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May 31, 2016

Via Internet Upload (VegetationTreatment@bof.ca.gov)

Board of Forestry and Fire Protection
ATTN: Edith Hannigan, Board Analyst
VTP Draft PEIR Comments
PO Box 944246
Sacramento, CA 94244-2460

Re: Vegetation Treatment Program (VTP) Draft Environmental Impact Report

To Whom It May Concern:

The Center for Biological Diversity (the "Center") submits the following comments on the Draft Program Environmental Impact Report ("DEIR") for the State's proposed Vegetation Treatment Program ("VTP" or "Program") prepared by the California Department of Forestry and Fire Protection ("Cal Fire"). The Center also joins, and incorporates by reference here, comments submitted on 27 May 2016 by Richard Halsey of the California Chaparral Institute and nine additional organizations, comments submitted on 24 May 2016 by The California Chaparral Institute, and comments submitted on 27 May 2016 by Shute, Mihaly, and Weinberger.

The Center is a non-profit organization with more than one million members and online activists and offices throughout the United States, including in Oakland, Los Angeles, and Joshua Tree, California. The Center's mission is to ensure the preservation, protection and restoration of biodiversity, native species, ecosystems, public lands and waters and public health. In furtherance of these goals, the Center's Climate Law Institute seeks to reduce U.S. greenhouse gas emissions and other air pollution to protect biological diversity, the environment, and human health and welfare. Specific objectives include securing protections for species threatened by global warming, ensuring compliance with applicable law in order to reduce greenhouse gas emissions and other air pollution, and educating and mobilizing the public on global warming and air quality issues.

Based on our review, we find that the DEIR fails to comply with the California Environmental Quality Act ("CEQA"), Public Resources Code § 21000 et seq., and the CEQA Guidelines, title 14, California Administrative Code, § 15000 et seq. The DEIR violates CEQA on numerous counts, including the following key deficiencies discussed further below: (1) the DEIR provides an inadequate analysis of the Program's environmental impacts; (2) Standard Project Requirements are actually mitigation measures and must be treated as such; (3) the DEIR fails to provide an accurate, stable, and finite project description; (4) the DEIR does not consider a reasonable range of alternatives; (5) the DEIR's justification for the VTP is not based on

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substantial evidence; (6) key objectives of the VTP are not based on substantial evidence; (7) the DEIR fails to adequately disclose, analyze, assess the significance of, and propose mitigation for impacts to biological resources caused by the Program; (8) the DEIR fails to meet CEQA's requirements with regard to the analysis of greenhouse gas ("GHG") emissions.

While these comments focus on the deficiencies in the DEIR's analysis of impacts on biological resources and greenhouse gas emissions, significant and unlawful deficiencies pervade the remaining environmental impacts analyses as well. In short, the proposed VTP will result in a wide range of harmful environmental impacts that are not adequately disclosed, analyzed, or mitigated in the DEIR. The California State Board of Forestry and Fire Protection cannot lawfully approve the VTP based on this EIR.

I. The DEIR Provides an Inadequate Analysis of the Program's Environmental Impacts

The DEIR provides an impermissibly vague and cursory analysis of the VTP's environmental impacts, which is a fatal flaw that permeates the entire document. The DEIR attempts to justify the lack of detailed analysis by labeling itself a programmatic EIR and suggesting that there will be a future opportunity for environmental review when each project is implemented. DEIR at E-5. CEQA, however, does not allow an agency to defer analysis simply by labeling its EIR a "program EIR." CEQA recognizes that a program EIR "can provide an occasion for a *more exhaustive* consideration of effects and alternatives" than a project-specific EIR. Guidelines § 15168(b)(1) (emphasis added). In addition, program EIRs must "deal[] with the effects of the program as specifically and comprehensively as possible" and consider "cumulative impacts that might be slighted in a case-by-case analysis." *Id*. § 15168(b)(2), (c)(5). As the Court summarized in *Friends of Mammoth v. Town of Mammoth Lakes Redevelopment Agency*, 82 Cal.App.4th 511, 533 (2000)("[d]esignating an EIR as a program EIR also does not by itself decrease the level of analysis otherwise required in the EIR." The California Supreme Court also recently cautioned, "'[t]iering does not excuse the lead agency from adequately analyzing reasonably foreseeable significant environmental effects of the project and does not justify deferring such analysis to a later tier EIR or negative declaration."); *Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova*, 40 Cal.4th 412, 431 (2007)(quoting Guidelines § 15152(b)).

Here, the DEIR fails as an informational document because it does not provide decision-makers and the public with adequate information about the impacts of the overall program. Moreover, the vague, cursory, deferred analysis in the program DEIR is not sufficient to support any later project-level decision-making. There is no process in the program DEIR that guarantees that a future, detailed environmental review will occur, or that environmental impacts will be disclosed, analyzed, and mitigated.

II. Standard Project Requirements are Actually Mitigation Measures and Must Be Treated as Such

Throughout the DEIR, Cal Fire presents Standard Project Requirements (SPRs) that "are program design elements for reducing or avoiding adverse environmental effects of the treatment activities that are set by the VTP and applied to individual projects." DEIR at 2-51-52. The DEIR broadly presumes these SPRs will mitigate any potentially significant impacts from the project. *See, e.g.,* DEIR at 3-8, 4-118, 4-429, 430. But this approach runs afoul of CEQA's requirement that impacts first be fully disclosed and analyzed separately from the mitigation analysis. As the court noted in *Lotus v. Dep't of Transportation*, separation of significance and mitigation/alternatives analysis ensures that appropriate mitigation measures have been considered and that decision makers and the public can "intelligently analyze the logic of the [agency's] decision." *Lotus v. Dept. of Transportation*, 223 Cal. App. 4th 645, 655-656 (2014). In *Lotus*, the EIR for a highway through an old-growth redwood stand assumed that because certain mitigation measures to minimize damage were proposed as part of the project, the impact was non-significant. The court, however, held that the EIR was deficient because it failed to first identify the significant impacts and then appropriate alternatives and mitigation measures, consequently "subvert[ing] the purposes of CEQA by omitting material necessary to informed decisionmaking and informed public participation." *Id.* at 658. Similarly, the VTP DEIR impermissibly conflates the impacts analysis and mitigation analysis to the extent that it assumes SPRs will reduce impacts to the level of non-significance.[1]

The fallacy of relying on SPRs rather than quantified mitigation measures is particularly apparent with regard to greenhouse gases. Some of the SPRs that the DEIR claims will reduce GHG emissions do not appear to do so. For instance, SPR CC-1 states that the project coordinator will run GHG emission models to "confirm" that GHG emissions are minimized. DEIR at 4-432. Yet, there is zero indication what it means to "confirm" minimal emissions, and what changes would be implemented to reduce greenhouse gases. This SPR is not only ineffective on its face but also constitutes impermissible deferred mitigation. *See* CEQA Guidelines § 15126.4(a)(1)(B). The DEIR also indicates that implementation of mitigation measure AIR-3 would reduce greenhouse gas emissions (DEIR at 4-432) but, as noted below, the air quality mitigation measures are aimed at reducing criteria pollutants such as particulate matter that vary inversely with CO_2 emissions. Had the effectiveness of these and other SPRs been subjected to the detailed analysis required for mitigation measures under CEQA, the shortcomings in assumed GHG reductions would have become evident. Furthermore, without sufficient information on the effectiveness of each mitigation measure, the DEIR fails as an

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[1] The fact that some of the SPRs may also be regulatory requirements does not excuse the DEIR's lack of analysis. Compliance with a regulatory requirement does not automatically reduce environmental impacts to a less-than-significant level. *See, e.g.*, *Californians for Alternatives to Toxics v. Department of Food & Agriculture*, 136 Cal. App. 4th 1, 16-17 (2005).

informational document under CEQA. *See, e.g., Sierra Club v. County of San Diego*, 231 Cal. App. 4th 1152 (2014).

Moreover, CEQA's requirements for mitigation measures are intended to ensure those measures are enforceable and are actually implemented. CEQA prohibits public agencies from approving projects with significant environmental impacts unless all feasible mitigation measures to minimize those impacts are adopted. *See* Pub. Res. Code §§ 21002, 21002.2(b), 21081. In doing so, the lead agency must "ensure that feasible mitigation measures will actually be implemented as a condition of development, and not merely adopted and then neglected or disregarded." *Federation of Hillside and Canyon Assns. v. City of Los Angeles*, 83 Cal.App.4th 1252, 1261 (2000) (italics omitted). Mitigation measures must be "fully enforceable," either through conditions of approval or through incorporation into a project itself. CEQA Guidelines § 15126.4(b). Where feasible mitigation measures exist, a public agency cannot approve a project without specifically finding that legally adequate measures have been incorporated into the project. *See* Pub. Res. Code § 21081(a)(1). An agency also must adopt a mitigation monitoring and reporting plan to ensure that measures are actually implemented following project approval. Pub. Res. Code § 21081.6(a)(1); CEQA Guidelines § 15097. If mitigation is infeasible, the agency must make a specific finding to this effect, and must adopt a statement of overriding considerations before it can approve the project. Pub. Res. Code § 21081(a)(3), (b); CEQA Guidelines §§ 15091(a)(3), 15093. Here, the DEIR improperly substitutes unenforceable, vague, and uncertain SPRs in place of the enforceable mitigation measures required under CEQA. The DEIR improperly relies on these vague SPRs to determine that each and every one of the Program's adverse impacts would be reduced to a less-than-significant level.

III. The DEIR Fails to Provide an Accurate, Stable, and Finite Project Description

In order for an environmental document to adequately evaluate the environmental ramifications of a project, it must first provide a comprehensive description of the project itself. An EIR must describe a proposed project with sufficient detail and accuracy to permit informed decision-making. *See* CEQA Guidelines § 15124. Indeed, "[a]n accurate, stable and finite project description is the *sine qua non* of an informative and legally sufficient EIR." *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus*, 27 Cal. App. 4th 713, 730 (1994), quoting *County of Inyo v. City of Los Angeles*, 71 Cal. App. 3d 185, 193 (1977). As a result, courts have found that, even if an EIR is adequate in all other respects, the use of a "truncated project concept" violates CEQA and mandates the conclusion that the lead agency did not proceed in a manner required by law. *San Joaquin Raptor*, 27 Cal. App. 4th at 730. Furthermore, "[a]n accurate project description is necessary for an intelligent evaluation of the potential environmental effects of a proposed activity." *Id.* (citation omitted). Thus, an inaccurate or incomplete project description renders the analysis of significant environmental impacts inherently unreliable. *See Communities for a Better Env't v. City of Richmond*, 184 Cal. App. 4th 70, 82-83 (2010) (approval of EIR based on inadequate project description constitutes legal error).

Here, the DEIR's basic description of the Program is impermissibly vague and unstable. The DEIR states that the VTP will implement a wide range of fuel treatment projects across a vast area encompassing 21.9 million acres of habitat in California. DEIR at 3-10. Projects conducted under the VTP fall into three general types (wildland-urban interface, fuel breaks, and ecological restoration projects) that are subject to a potential "menu" of six broad vegetation treatment types (prescribed fire with pile burn, prescribed fire with broadcast burn, mechanical treatment, manual treatment, prescribed herbivory, and herbicides). DEIR at 2-16-17. These treatments "may be applied singularly or in any combination needed for a particular vegetation type to meet specific resource management objectives." DEIR at 2-33. Adding to the Program's uncertainty, the DEIR provides only gross approximations of the proportions of treatment types to be applied in each bioregion, and sets no limits on treatment amounts. DEIR at 2-38. Instead, the vegetation treatment type that will be applied is determined only at the project-level ("during the planning phase of a VTP project, the appropriate activity would be selected," DEIR at 2-33); similarly, the regimen of follow-up maintenance activities is set at the project-level. DEIR at 2-35 ("In general, all vegetation types require follow up maintenance to meet long-term vegetation management goals. The type of follow-up treatment and interval between treatments would depend on site conditions and project objectives."). Overall, within a ten-year period the DEIR estimates that there would be approximately 2,301 projects implemented with an average of 231 projects per year and 60,000 acres treated annually. Once again, the maximum number of acres treated every year is uncertain and unbounded ("the actual acres treated annually in any region will vary year-to-year based on several factors," DEIR at 2-35) and the locations where treatment activities could occur are provided only at an extremely coarse scale (see maps at Figures ES-1, 2.2-5, 2.2-8, 2.2-10, and 2.2-12). In essence, Cal Fire fails to provide any stable or finite definition of the types and amounts of treatments that will be applied to the landscape, nor where treatments will be applied.

The lack of a stable and finite project description renders analysis of the Project's environmental impacts impossible. The DEIR acknowledges that each type of treatment activity will have different environmental impacts. DEIR at 2-38 ("each of these activity types can have a characteristic impact on the environment"). However, without knowing which treatment types and amounts will be used in each bioregion, there is no way of assessing the environmental impacts that the Program's treatments will incur. Accordingly, the DEIR fails to provide an adequate description of the Project.

IV. The DEIR Does Not Consider a Reasonable Range of Alternatives

The DEIR does not complete an adequate analysis of project alternatives. The mitigation and alternatives sections are the "core" of the EIR, and an agency should not approve a project as proposed if there are feasible alternatives or mitigation measures that would substantially lessen the impact of the project. Pub. Resources Code § 21002; *Habitat and Watershed Caretakers v. City of Santa Cruz*, 213 Cal. App. 4th 1277, 1302 (2013). Under CEQA, an EIR must consider a range of reasonable alternatives that would feasibly attain most of the objectives of the Program while avoiding or substantially lessening its significant impacts, and must compare the relative merits of these alternatives. CEQA Guidelines § 15126.6. Furthermore, the range of alternatives should be designed to "foster informed decision making." *Id*. The alternatives presented in the DEIR, however, fail to present a "range" because each alternative is simply some portion or combination of the same components as the preferred alternative. Yet, there are feasible alternatives that were not presented and would meet the objectives of the project and lessen environmental impacts. For instance, wildfire damage could be significantly reduced using a program that focuses "from the house out"[2] to reduce home flammability without extensive biomass removal.

The DEIR also dismisses a number of alternatives from consideration without sufficient analysis. Under CEQA, an agency must identify alternatives that were considered but rejected as infeasible. CEQA Guidelines §15126.6(c). In doing so, the agency must provide a reasoned analysis of its reasons because the public should not be expected to accept its determination on blind trust. *Laurel Heights Improvement Assn of San Francisco v. Regents of the University of California*, 47 Cal. 3d 376, 404 (1988); *Habitat and Watershed Caretakers v. City of Santa Cruz*, 213 Cal. App. 4th 1277, 1305 (2013). Furthermore, "an EIR should not exclude an alternative from detailed consideration merely because it would impede to some degree the attainment of the project objectives." *In re Bay-Delta*, 43 Cal. 4th 1143, 1165 (2008). Here, the DEIR rejects in rapid succession seven alternatives from further consideration. The DEIR quickly rejects these alternatives as failing to achieve project objectives and as "not consistent with 2010 Strategic Fire Plan for California or the 2012 Strategic Plan." DEIR at 3-37 to 3-40. Yet no explanation is given for what parts of these Strategic Plans are inconsistent or what aspects of the Project conflict with the stated objectives. Moreover, a generic and conclusory assertion of conflict with an agency's vision for management is not a valid basis for finding an alternative infeasible. The DEIR fails to provide adequate "facts or analysis" to enable the public to "understand and consider meaningfully the issues raised by the proposed project." *Laurel Heights*, 47 Cal. 3d at 405-405.

One alternative that the DEIR must analyze is a VTP limited to treating the defensible space around homes and other structures. As detailed below (Section V.H), on-the-ground research indicates that vegetation management within the defensible space in the 40-meter radius surrounding individual homes effectively protects homes from wildland fire, even intense fire, whereas management beyond the defensible space does not effectively protect homes. An alternative that analyzes vegetation treatments only in defensible space would greatly minimize the significant impacts of the Project while maximizing the protection of people, property, and natural resources of California, the stated mission of the Board and CalFire. DEIR at E-2.

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[2] See http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_faqs#gen01.

V. The DEIR's Justification for the VTP Is Not Based on Substantial Evidence

The DEIR's justification for the VTP is predicated on assertions that are either unsupported by the best-available science or highly uncertain. The DEIR states that the purpose of the VTP is "lowering the risk of damaging wildfire in the SRA by managing wildland fuels through the use of environmentally appropriate vegetation treatments." DEIR at E-2. The DEIR asserts that "[i]n some forested portions of California fire suppression has created an uninterrupted accumulation of wildland fuels with resultant increases in fire hazard" (DEIR at E-1)[3] and that "climate change suggests a continuing and even accelerated risk from wildfire," including large-scale mortality from insects. DEIR at E-2.

However, the DEIR fails to provide supporting scientific evidence to show that wildfire in California's forests is burning at unnatural or unusual levels or severities and therefore should be reduced. The DEIR similarly presents no evidence showing that fire suppression and bark beetle outbreaks have led to increased fire activity in California. The DEIR further ignores the extensive body of scientific studies examining current effects of climate change on wildfire activity which indicates that fire severity and amount have not increased in California's forests. In addition, studies projecting the influence of climate change on future fire activity indicate that fire severity in California forests is likely to stay the same or decrease, and that climate change effects on future fire activity are highly uncertain. The DEIR makes no effort to address this evidence.

In contrast to the DEIR's unsupported assertions, the best-available science detailed below indicates that (1) wildfire is a natural and necessary component of California forests, California's mixed-conifer and ponderosa pine forests have been historically characterized by mixed-severity fire including significant amounts of high-severity fire, and high-severity fire creates biodiverse, ecologically important, and unique habitat; (2) California forests are experiencing a deficit of fire compared with historical conditions; (3) California's forests are not burning at higher severity or amount, nor are the most long-unburned forests burning at higher severity; (4) the projected effects of climate change on fire activity in California are highly uncertain; (5) bark beetle outbreaks have not increased annual area burned or fire severity; (6) trees killed by drought and beetles do not increase fire intensity or extent; and (7) vegetation management within the defensible space immediately surrounding homes effectively protects homes from wildland fire.

As a result, the DEIR is out of touch with the best-available science on wildfire activity in California and fails to provide a defensible justification for the VTP. Of added concern, the body of science detailed below demonstrates that treatment activities to reduce wildfire pursuant to the DEIR are likely to cause significant environmental harm to California's ecosystems.

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[3] Similarly, the DEIR states: "catastrophic high severity wildfire; which in most cases in California is the inevitable eventual consequence of lack of fuel reduction coupled with fire suppression." DEIR at 4-117.

While these comments focus on the DEIR's deficiencies related to forests, the DEIR is also scientifically unsupported in its discussion and analysis of shrublands, particularly chaparral, and grasslands, as detailed by other commentators. See comments submitted 24 May 2016 and 27 May 2106 by the California Chaparral Institute (incorporated by reference).

A. Wildfire, including high-severity fire, is a natural and necessary component of California's forested landscapes.

1. California mixed-conifer and ponderosa pine forests are characterized by mixed-severity fire.

Numerous studies and multiple lines of evidence demonstrate that California's mixed-conifer and ponderosa pine forests are characterized by mixed-severity fire that includes ecologically significant amounts of high-severity fire. Mixed-severity fire creates complex successional diversity, high biological diversity, and diverse stand structure across California's forested landscapes.

Baker 2014: A reconstruction of historical forest structure and fire across 330,000 ha of Sierra Nevada mixed-conifer forests using data from 1865-1885 demonstrates that these historical forests experienced mixed-severity fire over 43-48% of the land area, with high-severity fire over 31-39% and low-severity fire over just 13-26%. Historical forests were generally dense with abundant large trees, but numerically dominated by smaller pines and oaks. Smaller trees, understory seedlings, saplings and shrubs created abundant ladder fuels. The high-severity fire rotation was 281 years in the northern and 354 years in the southern Sierra, which contributed to high levels of heterogeneity, including abundant areas and large patches (up to 9,400 ha) of early successional forest and montane chaparral, as well as old-growth forest over large land areas. The author concludes that "[p]roposals to reduce fuels and fire severity would actually reduce, not restore, historical forest heterogeneity important to wildlife and resiliency."[4]

Beaty and Taylor 2001: On the western slope of the southern Cascades in California, historical 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].)[5]

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[4] Baker, W.L. 2014. Historical forest structure and fire in Sierran mixed-conifer forests reconstructed from General Land Office survey data. Ecosphere 5(7): Article 79.

[5] Beaty, R.M. and A.H. Taylor. 2001. Spatial and temporal variation of fire regimes in a mixed conifer forest landscape, Southern Cascades, USA. Journal of Biogeography 28: 955–966.

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].[6]

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].[7]

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.[8]

Halofsky et al. 2011: In the Klamath-Siskiyou Mountains of northwestern California and southwestern Oregon, a mixed-severity fire regime produces structurally diverse vegetation types with intimately mixed patches of varied age. The close mingling of early- and late-seral communities results in unique vegetation and wildlife responses, including high resilience of plant and wildlife species to mixed-severity fire.[9]

Hanson and Odion 2016: An assessment of US Forest Service forest survey data from 1910 and 1911 for central and southern Sierra Nevada ponderosa pine and mixed-conifer forests indicates that these historical forests had a mixed-severity fire regime, with an average of 26% high-severity fire effects. This study's findings are contrary to those of several other reports that use a very small subset of the available data from the 1910 and 1911 surveys, demonstrating the importance of analyzing data from sufficiently large spatial scales when drawing inferences about historical conditions.[10]

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[6] Bekker, M.F. and A.H. Taylor. 2001. Gradient analysis of fire regimes in montane forests of the southern Cascade Range, Thousand Lakes Wilderness, California, USA. Plant Ecology 155: 15-28.
[7] Bekker, M.F. and A.H. Taylor. 2010. Fire disturbance, forest structure, and stand dynamics in montane forest of the southern Cascades, Thousand Lakes Wilderness, California, USA. Ecoscience 17: 59-72.
[8] Collins, B.M. and S.L. Stephens. 2010. Stand-replacing patches within a mixed severity fire regime: quantitative characterization using recent fires in a long-established natural fire area. Landscape Ecology 25: 927939.
[9] Halofsky, J. E., D.C. Donato, D.E. Hibbs, J.L. Campbell, M. Donaghy Cannon, J.B. Fontaine, J.R. Thompson, R.G. Anthony, B.T. Bormann, L.J. Kayes, B.E. Law, D.L. Peterson, and T.A. Spies. 2011. Mixed-severity fire regimes: lessons and hypotheses from the Klamath-Siskiyou Ecoregion. Ecosphere 2(4): art40.
[10] Hanson, C.T. and D.C. Odion. 2016. Historical fire conditions within the range of the Pacific fishers and spotted owl in the central and southern Sierra Nevada, California, USA. Natural Areas Journal 36: 8-19.

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.[11]

Odion et al. 2014: In the largest and most comprehensive analysis conducted to date 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.[12]

2. High-severity fire creates important habitat critical to numerous species.

High-severity fire creates complex, biodiverse, ecologically important, and unique habitat (often called "snag forest habitat"), which often has higher species richness and diversity than unburned old forest. Plant and animal species in the forest evolved with fire, and many of these species (such as the black-backed woodpecker[13]) depend on wildfires, and particularly high-severity fires, to reproduce and grow. Fire helps to 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 successional forests created by high-severity fire create habitat conditions that

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[11] Nagel, T.A. and A. H. Taylor. 2005. Fire and persistence of montane chaparral in mixed conifer forest landscapes in the northern Sierra Nevada, Lake Tahoe Basin, California,USA. J. Torrey Bot. Soc.132: 442-457.

[12] Odion, D.C., C.T. Hanson, A. Arsenault, W.L. Baker, D.A. DellaSala, R.L. Hutto, W. Klenner, M.A. Moritz, R.L. Sherriff, T.T. Veblen, and M.A. Williams. 2014. Examining historical and current mixed-severity fire regimes in Ponderosa pine and mixed-conifer forests of western North America. Plos One 9(2): e87852. *See also* response and rebuttal: Odion D.C., C.T. Hanson, W.L. Baker, D.A. DellaSala, and M.A. Williams. 2016. Areas of agreement and disagreement regarding ponderosa pine and mixed conifer forest fire regimes: a dialogue with Stevens et al. PLoS ONE 11(5): e0154579; Stevens J.T. et al. 2016. Average stand age from forest inventory plots does not describe historical fire regimes in ponderosa pine and mixed-conifer forests of western North America. PLoS ONE 11(5): e0147688.

[13] Seavy, N.E., R.D. Burnett, and P.J. Taille. 2012. Black-backed woodpecker nest tree preference in the burned forests of the Sierra Nevada, California. Wildlife Society Bulletin 36: 722-728; Tingely, M.W., R.L. Wilkerson, M.L. Bond, C.A. Howell, and R.B. Siegel. 2014. Variation in home-range size of black-backed woodpeckers. The Condor 116: 325-340.

are beneficial to wildlife. Early successional forests created by high-severity fire support some of the highest levels of native biodiversity found in temperate conifer forests.

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.[14]

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.[15]

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].[16]

Cocking et al. 2014: High-intensity fire areas are vitally important to maintain and restore black oaks in mixed-conifer forests.[17]

DellaSala et al. 2014: Complex early seral forests in the Sierra Nevada of California, which are produced by mixed-severity fire including large high severity patches, support diverse plant and wildlife communities that are essential to the region's ecological integrity. Fire suppression and biomass removal after fire reduce structural complexity, diversity, and resilience in the face of climate change.[18]

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-

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[14] Bond, M.L., D.E. Lee, R.B. Siegel, and J.P. Ward, Jr. 2009. Habitat use and selection by California Spotted Owls in a postfire landscape. Journal of Wildlife Management 73: 1116-1124.
[15] Buchalski, M.R., J.B. Fontaine, P.A. Heady III, J.P. Hayes, and W.F. Frick. 2013. Bat response to differing fire severity in mixed-conifer forest, California, USA. PLoS ONE 8: e57884.
[16] Burnett, R.D., P. Taillie, and N. Seavy. 2010. Plumas Lassen Study 2009 Annual Report. U.S. Forest Service, Pacific Southwest Region, Vallejo, CA.
[17] Cocking M.I., J.M. Varner JM, and E.E. Knapp. 2014. Long-term effects of fire severity on oak-conifer dynamics in the southern Cascades. Ecological Applications 24: 94-107.
[18] DellaSala, D., M.L. Bond, C.T. Hanson, R.L. Hutto, and D.C. Odion. 2014. Complex early seral forests of the Sierra Nevada: what are they and how can they be managed for ecological integrity? Natural Areas Journal 34: 310-324.

severity fire re-burn area had over 1,000 seedlings/saplings per hectare of natural conifer regeneration.[19]

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.[20]

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.[21]

Hanson 2013: Pacific fishers use 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.[22]

Hanson 2015: Pacific fisher females in the Sierra Nevada use unlogged higher severity fire areas, including very large high-severity patches. In the McNally fire area at 10 to 11 years postfire, female fishers used the large, intense fire area significantly more than unburned forest, and females were detected at multiple locations >250m into the interior of a very large (>5,000 ha), unlogged higher severity fire patch. The author concludes that these results "suggest a need to revisit current management direction, which emphasizes extensive commercial thinning and postfire logging to reduce fuels and control fire."[23]

Hutto 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*

[19] Donato, D.C., J.B. Fontaine, W.D. Robinson, J.B. Kauffman, and B.E. Law. 2009. Vegetation response to a short interval between high-severity wildfires in a mixed-evergreen forest. Journal of Ecology 97:142-154.
[20] Franklin, A.B., D.R. Anderson, R.J. Gutierrez, and K.P. Burnham. 2000. Climate, habitat quality, and fitness in northern spotted owl populations in northwestern California.Ecological Monographs 70: 539-590.
[21] Hanson, C. T. and M. P. North. 2008. Postfire woodpecker foraging in salvage-logged and unlogged forests of the Sierra Nevada. Condor 110: 777–782.
[22] Hanson, C.T. 2013. Pacific fisher habitat use of a heterogeneous post-fire and unburned landscape in the southern Sierra Nevada, California, USA. The Open Forest Science Journal 6: 24-30.
[23] Hanson, C.T. 2015. Uses of higher severity fire areas by female Pacific fishers on the Kern Plateau, Sierra Nevada, California, USA. Wildlife Society Bulletin 39: 497-502.

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.[24]

Hutto 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.[25]

Hutto et al. 2016: This review highlights that high severity fire was historically common in western conifer forests and is ecologically essential. Many animal and plant species depend on severely burned forests for persistence. The researchers recommend a "more ecologically informed view" of severe forest fire, including changes in management and education to maintain ecologically necessary levels of severe fire and the complex early-seral forest conditions it creates.[26]

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.[27]

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.[28]

Ponisio et al. 2016: A study of plant–pollinator communities in mixed-conifer forest in Yosemite National Park found that pyrodiversity (the diversity of fires within a region) increases the richness of the pollinators, flowering plants, and plant-pollinator interactions, and buffers pollinator communities against the effects of drought-induced floral resource scarcity. The

[24] Hutto, R. L. 1995. Composition of bird communities following stand-replacement fires in Northern Rocky Mountain (U.S.A.) conifer forests. Conservation Biology 9: 1041–1058.
[25] Hutto, R. L. 2008. The ecological importance of severe wildfires: Some like it hot. Ecological Applications 18: 1827–1834.
[26] Hutto, R.L., R.E. Keane, R.L. Sherriff, C.T. Rota, L.A. Eby, and V.A. Saab. 2016. Toward a more ecologically informed view of severe forest fires. Ecosphere 7(2):e01255.
[27] Lee, D.E. and M.L. Bond. 2015. Occupancy of California spotted owl sites following a large fire in the Sierra Nevada, California. The Condor 117: 228-236.
[28] Malison, R.L. and C.V. Baxter. 2010. The fire pulse: wildfire stimulates flux of aquatic prey to terrestrial habitats driving increases in riparian consumers. Canadian Journal of Fisheries and Aquatic Sciences 67: 570-579.

authors conclude that lower fire diversity is likely to negatively affect the richness of plant–pollinator communities across large spatial scales. [29]

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.[30]

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.[31]

Siegel et al. 2012: 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.[32]

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.[33]

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[29] Ponisio, L.C., K. Wilken, L.M. Gonigle, K. Kulhanek, L. Cook, R. Thorp, T. Griswold, and C. Kremen. 2016. Pyrodiversity begets plant-pollinator community diversity. Global Change Biology 22: 1794-1808.
[30] Raphael, M.G., M.L. Morrison, and M.P. Yoder-Williams. 1987. Breeding bird populations during twenty-five years of postfire succession in the Sierra Nevada. The Condor 89: 614-626.
[31] Sestrich, C.M., T.E. McMahon, and M.K. Young. 2011. Influence of fire on native and nonnative salmonid populations and habitat in a western Montana basin. Transactions of the American Fisheries Society 140: 136-146.
[32] Siegel, R.B., M.W. Tingley, and R.L. Wilkerson. 2012. Black-backed Woodpecker MIS surveys on Sierra Nevada national forests: 2011 Annual Report. A report in fulfillment of U.S. Forest Service Agreement No. 08-CS-11052005-201, Modification #4; U.S. Forest Service Pacific Southwest Region, Vallejo, CA.
[33] Swanson, M.E., J.F. Franklin, R.L. Beschta, C.M. Crisafulli, D.A. DellaSala, R.L. Hutto, D. Lindenmayer, and F.J. Swanson. 2010. The forgotten stage of forest succession: early-successional ecosystems on forest sites. Frontiers Ecology & Environment 9: 117-125.

B. California's forests have a deficit of fire, including a deficit of high-severity fire, compared with historical conditions.

Studies indicate that California's forests are experiencing a significant fire deficit compared with pre-settlement conditions, meaning that there is much less fire on the landscape than there was historically (Mouillet and Field 2005, Stephens et al. 2007, Marlon et al. 2012, Odion et al. 2014, Parks et al. 2015).[34] A recent analysis by Parks et al (2015) reported that California forests, including Sierra Nevada and southern Cascades forests, experienced a significant fire deficit during the recent 1984-2012 study period, attributed to fire suppression activities.[35] According to Stephens et al. (2007), prior to 1800, an estimated 18 to 47 times more area burned each year in California, including 20 to 53 times more forest area, than has burned annually during recent decades: "skies were likely smoky much of the summer and fall." This study estimated that 1.8 million to 4.8 million hectares burned each year in California prior to 1800, of which 0.5 million to 1.2 million hectares were forest, compared to just 102,000 hectares burned each year between 1950-1999, of which 23,000 hectares were forest. Based on this extreme fire deficit, Stephens et al. (2007) recommend "increasing the spatial extent of fire in California [as] an important management objective." Odion et al. (2014) similarly found evidence that there is currently much less high-severity fire in California's mixed-conifer and ponderosa pine forests than compared with historical levels.

C. Scientific studies are finding no significant trends in wildfire activity: California forests are not experiencing an increase in fire severity or burned area.

Scientific evidence does not indicate that wildfire activity is at unnatural levels in California's forests and therefore must be reduced. Notably, the majority of studies that have analyzed recent trends in fire severity, area burned, and fire frequency in California forests have found no significant trends in these metrics.

Eleven studies have analyzed recent trends in fire severity in California's forests in terms of proportion, area, and/or patch size. Nine of eleven studies found no significant trend in fire

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[34] Mouillot, F. and C. Field. 2005. Fire history and the global carbon budget: a 1º x 1º fire history reconstruction for the 20th century. Global Change Biology 11: 398-420; Stephens, S.L., R.E. Martin, and N.E. Clinton. 2007. Prehistoric fire area and emissions from California's forests, woodlands, shrublands and grasslands. Forest Ecology and Management 251: 205-216; Marlon, J.R., Bartlein, P.J., Gavin, D.G., Long, C.J., Anderson, R.S., Briles, C.E., Brown, K.J., Colombaroli, D., Hallett, D.J., Power, M.J., Scharf, E.A., and M.K. Walsh. 2012. Long-term perspective on wildfires in the western USA. PNAS 109: E535–E543; Odion, D.C. et al. 2014; Parks, S.A., C. Miller, M-A Parisien, L.M. Holsinger, S.Z. Dobrowski, and J. Abatzoglou. 2015. Wildland fire deficit and surplus in the western United States, 1984-2012. Ecosphere 6: Article 275.

[35] Parks, S.A. et al. 2015.

severity, including: Baker 2015 (California dry pine and mixed conifer forests), 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. 2012 (four Northwest CA forests), Odion et al. 2014 (eastern and western Sierra Nevada, eastern Cascades), Picotte et al. 2016 (California forest and woodland), and Schwind 2008 (California forests).[36] The two studies that report an increasing trend in fire severity—Miller et al. 2009 and Miller and Safford 2012 (Sierra Nevada, southern Cascades)[37]—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,

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[36] Baker, W.L. 2015. Are high-severity fires burning at much higher rates recently than historically in dry-forest landscapes of the Western USA? PLoS ONE 10(9): e0136147; Collins, B.M., J.D. Miller, A.E. Thode, M. Kelly, J.W. van Wagtendonk, and S.L. Stephens. 2009. Interactions among wildland fires in a long-established Sierra Nevada natural fire area. Ecosystems 12:114–128; Dillon, G.K., et al. 2011. Both topography and climate affected forest and woodland burn severity in two regions of the western US, 1984 to 2006. Ecosphere 2: Article 130; Hanson, C.T., D.C. Odion, D.A. DellaSala, and W.L. Baker. 2009. Overestimation of fire risk in the Northern Spotted Owl Recovery Plan. Conservation Biology 23:1314–1319; Hanson, C.T., and D.C. Odion. 2014. Is fire severity increasing in the Sierra Nevada mountains, California, USA? International Journal of Wildland Fire 23: 1-8; Miller, J.D., C.N. Skinner, H.D. Safford, E.E. Knapp, and C.M. Ramirez. 2012. Trends and causes of severity, size, and number of fires in northwestern California, USA. Ecological Applications 22: 184-203; Odion, D.C. et al. 2014; Picotte, J.J., B. Peterson, G. Meier, and S.M. Howard. 2016. 1984-2010 trends in fire burn severity and area for the coterminous US. International Journal of Wildland Fire 25: 413-420; Schwind, B. 2008. Monitoring trends in burn severity: report on the Pacific Northwest and Pacific Southwest fires (1984 to 2005). USGS.

[37] Miller, J.D., H.D. Safford, M.A. Crimmins, and A.E. Thode. 2009. Quantitative evidence for increasing forest fire severity in the Sierra Nevada and southern Cascade Mountains, California and Nevada, USA. Ecosystems 12:16–32; Miller, J.D. and H. Safford. 2012. Trends in wildfire severity: 1984-2010 in the Sierra Nevada, Modoc Plateau, and southern Cascades, California, USA. Fire Ecology 8(2): 41-57.

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.

Of note, Baker (2015) found that the rate of recent (1984–2012) high-severity fire in dry pine and mixed conifer forests in California is within the range of historical rates, or is too low. There were no significant upward trends from 1984–2012 for area burned and fraction burned at high severity. The author concluded that "[p]rograms to generally reduce fire severity in dry forests are not supported and have significant adverse ecological impacts, including reducing habitat for native species dependent on early-successional burned patches and decreasing landscape heterogeneity that confers resilience to climatic change."

In studies of area burned, Dennison et al. (2014) found no significant increase in annual fire area in the Sierra Nevada/Klamath/Cascades forest ecoregion in California during the 1984-2011 study period, nor a significant trend toward an earlier fire season in this or any other western ecoregion.[38] Similarly, Dillon et al. (2011) detected no trends in annual area burned in the two ecoregions that occur in part in northern California (i.e., Pacific, Inland Northwest) during the 1984-2006 study period.[39]

Studies that have analyzed recent trends in the number of fires in California's forests have reported conflicting results. Two studies found no trend in the number of fires: Schwind (2008) and Syphard et al. (2007).[40] Westerling et al. (2006) averaged data across forested regions in the western United States between 1970 and 2003 and reported that a marked shift occurred during the mid-1980s toward a higher frequency of large fires in the western US, although trends since the mid-1980s were less clear.[41]

D. The most long-unburned forests are not burning at higher fire severity.

Studies empirically investigating the assumption that the most long-unburned 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-

[38] Dennison, P.E., Brewer, S.C., Arnold, J.D., and M.A. Moritz. 2014. Large wildfire trends in the western United States, 1984-2011. Geophysical Research Letters 41: 2928–2933.
[39] Dillon, G.K., et al. 2011.
[40] Schwind, B. 2008; Syphard, A.D., V.C. Radeloff, J.E. Keeley, T.J. Hawbaker, M.K. Clayton, S.I. Stewart, and R.B. Hammer. 2007. Human influence on California fire regimes. Ecological Applications 17(5): 1388-1402.
[41] Westerling A.L., H.G. Hidalgo, D.R. Cayan, T.W. Swetnam. 2006. Warming and earlier spring increase western US forest wildfire activity. Science 313: 940–43.

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. 2012, and van Wagtendonk et al. 2012.[42]

E. The projected impacts of climate change on wildfire activity in California are uncertain.

While climate change will almost certainly alter fire activity in many California ecosystems, scientific research does not indicate that climate change will increase fire severity nor necessarily increase fire amount in California forests. As described above, the majority of studies that have analyzed recent wildfire trends in California forests have found no significant trends in fire activity. Studies that project trends in fire activity under climate change scenarios indicate that fire severity in California forests is likely to stay the same or decrease, and projection studies show no consensus on how climate change is likely to affect future fire probability or area burned in California forests, as detailed below.

Notably, a recent study by Parks et al. (2016) projected that most areas of the western US, including California's forested areas, will experience decreases or no change in fire severity by mid-century (2040-2069) under the highest-emission RCP 8.5 scenario used in global climate models.[43] Three studies that have projected changes in the probability of burning or the probability of a large fire occurring show no consensus, with projections for no change,

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[42] Odion, D.C., E.J. Frost, J.R. Strittholt, H. Jiang, D.A. DellaSala, and M.A. Moritz. 2004. Patterns of fire severity and forest conditions in the Klamath Mountains, northwestern California. Conservation Biology 18: 927-936; Odion, D.C., and C.T. Hanson. 2006. Fire severity in conifer forests of the Sierra Nevada, California. Ecosystems 9: 1177-1189; Odion, D.C., and C.T. Hanson. 2008. Fire severity in the Sierra Nevada revisited: conclusions robust to further analysis. Ecosystems 11: 12-15; Odion, D. C., M. A. Moritz, and D. A. DellaSala. 2010. Alternative community states maintained by fire in the Klamath Mountains, USA. Journal of Ecology; Miller, J.D., C.N. Skinner, H.D. Safford, E.E. Knapp, and C.M. Ramirez. 2012. Trends and causes of severity, size, and number of fires in northwestern California, USA. Ecological Applications 22:184-203; van Wagtendonk, J.W., K.A. van Wagtendonk, and A.E. Thode. 2012. Factors associated with the severity of intersecting fires in Yosemite National Park, California, USA. Fire Ecology 8: 11-32.

[43] Parks, S.A., C. Miller, J.T. Abatzoglou, L.M. Holsinger, M-A. Parisien, and S. Dobrowski. 2016. How will climate change affect wildland fire severity in the western US? Environmental Research Letters 11: 035002.

increases, or decreases in fire varying by region: Krawchuk and Moritz 2012, Moritz et al. 2012, and Westerling and Bryant 2008.[44]

Studies that have projected trends in area burned in California forests under climate change show no consensus. Four studies project both increases and decreases in total area burned depending on the region: Lenihan et al. 2003, Lenihan et al. 2008, Krawchuk et al. 2009, and Spracklen et al. 2009.[45] 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; Westerling et al. 2011).[46] The projected increases in Westerling et al. (2011) are relatively modest, with median increases in area burned of 21% and 23% by 2050, and 20% and 44% by 2085, relative to 1961-1990 under lower (B1) and higher (A2) emissions scenarios respectively. Given that the average annual burned area in California in the past several decades was many times lower than the burned area historically, these projected increases in fire activity in California would likely remain well within the historical range of the past several centuries.

As reviewed in Whitlock et al. (2015), wildfire projection studies involve numerous uncertainties, including high uncertainty around future changes in precipitation timing and amount in the western US, which create significant differences among study results. According to Whitlock et al. (2015), observed and projected changes in wildfire activity must be understood

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[44] Krawchuk, M. A., and M. A. Moritz. 2012. Fire and Climate Change in California. California Energy Commission. Publication number: CEC-500-2012-026; Moritz, M., Parisien, M., Batllori, E., Krawchuk. M., Van Dorn, J., Ganz, D., & Hayhoe, K. 2012. Climate change and disruptions to global fire activity. Ecosphere 3 (6): 1-22; Westerling, A. and B. Bryant. 2008. Climate change and wildfire in California. Climate Change 87: S231– S249.

[45] Lenihan, J.M., Drapek, R.J., Bachelet, D., and Neilson, R.P. 2003. Climate change effects on vegetation distribution, carbon, and fire in California. Ecological Applications 13: 1667-1681; Lenihan, J.M., D. Bachelet, R.P. Neilson, and R. Drapek. 2008. Response of vegetation distribution, ecosystem productivity, and fire to climate change scenarios for California. Climate Change 87(Suppl. 1): S215-S230; Krawchuk, M.A., M.A. Moritz, M. Parisien, J. Van Dorn, K. Hayhoe. 2009. Global pyrogeography: the current and future distribution of wildfire. PloS ONE 4: e5102; Spracklen, D.V., L.J. Mickley, J.A. Logan, R.C. Hudman, R. Yevich, M.D. Flannigan, A.L. Westerling. 2009. Impacts of climate change from 2000 to 2050 on wildfire activity and carbonaceous aerosol concentrations in the western United States. Journal of Geophysical Research 114: D20301.

[46] McKenzie, D., Z. Gedalof, D.L. Peterson, and P. Mote. 2004. Climatic change, wildfire, and conservation. Conservation Biology 18: 890-902; Fried, J. S., M. S. Torn, and E. Mills. 2004. The impact of climate change on wildfire severity: A regional forecast for northern California. Climatic Change 64 (1–2):169–191; Westerling, A.L., B. P. Bryant, H.K. Preisler, T.P. Holmes, H.G. Hidalgo, T. Das. And S.R. Shrestha. 2011. Climate change and growth scenarios for California wildfire. Climatic Change 109 (Suppl 1): S445-S463.

in terms of (1) fire's ecological benefits, (2) the current fire deficit in most forested regions of North America, and (3) a sufficiently long baseline to capture the historical range of fire variability within the particular ecosystem. Detecting and interpreting the significance of climate-driven fire patterns requires information on the magnitude and direction of change in comparison to the long-term fire occurrence within the ecosystem as well as the relative influences of climatic and non-climatic drivers that affect fire activity (i.e., invasion of nonnative plants, introduction of nonnative grazers, land-use change, and changes in forest management practices).[47]

F. Bark beetle outbreaks have not increased annual area burned or fire severity.

Substantial field-based evidence demonstrates that bark beetle outbreaks have not increased annual area burned in the western United States, beetle outbreaks do not contribute to severe fires, and outbreak areas do not burn more severely when fire does occur (Bond et al. 2009, Black et al. 2013, Harvey et al. 2013, Hart et al. 2015a, Hart et al. 2015b, DellaSala 2016).[48] Furthermore, scientific studies indicate that thinning and logging have no effect during beetle outbreaks of landscape scales, and that post-fire logging can reduce forest resilience to natural disturbances such as fire (DellaSala 2016).[49]

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[47] Whitlock, C., D.A. DellaSala, S. Wolf, and C.T. Hanson. 2015. Climate Change: Uncertainties, Shifting Baselines, and Fire Management. Pp. 265-289 in The Ecological Importance of Mixed Severity Fires: Nature's Phoenix. D.A. DellaSala and C.T. Hanson, eds. Elsevier, Amsterdam, Netherlands.

[48] Bond, M.L., D.E. Lee, C.M. Bradley, and C.T. Hanson. 2009. Influence of pre-fire tree mortality on fire severity in conifer forests of the San Bernardino Mountains, California. The Open Forest Science Journal 2: 41-47; Black, S.H., D. Kulakowski, B.R. Noon, and D.A. DellaSala. 2013. Do bark beetle outbreaks increase wildfire risks in the Central U.S. Rocky Mountains: Implications from Recent Research. Nat. Areas J. 33: 59-65; Harvey, B.J, D.C. Donato, W.H. Romme, and M.G. Turner. 2013. Influence of recent bark beetle outbreak on fire severity and postfire tree regeneration in montane Douglas-fir forests. Ecology 94: 2475–2486; Hart, S.J., T. Schoennagel, T.T. Veblen, and T.B. Chapman. 2015a. Area burned in the western United States is unaffected by recent mountain pine beetle outbreaks. PNAS 112: 4375-4380; Hart, S.J., T.T. Veblen, N. Mietkiewicz, and D. Kulakowski. 2015b. Negative feedbacks on bark beetle outbreaks: widespread and severe spruce beetle infestation restricts subsequent infestation. PLoS ONE 10(5): e0127975; DellaSala, D.A. 2016. Do mountain pine beetle outbreaks increase the risk of high-severity fires in western forests? A summary of recent field studies. Geos Institute.

[49] DellaSala, D.A. 2016.

G. Trees killed by drought and beetles do not increase fire intensity or extent.

The DEIR refers to the Governor's Proclamation of a State of Emergency on Tree Mortality, which addresses drought and beetle-related tree mortality in the state, as evidence that California's forests are in a "perilous condition" and "require accelerated management." DEIR at 1-11. While the governor's declaration identifies the potential health and safety issues related to dead and dying trees directly adjacent to (i.e. within falling distance of) houses, roads, and infrastructure, this does not indicate any ecological or public safety need for forest management (i.e., logging) of forests in general. Specifically, dead trees do not pose an increased fire risk to wildland-urban interface ("WUI") communities, as is made clear in the scientific literature and recent summaries of the state of the science on this issue (Hart et al. 2015a, DellaSala 2016, Hanson et al. 2016).[50] Furthermore, ecologically healthy forests and native wildlife populations depend upon abundant snags, and California's forests still have a deficit of snags (Hanson et al. 2016).

H. Vegetation management within the defensible space immediately surrounding homes effectively protects homes from wildland fire.

Vegetation management within the defensible space in the 40 meters [about 131 feet] surrounding individual homes effectively protects homes from wildland fire, even intense fire. However, forest management beyond the defensible space is not effectively protecting homes, and is unnecessarily putting firefighters at risk by focusing on remote wildlands.

Cohen 2000: The home and its surrounding 40 meters determine home ignitability.[51]

Cohen and Stratton 2008: The vast majority of homes burned in wildland fires are burned by slow-moving, low-intensity fire, and defensible space within 100-200 feet of individual homes [reducing brush and small trees, and limbing up larger trees, while also reducing the combustibility of the home itself] effectively protects homes from fires, even when they are more intense.[52]

Gibbons et al. 2012: Defensible space work within 40 meters [about 131 feet] of individual homes effectively protects homes from wildland fire, even intense fire. The authors concluded that the current management practice of thinning broad zones in wildland areas

[50] Hanson, C.T., D.A. DellaSala, M. Bond, G. Wuerthner, D. Odion, and D. Lee. 2016. Scientists Letter to Governor Brown on the Governor's Proclamation of a State of Emergency on Tree Mortality. 4 February 2016.
[51] Cohen, J.D. 2000. Preventing disaster: home ignitability in the Wildland-Urban Interface. Journal of Forestry 98: 15-21.
[52] Cohen, J.D., and R.D. Stratton. 2008. Home destruction examination: Grass Valley Fire. U.S. Forest Service Technical Paper R5-TP-026b.

hundreds, or thousands, of meters away from homes is ineffective and diverts resources away from actual home protection, which must be focused immediately adjacent to individual structures in order to protect them.[53]

Scott et al. 2016: This study investigated the degree to which fuel management practices on USFS land can reduce wildfire exposure to human communities on a landscape encompassing the Sierra National Forest in California. The study found that treating defensible space near homes was by far the most efficient at reducing WUI exposure, including exposure transmitted from USFS lands. Treating USFS land did little to reduce overall WUI exposure across the landscape.[54]

VI. Key Objectives of the VTP Are Not Based On Substantial Evidence

The DEIR fails to present substantial evidence to support key objectives of the VTP. The VTP's first objective to "[m]odify wildland fire behavior to help reduce losses to life, property, and natural resources" is the "governing goal of the Program." DEIR at E-3. This objective is based on the "primary assumption… that vegetation treatments can affect wildland fire behavior through the manipulation of wildland fuels." DEIR at 2-7. However, the DEIR itself acknowledges that this assumption is highly uncertain, thus undermining the basis for the entire program. For example, the DEIR states that "existing modeling literature suggests that relatively large proportions of the landscape needs to be treated to achieve wildfire risk reduction at the landscape scale" but then admits that the VTP will not be treating large portions of the landscape (e.g., "the proposed annual acres of treatment may not affect all the potential landscape fuels," DEIR at 2-7). The DEIR also states that "there is not a direct correlation between implementation of a vegetation treatment project and a proportionate reduction in numbers of fires or acres burned" (DEIR at 4-430) and that the "VTP is not proposed as the solution to California's vegetation management and fire problem" (DEIR at 2-36). Furthermore, the DEIR briefly acknowledges the need for frequent follow-up "maintenance" of areas receiving fuel treatments in order for treatments to remain effective (DEIR at 4-75), but fails to analyze how maintenance will be incorporated into the Program nor the environmental impacts of repeat treatments.

Even more fundamentally, the DEIR fails to provide substantial evidence to support its governing assumption that fuel treatment activities will be effective in reducing wildfire activity. The body of studies on fuel reduction treatments indicates that the potential for fuel

[53] Gibbons, P. et al. 2012. Land management practices associated with house loss in wildfires. PLoS ONE 7: e29212.
[54] Scott, J.H., M.P. Thompson, and J.W. Gilbertson-Day. 2016. Examining alternative fuel management strategies and the relative contribution of National Forest System land to wildfire risk to adjacent homes – A pilot assessment on the Sierra National Forest, California, USA. Forest Ecology and Management 362: 29-37.

treatments to reduce wildfire occurrence is highly uncertain.[55] Research indicates that larger fires are driven by hot, dry, windy weather conditions, with forest fuel conditions playing a relatively unimportant role in determining fire behavior and intensity.[56] Furthermore, research in western US forests indicates that there is a low probability that an area that has received a vegetation treatment will overlap with a moderate or high-severity fire, further limiting the presumed efficacy of the VTP.[57]

The DEIR similarly provides no support for the assumption underlying objective 3 that "decreasing fire size will have a resulting decrease on overall fire suppression costs." DEIR at 2-8. In fact, the DEIR cites a study (Gude et al. 2013) indicating that fire proximity to homes is a significant driver of suppression costs. The DEIR also acknowledges that there is no evidence showing that fuel treatments reduce fire damage in the WUI, defined in the DEIR as the area starting beyond the defensible space to 1.5 miles from a structure. DEIR at 2-8 ("there is a lack of quantifying data to directly relate treatment methods to a reduction in damage and costs relative to the WUI"). As detailed above (Section V.H., *supra*), the best-available science indicates that vegetation management within the defensible space in the 40 meters surrounding individual homes effectively protects homes from wildland fire, while forest management in the WUI beyond the defensible space does not effectively protect homes.

VII. The DEIR Fails to Adequately Disclose, Analyze, Assess the Significance of, and Propose Mitigation for Impacts to Biological Resources Caused by the Program

The DEIR's disclosure, analysis, and mitigation of impacts to biological resources from the implementation of the VTP are cursory, incomplete, and inadequate. Specifically, the DEIR completely fails to disclose, analyze, and assess the significance of several key impacts that would result from the Program; acknowledges but fails to analyze wide-ranging impacts to special-status species, sensitive habitat areas, and migratory corridors; is inconsistent with the best-available science; fails to identify any clear and consistent baseline against which the Program's impacts to biological resources can be evaluated; and improperly defers mitigation to the project level analysis. Due to all of these failures and omissions, the DEIR's discussion of impacts to biological resources fails to satisfy CEQA's fundamental requirements.

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[55] E.D. Reinhardt, et al., *Objectives and considerations for wildland fuel treatment in forested ecosystems of the interior western United States*, 256 FOREST ECOLOGY & MGMT. 1997 (2008).
[56] Id.; see also J.M. Lydersen, M.P. North, and B.M. Collins, *Severity of an uncharacteristically large wildfire, the Rim Fire, in forests with relatively restored fire regimes*, 328 FOREST ECOLOGY & MGMT. 326 (2014); T. Schoennagel, et al., *The interaction of fire, fuels, and climate across Rocky Mountain Forests*, 54 BIOSCIENCE 661 (2004); E.A. Johnson, *Towards a sounder fire ecology*, 1 FRONTIERS IN ECOLOGY & THE ENVT. 271 (2003).
[57] J.J. Rhodes and W.L. Baker, *Fire probability, fuel treatment effectiveness and ecological tradeoffs in western U.S. public forests*, 1 OPEN FOREST SCIENCE JOURNAL 1 (2008).

First, the DEIR completely fails to disclose, analyze, or assess the significance of impacts resulting from the Program's efforts to reduce wildfire activity in California ecosystems, including high-severity fire activity. As discussed in detail above (Part V.A, *supra*), overwhelming scientific evidence demonstrates that California forests are adapted to mixed-severity fire regimes, including significant amounts of high-severity fire that create critical habitat diversity and are necessary for the persistence of numerous animal and plant species. The Program's fundamental goal to reduce wildfire activity threatens California forest ecosystems which are already experiencing a significant fire deficit in comparison to historical conditions (Part V.B, *supra*). Nor does the DEIR adequately acknowledge the detrimental effects on wildlife species and habitat of removing dead trees (whether killed by fire, drought, or beetles) from the forest. The DEIR must acknowledge and analyze the findings of numerous studies, detailed above, that demonstrate that reduction in wildfire activity and fuel reduction activities threaten the health, resilience, and diversity of California ecosystems and species. Instead, the DEIR simply substitutes this required analysis with a conclusory and unsupported statement that high-severity wildfire (a natural component of most California ecosystems) is detrimental to wildlife: "each of the various treatment types proposed in this program come with potential negative direct and/or indirect effects on wildlife, one must weigh these effects against the known effects on wildlife from catastrophic high severity wildfire." DEIR at 4-117. Such unsupported, conclusory statements are not permitted under CEQA. Such statements also represent an impermissible attempt to balance adverse environmental effects against purported project benefits without making the specific findings required by law. "CEQA does not authorize an agency to proceed with a project that will have significant, unmitigated effects on the environment, based simply on a weighing of those effects against the project's benefits, unless the measures necessary to mitigate those effects are truly infeasible." *City of Marina v. Bd. of Trs. of Cal. State Univ.*, 39 Cal. 4th 341, 368-69 (2006); *see also* Pub. Res. Code § 21081(a)(3), (b).

Second, the DEIR fails to adequately analyze the adverse impacts of the VTP's treatment activities on biological resources. The DEIR states that over 300 special status wildlife taxa occur in habitats likely to be treated under the VTP. DEIR at 4-118. The DEIR repeatedly acknowledges that VTP's fuel reduction treatments are likely to have adverse effects on a wide variety of species: "direct effects to special status wildlife taxa due to fuel reduction treatments are inherently adverse and will not vary much between bioregions" and "some potential exists for substantial adverse effects [from fuel reduction treatments]" (DEIR at 4-121); "the potential for substantial adverse effects from prescribed fire are most likely to occur in the conifer woodland, hardwood woodland, herbaceous, and shrub habitat types due to problems with invasive species, impacts to regeneration, burn intensity, canopy removal and burn frequency" (DEIR at 4-128); "in summary, mechanical activities have the potential for significant effects in all lifeforms since there is no comparable natural disturbance to which individual plants or communities have adapted over time, and because of the high level of disturbance to canopy cover and the soil layer" (DEIR at 4-139).

However the DEIR completely fails to discuss and analyze the adverse impacts of the VTP on specific special-status species and sensitive habitats. To serve as an adequate informational document, the DEIR must analyze how the Program will impact special-status species, including California's forest-dependent special-status species such as the state and/or federally listed northern spotted owl, Sierra Nevada red fox, marbled murrelet, American wolverine, Pacific fisher, and the fire-dependent black-backed woodpecker[58] (under consideration for federal listing), and riparian and aquatic special status species such as the Sierra Nevada yellow-legged frog, mountain yellow-legged frog, Yosemite toad, Siskiyou Mountains salamander, and numerous listed salmon and steelhead species. Forest thinning has been found to degrade and eliminate habitat for numerous rare and imperiled wildlife species, and this must be disclosed and analyzed in the DEIR. For example, adverse effects have been found with regard to spotted owls (Gallagher 2010),[59] Pacific fishers (Garner 2013),[60] black-backed woodpeckers (Hutto 2008),[61] and olive-sided flycatchers (Robertson and Hutto 2007).[62] The need for species-specific analysis is affirmed by the DEIR itself which states that effects of the VTP will be species-specific and are thus difficult to generalize. DEIR at 4-116 ("Effects of fuel reduction on wildlife depend on the specific ecological requirements of individual species and thus are difficult to generalize, especially in a treatment area as large and complex as that considered here"). The DEIR must also analyze impacts to sensitive habitat areas, wildlife movement corridors, and consistency with conservation plans.

Third, the DEIR's thresholds of significance for biological resources are impermissibly lenient and sometimes contradictory. Under CEQA Guidelines § 15065(a)(1), a lead agency *must* find that a project will have a significant effect on the environment if the project has the potential to do any of the following:

- Reduce substantially the habitat of a fish or wildlife species;
- Cause a fish or wildlife population to drop below self-sustaining levels;
- Threaten to eliminate a plant or animal community; or

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[58] For example, thinning and post-fire clear-cutting are shown to have detrimental effects on the fire-dependent black-backed woodpecker by reducing post-fire habitat. *See* Odion, D.C. and C.T. Hanson, *Projecting Impacts of Fire Management on a Biodiversity Indicator in the Sierra Nevada and Cascades, USA: The Black-Backed Woodpecker*, 6 THE OPEN FOREST SCIENCE JOURNAL 14 (2013).

[59] Gallagher, C.V. 2010. Spotted owl home range and foraging patterns following fuels-reduction treatments in the northern Sierra Nevada, California. M.S. thesis, Univ. of Calif., Davis.

[60] Garner, J.D. 2013. Selection of disturbed habitat by fishers (*Martes pennanti*) in the Sierra National Forest. M.S. thesis, Humboldt State University.

[61] Hutto, R. L. 2008. The ecological importance of severe wildfires: Some like it hot. Ecological Applications 18: 1827–1834.

[62] Robertson, B.A. and R.L. Hutto. 2007. Is selectively harvested forests and ecological trap for olive-sided flycatchers? The Condor 109: 109-121.

- Reduce substantially the number or restrict the range of an endangered, rare, or threatened species.

The DEIR improperly avoids these standards by imposing thresholds that are impermissibly lenient under CEQA and likely to miss significant impacts. In *Endangered Habitats League, Inc. v County of Orange*, 131 Cal. App. 4th 777, 793 (2005), the court held that the EIR's standard of significance for impacts on biological resources was "impermissibly lenient" because it was narrower than the standards in 14 Cal. Code Regs. §15065(a)(1). The DEIR here makes the same error. For example, the DEIR requires that the "contribution to a substantial long-term reduction in the viability of any native species or subspecies" must occur "at the state level" to be significant. DEIR at 4-115 (emphasis added). Analyzing thresholds at the state level is likely to obscure significant impacts that might happen at smaller geographical scales. The DEIR itself asserts that detecting significant impacts at the bioregional level is virtually impossible: "in order for an effect to be considered significant at the bioregional level, the species in question would have to be impacted enough to meet one of the Significance Criteria stated above. The amount of habitat that would have to be adversely modified to cause a substantial adverse effect has not been scientifically determined for most species and is likely unknowable until the threshold has been crossed and the species is in jeopardy." DEIR at 4-121. The natural conclusion is that detecting impacts at the larger state level is even more infeasible.

The significance standards for biological resources are also contradictory at times. For example, CEQA Guidelines require that adverse effects must be considered and mitigated for "any species identified as a candidate, sensitive, or special-status in local or regional plans, policies, or regulations, or by CDFW or USFWS." DEIR at 4-114. However, the DEIR limits the scope of analysis to consider adverse effects as "significant" only if they would affect taxa that are listed as either threatened or endangered at the federal or state level. DEIR at 4-118.

Fourth, the DEIR fails to identify any clear and consistent baseline against which the Program's impacts to biological resources can be evaluated. The DEIR contains a brief, general discussion of the environmental and regulatory setting for the Program, but it does not contain any of the information about existing physical conditions necessary to evaluate the Program's biological impacts. *See, e.g., Save Our Peninsula Comm. v. Monterey Cty. Bd. of Supervisors*, 87 Cal. App. 4th 99, 119 (2001) ("Without a determination and description of the existing physical conditions on the property at the start of the environmental review process, the EIR cannot provide a meaningful assessment of the environmental impacts of the proposed project.").

VIII. The DEIR Fails to Meet CEQA's Requirements with Regard to the Analysis of Greenhouse Gas ("GHG") Emissions

The DEIR fails to meet CEQA's requirements with regard to the analysis of greenhouse gas ("GHG") emissions. First, it fails to include reasonably foreseeable indirect impacts of vegetation treatment. Second, the DEIR adopts an invalid threshold for significance. Third, the analysis of impacts under GHG "Impact 2" is fatally flawed.

A. The DEIR fails to analyze indirect greenhouse gas impacts from Cal Fire's Vegetation Treatment Program.

The DEIR stops short of the full analysis of impacts required under CEQA because it considers only short-term direct emissions of greenhouse gases ("GHGs"). CEQA requires disclosure and analysis of "direct physical changes in the environment and reasonably foreseeable indirect physical changes which may be caused by the project." CEQA Guidelines § 15064(d). Furthermore, an EIR must take into account both long-term and short term impacts, "giving due consideration to both short-term and long-term effects." CEQA Guidelines § 15126.2; see also Pub. Resources Code §21083; CEQA Guidelines § 15065(a)(2). This DEIR fails to consider either indirect effects or long-term impacts, resulting in a deficient impacts analysis.

Greenhouse gas emissions from bioenergy projects should have been considered as an indirect impact of the project. The DEIR notes that up to 10 percent of biomass from mechanical treatments might be removed to fuel biomass plants.[63] DEIR at 4-65. Yet, the DEIR contains no evaluation of the impact of emissions from that biomass when it is combusted for energy. This is important because combustion of wood for energy instantaneously releases virtually all of the carbon in the wood to the atmosphere as CO_2. Burning wood for energy is typically less efficient, and thus far more carbon-intensive per unit of energy produced, than burning fossil fuels. Measured at the stack, biomass combustion produces significantly more CO_2 per megawatt-hour than fossil fuel combustion; a large biomass-fueled boiler may have an emissions rate far in excess of 3,000 lbs CO_2 per MWh.[64] Smaller-scale facilities using gasification technology are

[63] The EIR provides no analysis, justification, or evidence to support the assumption that 10 percent of biomass from mechanical treatments could be removed to biomass plants. Absent a reasoned explanation and evidentiary support for this figure, Cal Fire's conclusions lack a legally adequate basis.

[64] The Central Power and Lime facility in Florida, for example, is a former coal-fired facility recently permitted to convert to a 70-80 MW biomass-fueled power plant. According to permit application materials, the converted facility would consume the equivalent of 11,381,200 MMBtu of wood fuel per year. *See* Golder Assoc., Air Construction Permit Application: Florida Crushed Stone Company Brooksville South Cement Plant's Steam Electric Generating Plant, Hernando County Table 4-1 (Sept. 2011). Using the default emissions factor of 93.8 kg/MMBtu CO_2 found in 40 C.F.R. Part 98, and conservatively assuming both 8,760 hours per year of operation and electrical output at the maximum 80 MW nameplate capacity, the facility would produce about 3,350 lbs/MWh CO_2. If the plant were to produce only 70 MW of electricity, the CO_2 emissions rate would exceed 3,800 lbs/MWh. If such a facility were dispatched to replace

similarly carbon-intensive; the Cabin Creek bioenergy project recently approved by Placer County would have an emissions rate of more than 3,300 lbs CO_2/MWh.[65] By way of comparison, California's 2012 baseline emissions rate from fossil-fuel electric power generation was 954 lbs CO_2 per MWh.[66] As one recent scientific article noted, "[t]he fact that combustion of biomass generally generates more CO_2 emissions to produce a unit of energy than the combustion of fossil fuels increases the difficulty of achieving the goal of reducing GHG emissions by using woody biomass in the short term."[67] Put more directly, replacing California grid electricity with biomass electricity likely more than *triples* smokestack CO_2 emissions.

Even if net carbon cycle effects are taken into account, emissions from biomass power plants can increase atmospheric CO_2 concentrations for decades to centuries depending on feedstocks, biomass harvest practices, and other factors. Multiple studies have shown that it can take a very long time to discharge the "carbon debt" associated with bioenergy production, even where fossil fuel displacement is assumed, and even where "waste" materials like timber harvest residuals are used for fuel.[68] One study, using realistic assumptions about initially increased and

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one MWh of fossil-fuel fired generation with one MWh of biomass generation, the facility's elevated emissions rate would also result in proportionately higher emissions on a mass basis.

[65] Ascent Environmental, Cabin Creek Biomass Facility Project Draft Environmental Impact Report, App. D (July 27, 2012) (describing 2 MW gasification plant with estimated combustion emissions of 26,526 tonnes CO_2e/yr and generating 17,520 MWh/yr of electricity, resulting in an emissions rate of 3,338 lbs CO2e/MWh).

[66] See Energy and Environment Daily, Clean Power Plan Hub, at http://www.eenews.net/interactive/clean_power_plan/states/california (visited May 18, 2016).

[67] David Neil Bird, et al., *Zero, one, or in between: evaluation of alternative national and entity-level accounting for bioenergy*, 4 GLOBAL CHANGE BIOLOGY BIOENERGY 576, 584 (2012), doi:10.1111/j.1757-1707.2011.01137.x.

[68] *See, e.g.*, Stephen R. Mitchell, et al., *Carbon Debt and Carbon Sequestration Parity in Forest Bioenergy Production*, GLOBAL CHANGE BIOLOGY BIOENERGY (2012) ("Mitchell 2012"), doi: 10.1111/j.1757-1707.2012.01173.x (attached); Ernst-Detlef Schulze, et al., *Large-scale Bioenergy from Additional Harvest of Forest Biomass is Neither Sustainable nor Greenhouse Gas Neutral*, GLOBAL CHANGE BIOLOGY BIOENERGY (2012), doi: 10.1111/j.1757-1707.2012.01169.x at 1-2 (attached); Jon McKechnie, et al., *Forest Bioenergy or Forest Carbon? Assessing Trade-Offs in Greenhouse Gas Mitigation with Wood-Based Fuels*, 45 ENVIRON. SCI. TECHNOL. 789 (2011) (attached); Anna Repo, et al., *Indirect Carbon Dioxide Emissions from Producing Bioenergy from Forest Harvest Residues*, GLOBAL CHANGE BIOLOGY BIOENERGY (2010) ("Repo 2010"), doi: 10.1111/j.1757-1707.2010.01065.x (attached); John Gunn, et al., Manomet Center for Conservation Sciences, Massachusetts Biomass Sustainability and Carbon Policy Study (2010), *available at* https://www.manomet.org/sites/manomet.org/files/Manomet_Biomass_Report_Full_LoRez.pdf (visited May 24, 2016).

subsequently repeated bioenergy harvests of woody biomass, concluded that the resulting atmospheric emissions increase may even be permanent.[69]

Another indirect source of emissions from the project is the loss of forest carbon. The DEIR avoids analysis of forest carbon loss through an impermissible constriction of the timescale of analysis. The DEIR acknowledges that impacts could be considered on multiple timescales from annual to decadal. DEIR at 4-424. It elects, however, to consider only annual emissions from equipment and combustion. This violates CEQA's requirement that long-term impacts be considered as well. In both the short- and long-term, vegetation treatment will remove biomass. The loss of this biomass significantly reduces stored carbon and thus equates to carbon emissions. One recent study concluded, for this and other reasons, that thinning operations tend to remove about three times as much carbon from the forest as would be avoided in wildfire emissions.[70] Another report from Oregon found that thinning operations resulted in a net loss of forest carbon stocks for up to 50 years.[71] Another published study found that even light-touch thinning operations in several Oregon and California forest ecosystems incurred carbon debts lasting longer than 20 years.[72] Other recent studies have shown that intensive harvest of logging residues that otherwise would be left to decompose on site can deplete soil nutrients and retard forest regrowth as well as reduce soil carbon sequestration.[73]

The DEIR also appears to misinterpret the benefits of prescribed burns relative to wildfires when it indicates that prescribed fires reduce greenhouse gas emissions. The EIR states that because the flaming phase is most efficient, it creates minimal emissions, while the smoldering phase causes greater emissions. DEIR at 4-421, 4-379. The DEIR then concludes that because prescribed burns are more efficient, they emit less greenhouse gases. DEIR at 4-421. While this may be true for criteria air pollutants, the exact opposite is true for CO_2 emissions. Combustion efficiency is a measure of how much carbon is released as CO_2 as opposed to other carbon forms; the greatest efficiency is associated with the largest fraction of CO_2. Therefore, the

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[69] Bjart Holtsmark, *The Outcome Is in the Assumptions: Analyzing the Effects on Atmospheric CO_2 Levels of Increased Use of Bioenergy From Forest Biomass*, GLOBAL CHANGE BIOLOGY BIOENERGY (2012), doi: 10.1111/gcbb.12015.
[70] John L. Campbell, et al., *Can fuel-reduction treatments really increase forest carbon storage in the western US by reducing future fire emissions?* FRONT. ECOL. ENV'T (2011), doi:10.1890/110057.
[71] Joshua Clark, et al., *Impacts of Thinning on Carbon Stores in the PNW: A Plot Level Analysis*, Final Report (Ore. State Univ. College of Forestry May 25, 2011).
[72] Tara Hudiburg, et al., *Regional carbon dioxide implications of forest bioenergy production*, 1 NATURE CLIMATE CHANGE 419 (2011), doi:10.1038/NCLIMATE1264.
[73] David L. Achat, et al., *Forest soil carbon is threatened by intensive biomass harvesting*, SCIENTIFIC REPORTS 5:15991 (2015), doi:10.1038/srep15991; D.L. Achat, et al., *Quantifying consequences of removing harvesting residues on forest soils and tree growth – A meta-analysis*, 348 FOREST ECOLOGY & MGMT. 124 (2015).

DEIR is factually incorrect in its assertion that increased combustion efficiency associated with prescribed burning translates to reduced greenhouse gas emissions.

B. The selected threshold for significance of "Impact 1" is irrational and violates CEQA.

In its analysis of GHG "Impact 1" the DEIR compares the annual direct greenhouse gas emissions from vegetation treatment to the CO_2 emissions that might occur if an area the same size as the project burned in a wildfire. This choice of significance threshold is invalid because (1) it weighs environmental effects against the objective of the project; (2) it incorrectly assumes that vegetation treatment of an area equates to prevention of wildfire in that location; and (3) it impermissibly and without justification compares the project's emissions to a hypothetical "wildfire" scenario rather than to a baseline derived from existing environmental conditions.

First, the comparison violates CEQA by using the benefit sought to be achieved as the threshold. "CEQA does not authorize an agency to proceed with a project that will have significant, unmitigated effects on the environment, based simply on a weighing of those effects against the project's benefits, unless the measures necessary to mitigate those effects are truly infeasible." *City of Marina v. Bd. of Trs. of Cal. State Univ.*, 39 Cal. 4th 341, 368-69 (2006). The DEIR acknowledges that prescribed burn, construction-related, and livestock greenhouse gas emissions[74] will occur due to increased forest management activities under the VTP. DEIR at 4-422. But these emissions are compared against the potential emissions from prevented wildfire, the precise objective of the project. DEIR at 2-6. The DEIR's attempt to dismiss the proposed VTP's adverse effects by weighing them against its purported benefits is legally improper absent full and formal compliance with the findings requirements of Public Resources Code section 21081.

Second, the DEIR fails to provide substantial evidence that vegetation treatment actually prevents fire, which is a fundamental assumption inherent in the selected threshold. The DEIR consistently indicates that potential reductions in wildfire size or severity are uncertain and

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[74] We note that methane from enteric fermentation is the primary greenhouse gas emitted by the livestock in question. In order to compare these to other project emissions, the EIR uses an extremely inaccurate value for methane global warming potential ("GWP"). The value used by the EIR is 21 (EIR at 4-420), but this is outdated. The most recent IPCC Fifth Assessment Report assigns a value of 34 to biogenic methane over 100 years and a value of 86 over 20 years. At a minimum an updated 100-year GWP must be adopted. See G. Myhre et al., *Anthropogenic and Natural Radiative Forcing*, in CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS. CONTRIBUTION OF WORKING GROUP I TO THE FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE IPCC Table 8.7 at 714 (Cambridge Univ. Press 2013). Furthermore, we urge Cal Fire to adopt a 20-year GWP as the California Air Resources Board has for its recent greenhouse gas analyses.

unpredictable: "while there is not a direct correlation between implementation of a vegetation treatment plan and proportionate reduction in numbers of fires or acres burned, … it would likely result in some reduction." DEIR at 4-430; *see also* DEIR at 4-423 (cannot predict, but "reasonable to assume"). This is largely because it is impossible to know in advance where fires will occur, and thus impossible to target only the areas likely to burn for treatment.[75] Viewed most optimistically, the data in the DEIR suggest that treatment at best may produce a reduction in burn severity. DEIR at 4-423, 424. Furthermore, the DEIR ignores the body of literature that finds no relation. For instance, a recent study by Syphard et al. (2012) found that Cal Fire's hazard analysis fails as a predictor of wildfire.[76] Price et al. (2015) found no relationship between area burned and previous fire for the Sequoia-Kings Canyon area.[77] Other studies have found that vegetation treatment in remote areas is ineffective.[78] Even if vegetation treatment were positively associated with lower fire severity, there remains extreme uncertainty that vegetation treatment of an area can even influence wildfire behavior in that particular location.

Third, by comparing project emissions to emissions that would occur if a similar area burned in a wildfire, the DEIR relies on an impermissible baseline. CEQA requires that environmental impacts be assessed against existing physical conditions rather than hypothetical or merely legally conceivable scenarios. *See, e.g.*, CEQA Guidelines § 15125(a); *Communities for a Better Env't v. S. Coast Air Quality Mgmt. Dist.*, 48 Cal. 4th 310, 319, 322 (2010); *Save Our Peninsula Comm. v. Monterey Cty. Bd. of Supervisors*, 87 Cal. App. 4th 99 (2001). As discussed above, there is no possible way Cal Fire can carry out vegetation treatments in only the areas that will burn in a wildfire. As one recent study put it, "[a]ny approach to [carbon] accounting that assumes a wildfire burn probability of 100% during the effective life span of a fuel-reduction treatment is almost certain to overestimate the ability of such treatments to reduce pyrogenic emissions on the future landscape."[79] As a result, the DEIR's assessment of GHG

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[75] See generally Campbell 2011, *supra* note 70 at 4 (noting that "[a]mong fire-prone forests of the western US, the combination of wildfire starts and suppression efforts result in current burn probabilities of less that 1%," and reviewing literature finding that only 3% of the area treated is likely to be exposed to fire during an effective treatment lifespan of 20 years).

[76] Syphard, A.D., J.E. Keeley, A.B. Massada, T.J. Brennan, and V.C. Radeloff. 2012. Housing arrangement and location determine the likelihood of housing loss due to wildfire. PLoS ONE 7: e33954 at 4 (doi: 10.1371/journal.pone.0033954).

[77] Price, O.F., J.G. Pausas, N. Govender, M.D. Flannigan, P.M. Fernandes, M.L. Brooks, and R.B. Bird G. 2015. Global patterns in fire leverage: the response of annual area burnt to previous fire. International Journal of Wildland Fire 24(3): 297-306.

[78] Keeley, J.E, H. Safford, C.J. Fotheringham, J. Franklin, and M. Moritz 2009. The 2007 Southern California wildfires: lessons in complexity. Journal of Forestry September: 287-296; Syphard, A.D., J.E. Keeley, and T.J. Brennan. 2011. Comparing fuel breaks across southern California national forests. Forest Ecology and Management 261: 2038-2048.

[79] Campbell 2011, *supra* note 70 at 4.

emissions rests on an inherently misleading and legally impermissible baseline and is also unsupported by substantial evidence.

Finally, it should be noted that the annual predicted volume of emissions from the proposed VTP would be significant based on objective measures. The DEIR estimates that the project would result in 298,745 metric tons of CO_2e each year. DEIR at 4-427. This is equivalent to 62,894 passenger cars or the electricity use in 41,098 homes[80] – not an insignificant source of emissions. For comparison, the South Coast Air Quality Management District has established a GHG threshold of 10,000 MT CO_2e per year.[81] The Bay Area Air Quality Management District established thresholds of 10,000 MT CO_2e per year for stationary sources and 1,100 MT CO_2e per year for non-stationary sources,[82] although these thresholds are currently not in place due to pending review at the California Supreme Court.[83] The DEIR also makes the mistake of minimizing GHG impacts by comparing the project's emissions to national and state inventories. This is not a valid basis of comparison. As the California Supreme Court recently noted, the global nature of climate change means that any one project is unlikely to appear significant, but rather the question is one of incremental effects that are cumulatively significant. *Center for Biological Diversity v. Dept. Fish and Wildlife*, 62 Cal. 4th 204, 219 (2015).

C. Analysis under GHG "Impact 2" is confusing and unsupported by substantial evidence.

The DEIR's GHG "Impact 2" titled "Impacts of climate change on VTP projects: increase in vulnerability of lands in Cal Fire's responsibility area" is confusing and appears to be attempting several different analyses at once. To the best we can discern, the DEIR is claiming that climate change will increase the incidence of wildfire, and vegetation treatment will mitigate the purported climate-related fire hazard. But then the same impact analysis also seems to consider whether the VTP complies with state climate goals. Both portions of the analysis are invalid and inadequate under CEQA. Furthermore, this confusing juxtaposition of analyses violates CEQA's requirement that information be clearly presented in order to adequately inform the reader. Kostka & Zischke, Practice Under the California Environmental Quality Act § 11.20 (CEB 2016 supp.).

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[80] Converted using EPA's Greenhouse Gas Equivalencies Calculator, available at https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

[81] See http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2.

[82] See http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines_May%202011_5_3_11.ashx.

[83] See http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines_May%202011_5_3_11.ashx.

1. The DEIR fails to provide substantial evidence for increased wildfire with climate change.

The DEIR purports to analyze whether the VTP will increase vulnerability to climate-induced wildfire. In so doing, it focuses on the assumption that climate change will increase wildfire without providing substantial evidence for that assertion. First, as detailed above (Part V.E., *supra*), the evidence is weak to non-existent that climate change increases fire hazard. Second, a number of the studies cited in the DEIR related to climate impacts on wildfire are inapposite. For instance, the DEIR cites to Randerson et al. (2006) for the proposition that frequency and intensity of wildland fires may result from altered weather, precipitation and temperatures. DEIR at 4-431. But Randerson et al. did not assess climate impacts on wildfire; instead, the study examined the impact of boreal fire on climate change at high northern latitudes. The DEIR implies that climate impacts somehow relate to increased exposure of people and homes to wildfire at the urban interface areas. *Id.* But the study by Syphard et al. (2007) that is cited for this proposition actually states that "while climate change may have played some role in our observed change in area burned, we cannot extend those results to our analysis because we included fires of all sizes under multiple land ownership classes, and historical fire patterns in the lower elevations do not correspond to patterns [in other studies]."[84] The analysis by Syphard et al. in fact provided an insightful examination of how human activity at the urban interface can increase fire risk and does not address climate change. In short, the DEIR has ignored a large body of data regarding climate change impacts on wildfire and has failed to provide substantial evidence for a number of its assertions related to climate change impacts.

2. The DEIR fails to adequately consider potential conflict with State GHG goals.

As noted in the DEIR, one of the significance criteria for greenhouse gases under Appendix G of the CEQA Guidelines is whether the project would "conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases." Yet, the DEIR ignores the potential conflict between losses of forest carbon from vegetation treatment and state climate goals, asserting without analysis that the VTP is necessary and sufficient to protect forest carbon goals.

Increased removals of carbon from forests and increased operational CO_2 emissions over the next 10 years will likely conflict with science-driven greenhouse gas reduction goals established in the 2008 Scoping Plan, the 2014 Scoping Plan update, Executive Order B-30-15,

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[84] Syphard, A.D.et al. 2007. Human Influence on California Fire Regimes. Ecological Applications 17: 1388-1402 at 1399.

and Executive Order S-3-05.[85] As discussed in detail above, the removal of excess biomass will result in a net loss of forest carbon and the use of forest materials for bioenergy generation can increase atmospheric CO_2 concentrations for a period of decades to centuries depending on the feedstocks involved. The DEIR fails to address whether foreseeable increases in CO_2 emissions as a result of VTP over the next several decades conflict with science and state policy requiring CO_2 emissions to decrease sharply over that same period. *See Center for Biological Diversity v. California Dept. of Fish & Wildlife*, 62 Cal. 4th 204, 223 & n.6.

The DEIR must compare how this project's impacts both in the form of direct GHG emissions and in the form of lost carbon storage relate to the deep carbon reductions that climate science as reflected in state policy indicates are necessary. In particular, the 2014 Scoping Plan Update states that "California forests must be managed to ensure that they provide net carbon storage even in the face of increased threats from wildfire, pests, disease, and conversion pressures." Scoping Plan Update at 72. Furthermore, Executive Order S-3-05 set a statewide greenhouse gas emissions reduction target of 1990 levels by 2020, and Executive Order B-30-15 set the greenhouse gas target of 40% below 1990 levels by 2030. And while none of these referenced plans set a specific numerical target for forest carbon, removals of carbon from forests and resulting CO_2 emissions need to be evaluated in light of these targets and cannot be ignored.

The DEIR asserts that vegetation treatment has been implemented in part under grants made possible in part by ARB's cap-and-trade program to mitigate impacts of climate change and reduce risks of catastrophic wildfire. But as noted above, the DEIR has ignored evidence that such treatment is ineffective for protecting forest carbon stores. Thus, the DEIR has not adequately analyzed potential conflict with state goals to reduce greenhouse gas emissions.

IX. Conclusion

In sum, the DEIR fails to comply with CEQA and the CEQA Guidelines. Cal Fire cannot approve the VTP on the basis of this DEIR. Rather, Cal Fire must revise both the DEIR and the VTP to comply with the requirements of law and to reflect the physical and ecological realities of California's forests.

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[85] *See* CAL. AIR RES. BD., FIRST UPDATE TO THE CLIMATE CHANGE SCOPING PLAN: BUILDING ON THE FRAMEWORK 33-34 (2014), *available at* http://www.arb.ca.gov/cc/scopingplan/document/updatedscopingplan2013.htm (visited May 20, 2016); CAL. AIR RES. BD., CLIMATE CHANGE SCOPING PLAN: A FRAMEWORK FOR CHANGE 117-21 (December 2008), *available at* http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm (visited May 20, 2016).

Sincerely,

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Attachments: References Cited (uploaded in PDF format)

References Cited (all references uploaded in pdf format)

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