hundreds of years (Luyssaert et al. 2008, Hudiburg et al. 2009, Law 2014, Schulze et al. 2012). Older trees not only store large amounts of carbon but actively sequester larger amounts of carbon compared to smaller trees (Stephenson et al. 2014). Contrary to the conventional forestry assumption that older trees are less productive, the mass growth rate for most temperate and tropical tree species increases continuously with age, meaning the biggest trees sequester the most carbon (Stephenson et al. 2014). In western USA old-growth forest plots, trees greater than 100 cm in diameter comprised 6% of trees, yet contributed 33% of the annual forest mass growth (Stephenson et al. 2014). Current research also shows that high-severity fire areas generally store the highest levels of carbon, due to the combination of the carbon in snags, downed logs, and post-fire regenerating vegetation, including shrubs and trees (Keith et al. 2009, Powers et al. 2013).

Logging significantly reduces forest carbon storage. Harvest of live trees from the forest not only reduces current standing carbon stocks, but also reduces the forest's future rate of carbon sequestration, and its future carbon storage capacity, by removing trees that otherwise would have continued to grow and remove CO2 from the atmosphere (Holtsmark 2012). Even if harvested biomass is substituted for fossil fuels, it can be decades or centuries before the harvested forest achieves the same CO2 reductions that could be achieved by leaving the forest unharvested (depending on harvest intensity, frequency, and forest characteristics) (Searchinger et al. 2009, Hudiberg et al. 2011, Campbell et al. 2012, Mitchell et al. 2012). It takes more than 100 years (~125-130 years) to make up for carbon loss after a forest is logged (Harmon 2014, Law 2014).

Accurate Accounting of the Carbon Impacts of Biomass Bioenergy.

Any policy to promote the use of forest-sourced biomass for bioenergy production must fully account for the emissions and climate change consequences associated with those activities. In order to develop a program that makes sense within the forest carbon and GHG emissions contexts, biomass uses must be compared not only to alternative "waste diversion" options but to the full spectrum of alternative fates, including the carbon sequestration and storage associated with living and growing trees and forests.

Woody biomass combustion is not carbon-neutral, as acknowledged by numerous scientific studies (see, e.g., Searchinger et al. 2009, Repo et al. 2010, Brandão et al. 2013), the IPCC,[1] and the EPA.[2] Measured at the smokestack, replacing fossil fuels with biomass actually *increases* CO2 emissions.[3] Notably, a recent study found that the climate impact per unit of CO2 emitted seems to be even higher for the combustion of slow-growing biomass than for the combustion of fossil carbon in a 100-year time frame (Holtsmark 2013). The warming effect from biomass CO2 can continue for decades or even centuries depending on the feedstock.

Multiple studies have shown that it can take a very long time for new biomass growth to recapture the carbon emitted by combustion, even where fossil fuel displacement is assumed, and even where "waste" materials like timber harvest residuals are used for fuel (Repo et al. 2010, Manomet Center for Conservation Sciences 2010, McKechnie et al. 2011, Mitchell et al. 2012, Schulze et al. 2012). One study, using realistic assumptions about repeat bioenergy harvests of woody biomass, concluded that the resulting atmospheric emissions increase may even be permanent (Holtsmark 2012). In addition to producing large amounts of CO2, biomass energy generation can result in significant emissions of other pollutants that worsen climate change and harm human health, such as black carbon. Many biomass emissions can exceed those of coal-fired power plants even after application of best available control technology.

Studies have found that global greenhouse gas emissions must peak by 2020 and drop sharply thereafter in order to preserve a likely chance of keeping global warming below 2°C — a level at

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[1] IPCC Task Force on National Greenhouse Gas Inventories, Frequently Asked Questions, at http://www.ipcc-nggip.iges.or.jp/faq/faq.html (last visited October 23, 2013) (Q1-4-5, Q2-10).

[2] U.S. EPA, Accounting Framework for Biogenic CO2 Emissions from Stationary Sources 11-12 (Sept. 2011) ("The IPCC . . . eschewed any statements indicating that its decision to account for biomass CO2 emissions in the Land-Use Sector rather than the Energy Sector was intended to signal that bioenergy truly has no impacton atmospheric CO2 concentrations."); see also Deferral for CO2 Emissions from Bioenergy and Other Biogenic Sources Under the Prevention of Significant Deterioration (PSD) and Title V Programs, 76 Fed. Reg. 43,490, 43,498 (July 20, 2011); Science Advisory Board Review of EPA's Accounting Framework for Biogenic CO2 Emissions from Stationary Sources 7 (Sept. 28, 2012) at 3.

[3] Typical CO2 emission rates for facilities:
Gas combined cycle 883 lb CO2/MWh
Gas steam turbine 1,218 lb CO2/MWh
Coal steam turbine 2,086 lb/CO2/MWh
Biomass steam turbine 3,029 lb CO2/MWh
Sources: EIA, Electric Power Annual, 2009: Carbon Dioxide Uncontrolled Emission Factors. Efficiency values used to calculate emissions from fossil fuel facilities calculated using EIA heat rate data. (http://www.eia.gov/cneaf/electricity/epa/epat5p4.html); biopower efficiency value is 24%, a standard industry value.

which serious impacts will still occur (UNEP 2013). California's climate goals, as reflected in AB 32 and applicable executive orders (S-3-05 and B-30-15) also call for increasingly steep reductions in emissions over the next three decades. Yet the science shows this is precisely the time period during which biomass emissions released today will increase atmospheric CO2 levels. At a time when we need to reduce emissions dramatically in the short term and keep them down, California forest policy should not be promoting biomass burning that will exacerbate climate change.

> "One of the penalties of an ecological education is that one lives alone in a world of wounds. Much of the damage inflicted on land is quite invisible to laymen. An ecologist must either harden his shell and make believe that the consequences of science are none of his business, or he must be the doctor who sees the marks of death in a community that believes itself well and does not want to be told otherwise."

Aldo Leopold

Respectfully submitted,

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