KLAMATH
FOREST ALLIANCE

March 1, 2023

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RE: Antelope and Tennant Fire Recovery Environmental Analysis

Dear Supervisor Smith and Project Lead Bousfield,

Please accept these comments on the Antelope Tennant Project Environmental Analysis on behalf of the Klamath Forest Alliance (KFA) as an addendum to those previously submitted on February 21, 2023. KFA and our allies have a long-term interest in the Medicine Lake Highlands and the surrounding forests. This area is one of the most culturally significant and geologically unique places in the country.

The Antelope and Tennant Project proposes multiple treatments including: 11,701 acres of "salvage" logging; 4,667 acres of "sanitation" and; 1,477 acres of hazard tree logging, all with ground-based heavy equipment. Approximately nine miles of existing temporary roads and eight miles of new temporary roads are proposed and an undisclosed number of log landings.

NEPA

Overall, this EA suffers from a serious lack of the necessary information that would allow the public or the agency to understand the impacts of this project – and for the agency to make an adequately informed decision. This analysis is extremely sparse compared to typical analyses for comparable large-scale projects. The lack of transparency and outright omission of important information about the project does not bode well for meaningful, well-informed public participation or decision making.

Please note that NEPA mandates a particular process but not necessarily a particular result. Note, Inland Empire Public Lands Council v. USFS, 88 F.3d 754, 758 (9th Cir. 1996). This process must proceed without undue bias from the action agency and ultimate decision maker. The Council of Environmental Quality (CEQ) regulations warn that **a NEPA document may not be used to justify a decision already made**. 40 CFR §1502.2(g).

"NEPA procedures must ensure that environmental information is available to public officials **and citizens before decisions are made and before actions are taken."** 40 CFR 1500.1(b). NEPA was enacted to ensure that important environmental effects "will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast." Robertson v. Methow Valley Citizens, 490 US 332, 348, 109 S.Ct. 1835. "NEPA requires consideration of the potential impact of an action before the action takes place." Tenakee Springs v. Clough, 915 F.2d 1308, 1313.

In preparing an EA, the agency must take a "hard look" at the consequences of the proposed action. *Envtl. Prot. Info. Ctr. v. United States Forest Serv.*, 451 F.3d 1005, 1009 (9th Cir. 2006). If the agency determines that an EIS is not necessary, it must provide a "**convincing statement of reasons to explain why a project's impacts are insignificant**." *Id.* (quoting *Nat'l Parks & Conservation Ass'n v. Babbitt*, 241 F.3d 722, 730 (9th Cir. 2001)). This statement must include information that is "sufficient to establish the reasonableness of the decision," *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1215 (9th Cir. 2008) (quoting *Found. for N. Am. Wild Sheep*, 681 F.2d at 1178 n. 29 (1982)), and be backed up by evidence with "scientific integrity," 40 C.F.R. § 1502.23 (2020). "General statements about 'possible effects' and 'some risk'" do not meet this standard. *Te-Moak Tribe of W. Shoshone of Nev. v. U.S. Dept. of the Interior*, 608 F.3d 592, 603 (9th Cir 2010) (quoting *Neighbors of Cuddy Mountain v. U.S. Forest Serv.*, 137 F.3d 1372, 1380 (9th Cir.1998)).

Courts developed the "hard look" requirement based on the statutory language of NEPA and not the implementing regulations, *see Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989) ("The sweeping policy goals announced in § 101 of NEPA . . . require that agencies **take a "'hard look'** at environmental consequences"). The language was never included in either the 1978 CEQ regulations or the revised 2020 regulations. Therfore, the changes in the regulations do not affect what constitutes a hard look, and the Forest Service must meet, yet fails, the "hard look" requirement, for nearly every resource in the Antelope Tennant NEPA analysis.

WILDLIFE

The EA states, "*All federally listed species that may be impacted by the Project are being considered in Project level Biological Assessment/Evaluations. At the time of this document, survey and analysis for the biological evaluations and biological assessments is ongoing within the respective analysis area for each species to be considered.*"

The Biological Assessment and Evaluation for wildlife are essential to understanding the projects impacts to surviving wildlife and habitat. Without the site-specific analysis in these documents the public is not able to provide the agency with the best-informed input. This is contrary to the intent and purpose of NEPA.

Northern Spotted Owl (NSO)

Despite not having any place-based information in the EA, we make our best attempt to provide Forest Service staff with pertinent knowledge that should be considered and analyzed in an EA and Biological Assessment.

Project design features are not a substitute for evaluating impacts to an endangered (warranted but precluded) species. It is not adequate to state that "current NSO habitat suitability would be determined prior to implementation". The public and decision maker must know prior to public comment and a decision how the agency is determining "suitable" habitat, where it is located and what is being proposed.

The best available scientific data confirms that spotted owls use unlogged, burned snag forest habitat and that it functions as foraging habitat. It has been shown that spotted owls will not use post-fire logged habitat. The EA indicates that Post Fire Foraging habitat would be affected by project treatments.

The following research is applicable and should be incorporated in the analysis of impacts to habitat, as it may help the agency to define suitable habitat and to revise activities to prevent taking suitable habitat.

> Raphael et al. 2013[1]: a coarse-scale simulation of forest succession, wildfire effects, and thinning treatments on spotted owl habitat in Oregon and Washington projected over a 100-year time series which found active "fuel reduction" was anticipated to cause substantial short-term (simulation years 0-30) owl population declines.

[1] Raphael, Martin G.; Hessburg, Paul; Kennedy, Rebecca; Lehmkuhl, John; Marcot, Bruce G.; Scheller, Robert; Singleton, Peter; and Spies, Thomas, Assessing the Compatibility of Fuel Treatments, Wildfire Risk, and Conservation of Northern Spotted Owl Habitats and Populations in the Eastern Cascades: A Multi-scale Analysis, (2013). JFSP Research Project Reports. 31.

Odion et al. 2014[2]: tested whether the forest thinning recommendations in unburned owl habitat constituted a short-term impact to avoid the longer-term effect of high-severity fires as required in the spotted owl recovery plan. Rotations of severe fire in spotted owl territories were 362 and 913 years for the Klamath and dry Cascades provinces, respectively—more than adequate to sustain old- growth forests in fire-dominated regions. They projected that over a 40-year period, thinning would remove 3-6 times more-dense, late-successional forests than it presumably "saved" from high-severity fire. Even if rates of high-severity fire increased under climate change, the recovery plan requirement that the long-term benefits of commercial thinning clearly outweigh adverse short-term impacts was summarily rejected. The researchers also concluded that exclusion of high-severity fire may not benefit spotted owls in areas where owls evolved with reoccurring fires, due to owl foraging preferences.

Lee 2018[3]: found that wildfires of mixed severity had mostly positive effects on owl recruitment, owl reproduction, and owl foraging in low- and moderate-severity burns with the inclusion of high-severity patches. Generally, where owls abandoned nesting territories there was clear evidence that unoccupied sites were associated with logging rather than wildfires. Despite these findings, wildfire is routinely considered a primary cause of habitat loss in planning recovery actions, even though fire effects are in dispute.

Hanson, Bond, and Lee 2018[4]: Owls preferentially select high-severity fire areas, characterized by high levels of snags and native shrubs, for foraging in forests that were not logged after fire, suggesting that removal of this foraging habitat might impact occupancy. The authors assessed the effect of post-fire logging and high-severity fire on occupancy in eight large fire areas, within spotted owl sites with two different levels of high-severity fire effects. They found a significant adverse effect of such logging and no effect of high-severity fire alone. These results indicate it is post-fire logging, not large fires themselves, that poses a conservation threat to this imperiled species.

Hanson, Lee, and Bond 2021[5]: A literature review of 13 published papers across all subspecies of spotted owl determined that spotted owl populations have been declining in managed forests that were largely unaffected by recent wildfires while remaining stable in unmanaged forests that

[2] Odion et al., Effects of Fire and Commercial Thinning on Future Habitat of the Northern Spotted Owl, The Open Ecology Journal, 2014, 7, 37-51.
[3] Lee, D.E., Spotted Owls and forest fire: a systematic review and meta-analysis of the evidence. Ecosphere 9 (7), (2018) 22.
[4] Hanson CT, Bond ML, Lee DE (2018) Effects of post-fire logging on California spotted owl occupancy. Nature Conservation 24: 93–105.
[5] Hanson, C.T., Lee, D.E., Bond, M.L. Disentangling Post-Fire Logging and High-Severity Fire Effects for Spotted Owls. Birds (2021) 2, 147–157.

experienced large fires. Despite this, it remains a commonly held belief that large fires are a primary threat to spotted owl species persistence. Seemingly minor amounts of post-fire logging (as little as 5%) significantly reduce spotted owl occupancy. Authors recommend avoidance of all post-fire logging activities (including roadside work as proposed here) within 1.25 miles of site centers.

Hanson 2021[6]: found that pre-fire snag density was not correlated with burn severity. More intensive forest management was correlated to higher fire severity. Results suggest the fuel reduction approach is not justified and provide indirect evidence that such management represents a threat to the spotted owl.

Hanson and Chi 2021[7]: Natural regeneration of conifer trees after fire was abundant, including in the interior of the largest high-intensity fire patches within the Rim fire. This implies managers do not need to subject forests to the well-documented harms caused by post-fire logging and replanting.

Because there is a major ongoing scientific controversy regarding spotted owl use of post-fire landscapes, the agencies must review whether its assumptions regarding continued suitability of habitat after the fire are justified.[8] The debate is well summed up:

> Further south (e.g., Klamath providence of California) and in drier mixed conifer forests along the eastern slopes of the Cascades in Washington and Oregon, the spotted owl nests in older forests juxtaposed with dense shrubs occupied by its favorite meal—woodrats (Neotoma spp.) (Forsman et al., 2004). Here, fire is Nature's architect that periodically sculptures a mosaic of burn severity habitat patches (e.g., low, moderate, and severe fire effects on tree mortality, Fig. 5.2B) that the owl does best in (Franklin et al., 2000; Dugger et al., 2005; Lee, 2018). Reoccurring wildfires produce a "bed-and-breakfast" like effect where older forest patches that survived fire serve as the owls' "bedroom," and severely burned patches where most trees were killed, the "breakfast room." Just how much of each the owl needs is the subject of intense debate (see Jones et al., 2016 vs. Lee, 2018, see below) with important recovery implications.[9]

[6] Hanson, C.T., Is "Fuel Reduction" Justified as Fire Management in Spotted Owl Habitat? Birds (2021), 2, 395–403.

[7] Hanson and Chi, Impacts of Postfire Management Are Unjustified in Spotted Owl Habitat, Frontiers in Ecology and Evolution, February 20, 2021.

[8] See, e.g., *Bark v. U.S. Forest Serv*., 958 F.3d 865 (9th Cir. 2020).

[9] DellaSala, Conservation Science and Advocacy for a Planet in Peril, Elsevier, 2021, pp. 99-126.

Detailed maps like those provided for the roadless areas, including overlays of owl activity centers, habitat, land allocations, and proposed treatments, as a start, should be provided for the project area.

The EA/BA should address the 2021 Franklin et al. meta-analysis[10] of spotted owl population demographics and should incorporate data from USFWS's 2020 finding warranted for "uplisting" to "endangered"[11] in its analysis of the project's impacts. Does this important new information affect the Forest Service's risk analysis regarding whether and where it would operate in spotted owl habitat or in known spotted owl sites? How has the change in baseline conditions for habitat affected NSO populations? How have the multiple national forest projects with a "May Affect" and "Likely to Negatively Affect" determinations been considered regionally?

The Northern spotted owl recovery plan gives a fair overview of the state of the science regarding post-fire forest management and restoration. The plan recognizes the natural role of fire in developing and maintaining complex habitat supporting spotted owls and diverse prey species. Relevant parts of the recovery plan state:

- "There is evidence of spotted owls occupying territories that have been burned by fires of all severities. The limited data on spotted owl use of burned areas seems to indicate that different fire severities may provide for different functions."[12]

- "... [S]support is lacking for the contention that reduction of fuels from post-fire harvest reduces the intensity of subsequent fires (McIver and Starr 2000), and planting of trees after post-fire harvest can have the opposite effect."[13]

- "Detrimental ecological effects of post-fire timber harvest include: increased erosion and sedimentation, especially due to construction of new roads; damage to soils and nutrient-cycling processes due to compaction and displacement of soils; reduction in soil-nutrient levels; removal of snags and, in many cases, live trees (both of which are habitat for spotted owls and their prey); decreased regeneration of trees; shortening in duration of early-successional ecosystems; increased spread of weeds from vehicles; damage to recolonizing vegetation; reduction in hiding cover and downed woody material used by spotted owl prey; altered composition of plant species; increased short-term fire risk when harvest generated slash is not treated

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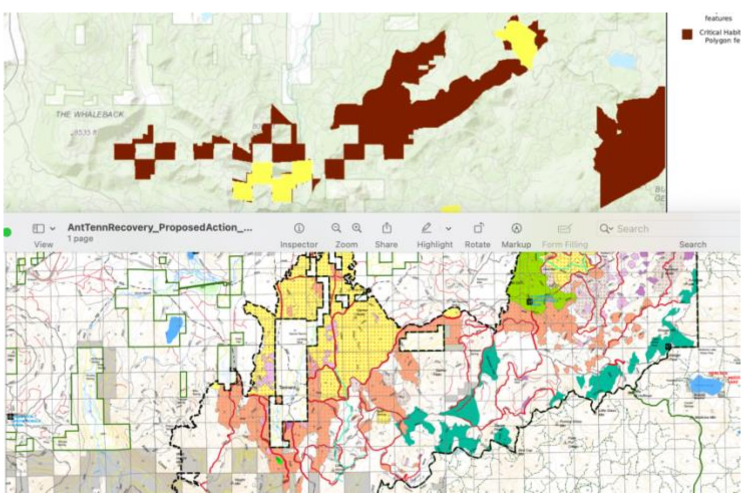
[10] Franklin et al., Range-wide declines of northern spotted owl populations in the Pacific Northwest: A meta-analysis. Biological Conservation. July 2021. Abstract. ("Our analyses indicated that northern spotted owl populations potentially face extirpation if the negative effects of barred owls are not ameliorated while maintaining northern spotted owl habitat across their range.")
[11] 17 85 FR 81144, Dec. 15, 2020.
[12] USDI, 2011 Revised Recovery Plan for the Northern Spotted Owl, at p. III-31.
[13] Id. at p. III-47.

and medium-term fire risk due to creation of conifer plantations; reduction in shading; increase in soil and stream temperatures; and alterations of patterns of landscape heterogeneity . . . ."[14]

- "Consistent with restoration goals, post-fire management . . . should promote the development of habitat elements that support spotted owls and their prey, especially those which require the most time to develop or recover (e.g., large trees, snags, downed wood). Such management should include retention of large trees and defective trees, rehabilitation of roads and firelines, and planting of native species (Beschta et al. 2004, Hutto 2006, Peterson et al. 2009). **We anticipate many cases where the best approach to retain these features involves few or no management activities**. Forests affected by medium- and low-severity fires are still often used by spotted owls and should be managed accordingly. Many researchers supported the need to maintain habitat for spotted owl prey. For example, Lemkuhl et al. (2006) confirmed the importance of maintaining snags, downed wood, canopy cover, and mistletoe to support populations of spotted owl prey species. Gomez et al. (2005) noted the importance of fungal sporocarps which were positively associated with large, downed wood retained on site post-harvest. Carey et al. (1991) and Carey (1995) noted the importance of at least 10 to 15 percent cover of downed wood to benefit prey."[15]

The bulk of recent research presented above should be addressed prior to public comment and decision. If the agencies assumptions regarding post-fire habitat suitability are flawed, then the project could have larger impacts than predicted. This is a crucial issue that deserves to be examined closely.

Critical Habitat



According to Data Basin, a science-based mapping and analysis platform that supports learning, research, and sustainable environmental stewardship, it appears that much of the lodgepole pine "sanitation" units and "salvage" units are within NSO Critical Habitat. The proposed action would remove habitat and be contrary to recovery.

[14] Id. at p. III-48.
[15] Id. at p. III-49 (emphasis added).

Gray Wolves

The project area is within the Whaleback Pack territory, which as of September 2022, there were a minimum of two adults (breeding wolves OR85 and WHA01F), five yearlings, and eight pups. There are at least 15 wolves in and around the project area. The EA and BA must adequately assess this information and provide real protections for endangered wolves who prefer the habitat of the Cascades.

The EA should consider peer-reviewed published literature on the effects of post-fire logging on habitat use by wolves, reproduction and den site selection by wolves in landscapes disturbed by logging, trophic consequences of post-fire logging in wolf-ungulate systems, spatial response of wolves to roads and trails in forested landscapes, and spatiotemporal segregation of wolves due to human-made structures including roads and trails, human presence in the form of forestry operations, and human presence from outdoor recreation in forested areas. Research on these crucial issues have been conducted in Poland; Scandinavia; Alberta, Canada; Quebec, Canada; Prince of Wales Island and Southeast Alaska; Glacier Bay National Park, Alaska; and at least one paper reports on a global-scale meta-analysis across wolves' worldwide range of site selection by wolves for den sites and rendezvous sites and how those selections relate to humans and human effects including roads and villages. These papers note that forest harvest involves the creation and/or use of roads, and the creation of cutblocks, both of which can influence habitat use by many species, including wolves, and that forest harvesting alters both the amount and spatial distribution of habitat types. The authors of multiple studies have concluded that logging related disturbances, such as from roads and trails, can have cumulative effects on wolf movement and use of the landscape, including on critical activities such as den site and rendezvous site selection, hunting success and avoidance of human-caused mortality.

In a forest in western Poland, data collected from radio-collared wolves and their tracks and scent markings revealed that wolves use forest roads to travel fast and far from home ranges but spend relatively little time on roads.[16] Avoidance of roads by wolves, however, was not limited to those with high traffic levels; wolves also avoided roads with negligible traffic. (Id.) Ongoing expansion and improvement of forest road networks was viewed as problematic, since it may lead to increased human-caused mortality of wolves and elevated costs to wolves from having to avoid humans and roads. The authors concluded that in densely populated countries with fragmented forests, "forest roads should be considered in wolf habitat assessments, and any formerly existing bans for non-authorized vehicles on forest roads should be reinforced." (Id. at 210.)

[16] Bojarska, K., Sulich, J., Bachmann, S. *et al.* Opportunity and peril: how wolves use a dense network of forest roads. *Mamm Biol* **100**, 203–211 (2020). https://doi.org/10.1007/s42991-020-00014-0

Postfire logging in a large burn in the Canadian Rockies, Alberta, Canada, studied for three years postburn impacted the trophic dynamics between wolves, three ungulate species (elk, deer, and moose), and ungulate forage biomass.[17] Wolves selected proximity to forest roads and the higher forage biomass that was associated with postfire logging in open logged areas, but this resulted in the highest predation risk for elk in postfire logged areas; thus, elk avoided those areas due to the human alteration of top-down predation risk despite enhancements to bottom-up forage biomass. (Id.) The authors concluded that "Managers should consider consequences of postfire logging on the interactions among species when gauging logging effects on terrestrial ecosystems. Making use of existing roads, minimizing construction of new roads, and managing road removal following postfire logging will help mitigate the negative effects of postfire logging on terrestrial ecosystems." (Id. at 1053.)

Human activity on trails and roads may lead to indirect habitat loss, further limiting available habitat. Predators and prey may respond differentially to human activity, potentially disrupting ecological processes.[18]

A study of six wolf packs inhabiting forest surrounding Quebec found that cumulative effects of forestry had a strong influence on habitat selection by wolves in boreal ecosystems.[19] Researchers found that an accurate characterization of wolf pack distribution in a harvested landscape needs to consider both roads and cutblocks plus the local representation of these features in the landscape and temporal changes in levels of disturbance throughout the year. (Id. at 428-429.) During denning, wolves selected regenerating cutblocks in areas where the abundance of roads and cutblocks was low but tended to avoid them in highly altered parts of their home range. (Id. at 429.) The authors noted that, while human disturbance should be relatively infrequent in regenerating cutblocks, hunting opportunity for wolves also needs to be good for these regenerating areas to be good wolf habitat and this may not be the case; while cutblocks result in forage

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[17] Nathan F. Webb, Mark Hebblewhite, Evelyn H. Merrill. Statistical Methods for Identifying Wolf Kill Sites Using Global Positioning System Locations. *Journal Of Wildlife Management* 72(3):798–807; 2008

[18] Rogala, J. K., M. Hebblewhite, J. Whittington, C. A. White, J. Coleshill, and M. Musiani. 2011. Human activity differentially redistributes large mammals in the Canadian Rockies national parks. *Ecology and Society* **16**(3): 16. http://dx.doi.org/10.5751/ES-04251-160316

[19] Me´lina Houle, Daniel Fortin, Christian Dussault, Re´haume Courtois, Jean-Pierre Ouellet. Cumulative effects of forestry on habitat use by gray wolf (Canis lupus) in the boreal forest. Landscape Ecology (2010) 25:419–433 DOI 10.1007/s10980-009-9420-2

regeneration along edge habitat that moose would like, the cutblocks also reduce cover for moose to hide from predators, and thus may reduce the incentive for wolves to use dense edge habitat. (Id.) With respect to roads, the wolves here were found to use roads for travel but chose areas with less dense numbers of roads. (Id.) The authors concluded that "By neglecting the consideration of cumulative impacts of human activities on landscape use by wolves, erroneous conclusions about the influence of anthropogenic disturbance on wolf distribution could be drawn. Effective management of wolf habitat in human-altered landscapes requires the consideration of cumulative effects." (Id. at 431.)

In a study in west-central Alberta of four wolf packs, there was no evidence the wolves preferred or avoided forest cutblock edges.[20] Instead, the wolves preferred areas of shrubs and waterways. (Id. at 373.) Measuring habitat use by wolves directly, the data showed that wolf use of landscapes was not random. (Id. at 372.) The authors found that information is required on how the primary prey of wolves in an area "are responding to the changing landscape mosaic that accompanies timber extraction, because this may ultimately determine how wolves use the landscape." (Id. at 373.)

Between 2005 and 2010, 22 collared wolves in nine packs were tracked within the southern portion of Quebec's boreal forest. (Lesmiresis et al. 2012.) Timber harvesting in the area had generated a young forest matrix interspersed with mature remnants; the area was also highly fragmented by numerous roads. Wolves selected areas providing food (moose and beaver) or which were likely to improve hunting success, but avoided anthropogenic disturbances, such as such as cabins and recent clearcuts. (Id. at 128-129.) Forest areas that were recently logged were generally avoided by wolves, leading the authors to speculate that recently-logged areas may not provide substantial benefits to wolves and that risk of human encounters in those areas may be too high. (Id. at 130.) The authors concluded that wildlife managers should take into account predator responses to logging-related disturbances when planning forest management for potential prey species. (Id. at 125.)

Wolves generally select home sites for dens removed from human activities including roads and villages.[21] The authors recommended that habitat levels below

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[20] Kuzyk, Gerald W., Jeff Kneteman, and Fiona K.A. Schmiegelow. 2004. Winter habitat use by Wolves, *Canis lupus,* in relation to forest harvesting in west-central Alberta. Canadian Field-Naturalist 118(3): 368-375.

[21] Víctor Sazatornil, Alejandro Rodríguez, Michael Klaczek, Mohsen Ahmadi, Francisco Álvares, Stephen Arthur, Juan Carlos Blanco, Bridget L. Borg, Dean Cluff, Yolanda Cortés, Emilio J. García, Eli Geffen, Bilal Habib, Yorgos Iliopoulos, Mohammad Kaboli, Miha Krofel, Luis Llaneza, Francesca Marucco, John K. Oakleaf, David K. Person, Hubert Potočnik' Nina Ražen, Helena Rio-Maior, Håkan

occupancy and territory – such as behavioral avoidance responses by wolves to human made structure ranging from settlement and villages to linear structure such as all kinds of roads and avoidance of agricultural lands in favor of refuge lands – in combination with the interaction of human- related risks, should be regarded when managing and conserving large carnivores such as wolves in human-dominated landscapes. (Id.) They recommended that managers "be focused on providing shelter from human interference in the small portions of land that fulfill the characteristics of the places that wolves in particular and large carnivores in general select as breeding sites, in order to encourage their persistence." (Id.)

Wolf litter sizes, den characteristics and den site selections were studied in an extensively logged and roaded area on Prince of Wales and adjacent islands in Southeast Alaska.[22] While landscape features such as elevation and slope, and proximity of fresh water had the greatest effects on den site selection, wolves selecting den sites generally avoided roads and logged stands. (Id. at 219, 221-222.) The authors concluded that "biologists should be careful not to dismiss the effects of resource developments such as timber harvest and roads on wolves simply because they find dens in disturbed areas. Retaining roadless forested buffers > 100 m wide around low elevation lakes and streams likely would preserve some den site options for wolves in extensively logged watersheds. Closing roads, wherever feasible, within that buffer likely would reduce the effects of existing roads on den site location." (Id. at 222.)

Another study of wolves on Prince of Wales Island looked at seasonal habitat selection with respect to forest structure, succession, land cover, topography, road densities and habitat predicted to support wolves' chief prey species of Sitka black-tailed deer and salmon.[23] This area is temperate rainforest characterized by patchworks of old growth and harvested stands in various stages of regeneration. Within their home ranges, wolves selected low elevation, flat terrain with open land cover and low-volume old-growth forests across seasons. (Id. at 195.) Areas of high road densities were avoided during denning season and summer, but strongly selected during winter. (Id. at 196.) The study demonstrated that thinning treatments do not enhance habitat for wolves, with wolves making limited use or

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Sand, David Unger, Petter Wabakken and José Vicente López-Bao. *The role of human-related risk in breeding site selection by wolves*. http://www.elsevier.com/open-access/userlicense/1.0/

[22] David K. Person and Amy L. Russell. *Reproduction and Den Site Selection by Wolves in a Disturbed Landscape*. *Northwest Science83(3), 211-224, (July 2009).*

[23] Gretchen H. Roffler, David P. Gregovich, Kristian R. Larson. *Resource selection by coastal wolves reveals the seasonal importance of seral forest and suitable prey habitat*. Forest Ecology and Management, Volume 409, 2018, Pages 190-201, ISSN 0378-1127, https://doi.org/10.1016/j.foreco.2017.11.025.

avoidance of seral forests. (Id. at 197.) Researchers concluded that successional forests had a limited period of use, less than 30 years due to habitat preferences exhibited by the wolves, and thus forestry practices could reduce availability of wolves' preferred habitat, "with potential population-level consequences for wolves." (Id. at 199.)

A recently-published study examining the impacts of low levels of outdoor recreation on the behavior of wildlife in Glacier Bay National Park found that wolves, brown bears and black bears were all affected and that wolves used areas of high human impacts more intensely than either bears or moose but shifted their activity to be more strongly nocturnal.[24] Lack of detection of these wildlife species was most pronounced in wolves, which were not detected at all at the site with the most human use. (Id. at 9.) The authors concluded that wildlife response to human activity may be underestimated unless both spatial and temporal responses are considered, and that nearly any level of human activity in a protected area may alter wildlife behavior both spatially and temporally. (Id. at 9, 11.)

As these studies demonstrate, simply determining where the pack has its den site and its rendezvous sites and aiming to protect those locations by establishing a buffer around them during the key seasonal pup-rearing period would fail to adequately analyze the cumulative impacts on the Whaleback pack and/or other lone wolves dispersing through the areas where the proposed project would take place. The increased use of logging roads and trails during the operation and the creation of cutblocks has potential negative impacts to wolves such as increased behavioral avoidance of these areas. The creation of edge habitat which ungulates may avoid due to increased predation risk by wolves potentially reduces hunting opportunities for wolves. Any project that will potentially create less desirable, less suitable, less optimal habitat for wolves – a state-and-federally endangered species – mandates a thorough analysis.

Sensitive Species

The Sensitive Species Program was developed to meet obligations under the ESA, the NFMA and Forest Service national policy direction as stated in the FSM Section 2670, and the USDA Regulation 9500-4. The Sensitive Species Program is supposed to be a proactive approach to conserving species to prevent a trend toward listing under the ESA and assist in providing for a diversity of plant and animal communities.

[24] Mira L. T. Sytsma, Tania Lewis, Beth Gardner, Laura R. Prugh. *Low levels of outdoor recreation alter wildlife behavior*. People and Nature Oct 2022. https://doi.org/10.1002/pan3.10402

"Project areas should be surveyed for the presence of Sensitive species before project implementation. If surveys cannot be conducted, project areas should be assessed for the presence and condition of Sensitive species habitat." LRMP at 4-23

"Management activities shall be compatible with the recovery of Endangered, Threatened (E&T) plants and animals." LRMP at 4-36

"Collect information on Sensitive Species to assess population distribution and habitat associations**…Inventory a portion of the suitable habitat each year.** Assess conditions at occupied sites. Based on the assessment, use appropriate management techniques to maintain or enhance habitat suitability." LRMP at 4-38

"The KNF must "seek to conserve E&T species and shall utilize its authorities in furtherance of the Endangered Species Act." FSM 2670.11

"Conservation strategies, including management objectives for habitat **and populations** of candidate species will be developed in cooperation with the FWS and CDF&G and implemented to **ensure viable populations** of these species throughout their geographic ranges to reduce the probability of their being federally listed." IV-96 LRMP

"All proposed projects that involve disturbance to wildlife habitat and have potential to impact listed or sensitive wildlife species **will be evaluated to determine if any listed species are present**." IV-97 LRMP

"Site specific habitat management plans are required for federally listed threatened and endangered species to protect and enhance essential habitat, and to explain allowable, desired and planned management activities within each area. **Habitat area (designated) management plans will be completed**, as part of the biological evaluation process, **for Sensitive wildlife species** that may be affected by proposed management activities." IV- 99 LRMP

"Known nest sites, roost sites, den sites and associated **micro-habitat conditions will be protected for candidate species**:" IV- 100 LRMP

We are very concerned that the multiple Sensitive species, including goshawks, great grey owls, bald eagles and willow flycatchers in the area would be harmed and heavily impacted by the proposed treatments. The EA provides no information on these species completely relies on Project Design Features to mitigate any harm. The EA on page 39 is incomplete and does not contain a Table 16.

RETAIN ALL LIVING ROADSIDE TREES

Our previous comments addressed the proposed “sanitation” treatment. Here we address the probability of mortality roadside hazard prescription. Within and around high severity patches, green living trees that survived the fire are disproportionally important to wildlife, as seed sources for future regeneration, as biological legacies, and for the development of structural complexity. They are also likely the most fire resilient portions remaining on the landscape.

No living trees should be felled in the project, unless they have been structurally compromised and are a clear roadside hazard. Rating trees on their predicted probability of mortality will provide little benefit to public safety and will only remove potentially viable, living trees. To remove these trees would compound the loss of living forest canopy, reduce future structural complexity, impact wildlife, eliminate potential seed sources for regeneration, and homogenize high severity burn patches. Retention of living green trees, especially trees over 21” DBH, provides opportunities for highly important green trees to remain on site. No matter what level of crown scorch was sustained, these trees have the potential to provide important biological functions in both the short and long term.

There is no ecologically or biologically valid reason for the removal of living, green trees in the planning area, even if these trees will die in 1-10 years. In the short term, they will likely provide additional seed sources in areas void of green trees. They provide additional heterogeneity, microclimate, habitat, shade, and protection for regenerating forests. In the long term, living trees that continue growing will become highly valuable legacy trees with irreplaceable biological value.

Living trees do not represent significant public safety risks and provide significant biological benefits. Please consider releasing a decision document that clearly retains living trees in the project area. Given the high severity, standing replacing fire effects sustained during the fire, it is desirable to maintain all living trees, even in matrix lands.

We have documented numerous USFS projects that demonstrate a general inability of marking crews to accurately predict post-fire mortality rates based on the marking guidelines and protocol from Smith and Cluck. These projects include the 2014 Westside Project, the 2016 Horse Creek Community Protection Project and the 2017 Seiad Creek Hazard Tree project. If these trees are still living multiple years after the fire, it indicates that they will continue to do so.

Applicable information can also be acquired from the abundance of recent fire footprints in the region, where many heavily scorched trees are surviving despite significant crown damage. Unmanaged post-fire landscapes demonstrate that trees with compromised crowns remain viable and sound for decades or longer.

The accuracy of predicted mortality of fire damaged trees is important when considering the scale of fire across this landscape and the scale of post-fire logging and hazard tree operations being proposed annually in the region. We believe the accuracy and efficacy of mortality prediction is highly questionable.

The EA fails to review similar recent Forest Service actions for efficacy and assumes that the Smith and Cluck protocol are sufficient. Higher standards are needed to maintain and retain important living tree structures during post-fire operations. We believe this includes retaining green, living trees, especially those over 26" dbh. Significant crown scorch does not always translate to fire induced mortality and many trees of many species can recover canopy structure and persist long after fire damage or fire effects occur. Trees living two years after the fires will likely continue to stand and provide ecosystem benefits and needed habitat.

These hazard tree marking standards should be informed by regionally appropriate monitoring data in the Cascades. The agency should conduct monitoring and research to quantify, qualify, and explore the probability of mortality for fire-scorched trees specifically in the region. The opportunity appears readily available and this research would significantly inform this project and others in the future.

ECOLOGICAL CONSEQUENCES, INCREASED FUEL LOADS AND REBURN HYPOTHESIS

Among others cited in these comments, the following peer-reviewed studies report significant findings that should be addressed:

> Bradley et al. 2016: Weather and climate are the dominant variables in fire risk, but a key secondary factor is logging. The more trees that are removed, the more the forest microclimate is altered to increase fire risk, by creating hotter, drier conditions, spreading combustible weeds like cheatgrass, creating flammable slash debris, reducing windbreak effect, and reducing canopy cover thus drying out the forest floor. Reduced forest protections and increased logging tend to make wildland fires burn more intensely.[25]
>
> Cruz et al. 2014: Commercial thinning, where mature trees are removed, tends to make wildland fires burn *more* intensely (see also Cruz et al. 2008).[26]
>
> Campbell et al. 2012: The "life-expectancy" for a fuels reduction treatment is 10-25 years, after which the "fuel" will have regrown and the fire risk will

[25] Bradley, C.M. C.T. Hanson, and D.A. DellaSala. 2016. Does increased forest protection correspond to higher fire severity in frequent-fire forests of the western USA? Ecosphere 7: article e01492.

[26] Miguel Cruz et al., Using Modeled Surface and Crown Fire Behavior Characteristics to Evaluate Fuel Treatment Effectiveness: A Caution, *For. Sci.* 60(2):1000 – 1004; Cruz et al., Development of Model Systems to Predict Wildfire Behaviour in Pine Plantations, Australian Forestry 2008, Vol. 71, No. 2, 113-121.

return to baseline. The probability that a fire would occur in a thinned area during its 10-25 year lifespan is somewhere in the range of 1-3%.[27]

DellaSala et al. 2022: Treating wildfires using bottom-up fuels reduction approaches when top-down extreme climate factors are increasingly overriding such efforts could push ecosystems beyond resilience thresholds at the further expense of biodiversity and the climate.[28]

Hanson and Chi 2021: Regeneration of trees in high-intensity burned patches occurs naturally, even beyond 1000 feet from the nearest live conifer.

Hanson et al. 2021: Literature review of 13 published, peer-reviewed studies which found that authors failed to account for the impacts of post-fire logging when analyzing high-severity fire impacts on spotted owl occupancy and foraging. Every study that showed a significant negative effect of "high-severity fire" was also confounded by post-fire logging, except one (which could have been confounded by post-fire logging outside the nest core).

North et al. 2019: Standard post-fire reforestation practices may result in high mortality. Planting practices, particularly regarding spacing and density, could be modified to increase seedling survival and build early drought and fire resilience. In practice, USFS increasingly is unable to return to planted areas to implement shrub release, pre-commercial thinning, or prescribed fire, with many planted areas never receiving planned follow-up management to reduce fire risk.

Schoennagel et al. 2017: The extremely low probability (less than 1%) of thinned sites encountering a fire where thinning has occurred limits the effectiveness of such activities to forested areas near homes. Fuels reduction is mostly a myth; allowing wildfires to burn while increasing prescribed burns around communities would ameliorate fire risk meaningfully while directing scarce resources in an effective manner.[29]

Zald and Dunn 2018: While small-tree thinning can reduce fire intensity when coupled with burning of slash debris under very limited conditions,

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[27] JL Campbell et al., Can fuel-reduction treatments really increase forest carbon storage in the western US by reducing future fire emissions? Front Ecol Environ 2012; 10(2): 83–90.
[28] DellaSala et al., Have western USA fire suppression and megafire active management approaches become a contemporary Sisyphus? Biological Conservation, Volume 268, April 2022.
[29] Schoennagel, T., et al. 2017. Adapt to more wildfire in western North American forests as climate changes. Proceedings of the National Academy of Sciences of the USA 114: 4582–4590.

intensive forest management characterized by young trees and homogenized fuels burn at higher severity.[30]

The analysis should engage with the body of science calling into question whether fuels treatments provide meaningful risk reduction at all, even when fully implemented. Weather and climate govern fire behavior, and forest density is generally a "poor indicator" of fire intensity.[31] Studies of large mixed-conifer forest fires in similar forest types to the KNF have found that the forests with the highest pre-fire ***living*** tree densities and downed logs burned at lower intensity than those with the fewest trees and downed logs burned at high intensity.[32]

As for ***dead*** trees (snags), recent large studies have also found that abundance and density of snags did not influence fire behavior.[33] And again, some studies found that forests with greater numbers of snags burned less intensely than other forests, and this effect increased over time, becoming most pronounced 25 years after tree death, when many of the snags had fallen and become downed wood.[34]

And contrary to the agency's narrative of "fuels accumulation" in fire-adapted Western forests leading to more severe fires and needing the corrective action of logging, study after study has shown that the densest, most fire-suppressed forests primarily burn at low- and moderate-severity. This was the case even in frequent-fire and drier mixed-conifer forests.[35] Climate and weather, not tree and snag ("fuels") density, are unequivocally the primary drivers of severe, stand-replacing fire behavior. Yet this project's environmental analysis fails to consider this information.

The NEPA analysis for this project should analyze whether an old-fashioned policy of "fuels reduction" can be justified in order to reduce future fire

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[30] Zald, H.S.J., and C.J. Dunn. 2018. Severe fire weather and intensive forest management increase fire severity in a multi-ownership landscape. Ecological Applications 28:1068-1080.

[31] E.g., Bradley et al. 2018; Zald and Dunn 2018.

[32] Meigs et al., Forest Fire Impacts on Carbon Uptake, Storage, and Emission, Ecosystems (2009) 12: 1246–1267; John Campbell et al., Pyrogenic carbon emission from a large wildfire in Oregon, United States, Journal of Geophysical Research Atmospheres 112(G4), Dec. 2007.

[33] Bond et al., Influence of Pre-Fire Tree Mortality on Fire Severity in Conifer Forests of the San Bernardino Mountains, California, The Open Forest Science Journal, 2009, 2, 41-47; Hart et al., Area burned in the western United States is unaffected by recent mountain pine beetle outbreaks, www.pnas.org/cgi/doi/10.1073/pnas.1424037112 (2015); S J Hart and D L Preston, Fire weather drives daily area burned and observations of fire behavior in mountain pine beetle affected landscapes, Environ. Res. Lett. 15 054007; Garrett W Meigs et al., Do insect outbreaks reduce the severity of subsequent forest fires?, Environ. Res. Lett. 11 045008.

[34] Meigs et al. 2016.

[35] E.g., Miller et al., Trends and causes of severity, size, and number of fires in northwestern California, USA , Ecological Applications, 22(1), 2012, pp. 184–203; Odion et al. 2004; Odion and Hanson 2006, Fire Severity in Conifer Forests of the Sierra Nevada, California, Ecosystems (2006) 9: 1177–1189.

intensity. The great majority of project activities proposed here are premised on the idea that reducing biomass in the post-fire forest would in some way impact future fire risk. The scientific consensus is that this is unlikely and, at most, is limited in application to very specific circumstances where certain conditions and follow-up management activities can be guaranteed. At worst, it appears that management activities that reduce biomass, e.g., thinning and mechanical fuels reduction, may cause subsequent fires to burn more intensely.

In our experience the USFS rarely, if ever, follows through with fuel reduction treatments. This is true for every Northern California national forest in the Pacific Northwest and can be seen on the Goosenest Ranger District. Logging of this magnitude, as proposed, would certainly cause an intense amount of concentrated accumulation of flammable fuels, which would be additive to the proposal to lop and scatter slash up to across perhaps thousands of acres. In the simplest terms, post-fire logging always leaves a huge, nearly insurmountable, mess. Our watersheds would be safer and less fire prone if the agency were to focus on treating finer smaller vegetation only and leaving these ecosystems to recover naturally without the destruction and devastation caused by heavy equipment and thousands of acres of mechanical disturbance.

The NEPA analysis for this project should also engage with research like that of North et al. 2015 finding that varied constraints, from land allocation to terrain, significantly prevent implementation of planned fuel reduction techniques.[36] Please evaluate the KNF's record of implementation for post-fire management, including whether such follow-up activities as pile-burning and other hazard-reduction activities were performed after timber sales, and the time lag. For this project, and considering North et al. 2015, the EA should predict whether the agency is likely to complete all planned future fire-hazard reduction activities proposed here – and if not, the EA should do a risk-benefit analysis on whether the increased fire risk posed by its initial post-fire logging activities is indicated.[37]

The agency claims that the project is needed to reestablish forested conditions (reforestation) to consist with management plan objectives where tree seed sources are lacking due to high severity fires. However, roads, planting, and salvage logging will impede the severely stressed system from natural ecological recovery.

> An intense debate exists on the effects of post-fire salvage logging on plant community regeneration, but scant data are available derived from experimental studies. We

[36] North et al. 2015. Constraints on mechanized treatment significantly limit mechanical fuels reduction extent in the Sierra Nevada. Journal of Forestry 113: 40-48.
[37] *See* Franklin, Johnson, and Johnson. *Ecological Forest Management*. Ch. 20, pp. 374-75.

analyzed the effects of salvage logging on plant community regeneration in terms of species richness, diversity, cover, and composition by experimentally managing a burnt forest on a Mediterranean mountain (Sierra Nevada, S Spain) …Post-fire salvage logging was associated with reduced species richness, Shannon diversity, and total plant cover. Moreover, salvaged sites hosted different species assemblages and 25% lower cover of seeder species (but equal cover of resprouts) compared to the other treatments. Cover of trees and shrubs was also lowest in salvage logging, which could suggest a potential slow-down of forest regeneration. Most of these results were consistent among the three plots despite plots hosting different plant communities. Concluding, our study suggests that salvage logging may reduce species richness and diversity, as well as the recruitment of woody species, which could delay the natural regeneration of the ecosystem.[38]

In the western USA, typically, the argument is that post-fire logging and subsequent conifer plantings are needed to leap-frog over successional stages to a "forest" even though those actions degrade one of the most biologically diverse seral stages – complex early seral forest—and post-fire logging does not create a diverse forest ecosystem but, rather, a biologically diminished and impoverished one. In short post-fire logging is a tax on ecological recovery.

Post-fire logging disrupts fire affected ecosystem processes and inhibits development and longevity of complex early seral forests (Lindenmayer et al. 2008[39], Donato et al. 2012[40], DellaSala et al. 2015[41], Thorn et al. 2018[42]) along with keystone biological legacies. Post-fire logging impacts are documented across a broad range of taxa and geographic regions and typically include soil compaction, aquatic and terrestrial habitat degradation (particularly rare and imperiled species), spread of invasive species, increased fine fuels, and conifer seedling mortality among others (Beschta et al. 2004[43], Karr et al. 2004[44], Lindenmayer et al.

[38] Alexandro B. Leverkus, Juan Lorite, Francisco B. Navarro, Enrique P. Sánchez-Cañete, Jorge Castro. Post-fire salvage logging alters species composition and reduces cover,richness, and diversity in Mediterranean plant communities. Journal of Environmental Management 133 (2014) 323e331

[39] Lindenmayer, D.B., P.J. Burton, and J.F. Franklin. 2008. Salvage logging and its ecological consequences. Island Press: Washington, DC.

[40] Donato, D.C., J.L. Campbell, and J.F. Franklin. 2012. Multiple successional pathways and precocity in forest development: can some forests be born complex? J. Vegetation Science 23:576-584.

[41] DellaSala, D.A., and C.T. Hanson. 2015. The ecological importance of mixed-severity fires: nature's phoenix. Elsevier: United Kingdom.

[42] Thorn, S.,et al. 2018. Impacts of salvage logging on biodiversity: a meta-analysis. Journal of Applied Ecology 55:279-289.

[43] Beschta, R.L., J.J. Rhodes, J.B. Kauffman, R.E. Gresswell, G.W., Minshall, J.R., Karr, D.A. Perry, F.R. Hauer, and C.A. Frissell. 2004. Postfire management on forested public lands of the western United States. Conservation Biology 18:957-967.

[44] Karr, J.R., J.J. Rhodes, G.W. Minshall, F.R. Hauer, R.L. Beschta, C.A. Frissell, and D.A. Perry. 2004. The effects of postifre salvage logging on aquatic ecosystems in the American West. Bioscience 54:1029-1033.

2008[45], Lindenmayer and Noss 2006[46], DellaSala et al. 2015[47], Thorn et al. 2018[48]).

Context and scale matter in ecology and is relevant in the project area considering cumulative impacts of adjacent large-scale post-fire logging projects across the region in addition to extensive logging proposed in the Antelope Tennant project.

High intensity burns are governed mainly by extreme fire weather, rendering forest thinning and related treatments ineffectual (Kalies and Kent 2016[49], Bowman et al. 2017[50]). The proposed action is not likely to reduce future high severity events but would instead increase future fire risk, damage ecosystem processes and ecological integrity. The Klamath National Forest proposes a highly controversial and ecologically inappropriate logging project that would accumulate impacts in space and time to- NSO and multiple other wildlife species,landscape connectivity, late seral and complex early seral conditions and ecological integrity and resilience.

Together with the Mendocino, Six Rivers, Shasta-Trinity and Rogue River Siskiyou National Forest and beyond, post-fire logging timber sales are massive and controversial and would setback ecosystem processes for decades if not longer. As it stands, it is likely that the combined effects of post-fire logging and other management disturbances would result in widespread ecological damage and result in a mortality sink for spotted owls moving the Klamath and Cascade Provinces toward a landscape trap where fire regimes and biodiversity are flipped to a novel state (Paine et al. 1999[51], Lindenmayer et al. 2011[52]).
The response of fire-adapted species and communities to post-fire logging depends on the scale, intensity, degree of biological legacies removed (McIver and Starr 2000, Lindenmayer et al. 2006, 2008), disturbance history of the site (Reeves et al. 2006, Hutto 2008), and species-specific tolerances to logging. Impacts can be summarized as follows:

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[45] Lindenmayer, D.B., P.J. Burton, and J.F. Franklin. 2008. Salvage logging and its ecological consequences. Island Press: Washington, DC.
[46] Lindenmayer, D.B., and R.F. Noss. 2006. Salvage logging, ecosystem processes, and biodiversity conservation. Conservation Biology 20:949-958
[47] DellaSala, D.A., and C.T. Hanson. 2015. The ecological importance of mixed-severity fires: nature's phoenix. Elsevier: United Kingdom.
[48] Thorn, S.,et al. 2018. Impacts of salvage logging on biodiversity: a meta-analysis. Journal of Applied Ecology 55:279-289.
[49] Kalies, E.I., and L.L. Yocom Kent. 2016. Tamm Review: Are fuel treatments effective at achieving ecological and social objectives? A systematic review. Forest Ecology and Management 375-84-95.
[50] Bowman, D.M.J.S., G.J. Williamson, J.T. Abatzoglou, C.A. Kolden, M.A. Cochrane, and A.M.S. Smith. 2017. Human exposure and sensitivity to globally extreme wildfire events. Nature Ecology & Evolution 1:1-6.
[51] Paine R.T, M.J. Tegner MJ, and E.A. Johnson. 1998. Compounded perturbations yield ecological surprises. Ecosystems 1: 535–545.
[52] Lindenmayer, D.B., R.J. Hobbs, G.E. Likens, C. J. Krebs, and S.C. Banks. 2011. Newly discovered landscape traps produce regime shifts in wet forests. PNAS

- Alteration of stand structure and function;
- Loss of soil nutrients;
- Chronic sedimentation and erosion;
- Reduction in carbon storage;
- Increased fine fuel loads and re-burn severity (Donato et al.2006[53]);
- Degradation of habitat for threatened, endangered, and sensitive species;
- Reduced habitat and prey for apex predators and forest carnivores;
- Reduced snag densities for cavity nesting birds and mammals;
- Exotic species invasions, and lowered resistance; and
- Reduced resilience of post-fire landscapes to future disturbances, among other alterations.

Post-fire logging can increase future fire intensity by removing critical large-diameter snags that are known to mitigate conditions that lead to high-intensity fires. "[C]ommercially extracting fire-killed trees via logging causes significant short- and long-term adverse effects on forest ecosystem structures, functions and processes."[54] There is growing and ever expanding evidence that logging fire-affected forests "exacerbates the short-term adverse effects of fire, causes significant long-term environmental damage and ecological degradation of burned watersheds."[55] It also results in decreased forest resilience and increased vulnerability to intense fires.[56]

The Thompson et al. study looked at the reburn on the 2002 Biscuit Fire:

> We used satellite data, government agency records, and aerial photography to examine a forest landscape in southwest Oregon that burned in 1987 and then was subject, in part, to salvage logging and conifer planting before it reburned during the 2002 Biscuit Fire. Areas that burned severely in 1987 tended to reburn at high severity in 2002, after controlling for the influence of several topographical and biophysical covariates. Areas unaffected by the initial fire tended to burn at the lowest severities in 2002. Areas that were salvage-logged and planted after the initial fire burned more severely than comparable unmanaged areas, suggesting that fuel conditions in conifer plantations can increase fire severity despite removal of large woody fuels.[57]

Salvage logging does not necessarily prevent subsequent disturbances, and

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[53] Donato, D.C., J.B. Fontaine, J.L. Campbell, W.D. Robinson, J.B. Kauffman, and B.E. Law. 2006. Post-wildfire logging hinders regeneration and increases fire risks. Science, January 20, 2006 Vol. 311 p. 352.
[54] Timothy Ingalsbee, Ph.D. SALVAGING TIMBER; SCUTTLING FORESTS-The Ecological Effects of Post-Fire Salvage Logging. Western Fire Ecology Center American Lands Alliance
[55] McIver, J.; and L. Starr. 2000. Environmental Effects of Postfire Logging: Literature Review and Annotated Bibliography. Gen. Tech. Rep. PNW-GTR-486. USDA-Forest Service, Pacific Northwest Research Station. 72p.
[56] Nourished by Wildfire. The Ecological Benefits of the Rim Fire and the Threat of Salvage Logging. Center For Biological Diversity_2014
[57] Thompson, J.R., Spies, T.A., and Ganio, L.M. 2007. Reburn severity in managed and 338 unmanaged vegetation in a large wildfire. Proceedings of the National Academy of Sciences 339 of the United States of America 104: 10743–10748. https://www.fs.usda.gov/treesearch/pubs/29686

sometimes it may increase disturbance likelihood and magnitude.[58] Salvage logging has been proposed to reduce post-fire hazardous fuels and mitigate re-burn effects, but debate remains about its effectiveness when considering fuel loadings are dynamic, and re-burn occurrence is stochastic, in time. Although salvage logging reduces coarse woody fuel loadings, alone it does not mitigate re-burn hazard because it increases fine woody fuel loadings and has little direct effect on reestablishing vegetation.[59]

The EA fails to take a hard look at the project's impacts on the likelihood and severity of future fires and ignores the scientific controversy surrounding the issue. Because "fire management is a crucial issue that has wide-ranging ecological impacts and affects human life," the controversy around the effects of post-fire logging on future fire severity obligates the Forest Service to conduct an EIS. *Bark v. United States Forest Serv.*, 958 F.3d 865, 871 (9th Cir. 2020) (holding Forest Service must conduct EIS where impacts of project on future fire severity are controversial).

The Forest Service's analysis of the risks of future wildfires ignores evidence that is contrary to its desired conclusions and makes numerous unsupported assumptions. This failure to analyze contrary evidence establishes that the Forest Service did not take a hard look at the project's impacts. *Bark v. United States Forest Serv.*, 958 F.3d 865, 871 (9th Cir. 2020) ("Failing to meaningfully consider contrary sources in the EA weighs against a finding that the agency met NEPA's "hard look" requirement as to the decision not to prepare an EIS.").

Additionally, the very existence of the controversy is enough to require an EIS in this scenario. There is "evidence from numerous experts" that "undermines the agency's conclusions." *Bark v. United States Forest Serv.*, 958 F.3d 865, 870 (9th Cir. 2020). This is enough "to demonstrate a substantial dispute" and because the potential implications of this controversy for the project's impacts are so large, it is enough on its own to require the agency prepare an EIS. *Id.*

LEGACY SNAG RETENTION

Nothing in a forest is wasted, especially after a fire, as biological legacies link pre- and post-disturbance conditions, life and death in the forest, and aquatic and terrestrial ecosystems. Biological legacies such as large snags and downed logs typically have long "residence" times, persisting for decades to centuries and

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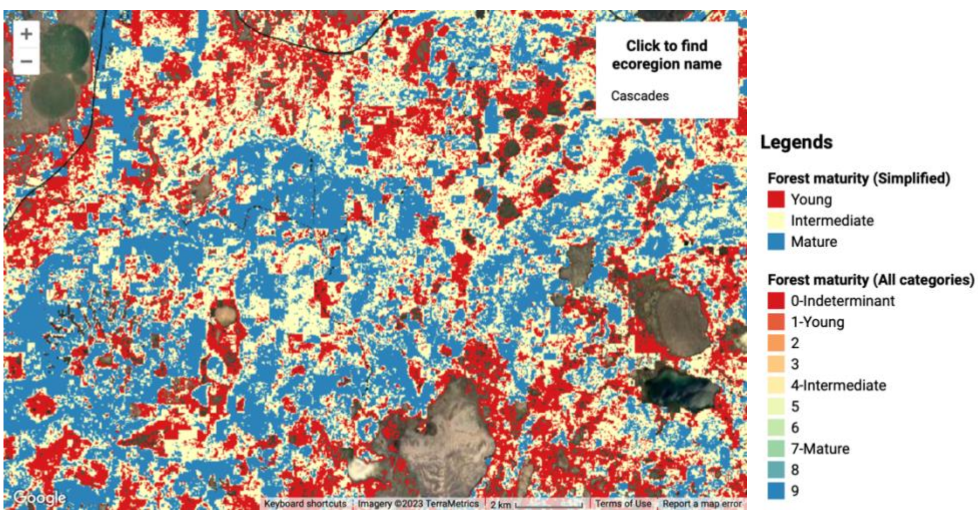
[58] Leverkus, A.B., Buma, B., Wagenbrenner, J., Burton, P.J., Lingua, E., Marzano, R. and Thorn, S., 2021. Tamm review: Does salvage logging mitigate subsequent forest disturbances?. *Forest Ecology and Management*, *481*, p.118721.

[59] Christopher J. Dunn, John D. Bailey. Modeling the direct effects of salvage logging on long-term temporal fuel dynamics in dry-mixed conifer forests. Forest Ecology and Management 341 (2015) 93–109

spanning successional stages. They include predisturbance elements (large live and dead trees, shrubs) that survive, persist, or regenerate in the burn area and are an important seed source for recolonization of plants in the new forest. They perform vital ecosystem functions such as anchoring soils (e.g., large root-wads of live and dead trees), recycling nutrients (e.g., downed logs decomposed by detritovores), storing carbon long-term (given slow rates of decomposition) and sequestering it, providing microsites for recolonizing plants and wildlife (e.g., so called "nurse-logs" that are substrate for conifer seedlings, large snags that provide shade for seedlings), and acting as refugia for numerous species (e.g., downed logs as moisture sites for salamanders, fungi, and invertebrates).When large snags along streams eventually topple into the riverbed they become hiding cover for fish, and pulses of post-fire sedimentation create spawning grounds for native fish, linking aquatic and terrestrial ecosystems. Snags are utilized by hundreds of wildlife species for foraging (as they harbor numerous insects, particularly the larval stages), nesting, hiding, roosting, perching, and denning (examples include cavity nesting birds, bats, mammals, including many rare species). Many insectivorous species that use snags, in turn, perform vital trophic functions that help keep insects in check post-fire.



The map above[60] depicts the extent of mature forest habitat in the project area.

After years of mismanaged forest, road building and overcut stands, wildfire restarts the ecological succession to the earliest stages of plant growth and interactions of biological communities, including primary seral stages of tree seedlings, woody plants, post-fire endemic wildflowers, lichens, bryophytes, fungi, and wildlife. The forest communities that experienced wildfire was not lost, but rapidly disturbed (temporarily) in extent while a new forest has begun to develop on

[60] Dominick A. DellaSala, Brendan Mackey, Patrick Norman, Carly Campbell, Patrick J. Comer, Cyril F. Kormos, Heather Keith and Brendan Rogers (2022) Mature and Old-Growth Forests Contribute to Large-Scale Conservation Targets in the Conterminous USA. *Front. For. Glob. Change* doi: https://www.frontiersin.org/articles/10.3389/ffgc.2022.979528/full

burned areas that support this newly reset forest ecosystem. Legacies of snags, dead and dying trees, mycorrhizal fungi and other species are present in sufficient abundance to regenerate the forest ecosystem without intervention (e.g., treatments, logging, road and landing construction et).

Snags play an integral role in the ecology of old-growth forests. The Northwest Forest Plan expressly states:

> Tree mortality is an important and natural process within a forest ecosystem. Diseased and damaged trees and logs are key structural components of late-successional and old-growth forests. Salvage of dead trees affects the development of future stands and habitat quality for a number of organisms. Snag removal may result in long-term influences on forest stands because large snags are not produced in natural stands until trees become large and begin to die from natural mortality. Snags are used extensively by cavity-nesting birds and mammals such as woodpeckers, nuthatches, chickadees, squirrels, red tree voles, and American marten. Removal of snags following disturbance may reduce the carrying capacity of these species for many years.

In general, the contribution of very large logs (e.g., 20 inches in diameter, or larger) to fire severity and intensity is almost negligible, as they are the fuels least available for combustion. When these large logs do burn, it is because the smaller fuels needed to ignite them and sustain combustion are present. Logs also burn mainly by smoldering combustion, which is not considered in the calculation of fire intensity. This is the reason why relatively high fuel loads comprised primarily of large-diameter woody material can be present without eliciting high intensity fire effects.

At C-40 the NFP informs the Forest Service:

> A renewable supply of large down logs is critical for maintaining populations of fungi, anthropods, bryophytes and various other organisms that use this habitat structure. Provision of coarse woody debris is also a key standard and guideline for American marten, fisher, two amphibians, and two species of vascular plants…Coarse woody debris that is already on the ground needs to be retained and protected from disturbance to the greatest extent possible during logging and other land management activities that might destroy the integrity of the substrate. Scattered green trees will provide a future supply of down woody material as the stand regenerates and are important in providing for the distribution of this substrate throughout the managed landscape.

Coarse woody debris is a necessary component of forest ecosystems. It is an essential element for many species of vascular plants, fungi, liverworts, mosses, lichens, arthropods, salamanders, reptiles and small mammals. Provision for retention of snags and logs should be made, at least until the new stand begins to contribute coarse woody debris. Natural disturbances do not result in complete mortality of stands. The surviving trees are important elements of the new stand. They provide structural diversity and provide a potential source of additional large snags during the development of new stands. Furthermore, trees injured by disturbance may develop cavities, deformed crowns, and limbs, which are habitat components for a variety of wildlife species.

Adequate numbers of large snags are especially critical for bats because these trees are used for maternity roosts, temporary night roosts, day roosts, and hibernacula. Large snags should be well distributed because bats compete with primary excavators and other species that use cavities. Day and night roosts are often located at different sites, and migrating bats may roost under bark in small groups. Thermal stability within a roost site is important for bats, and large snags and green trees provide that stability. Individual bat colonies may use several roosts during a season as temperature and weather conditions change. Roosting bats may also use large, down logs with loose bark.

The high severity patches in commercial units are providing natural openings and complex early seral habitat needed and preferred by many species for foraging. Both the Northwest Forest Plan and LRMP discuss the need to retain snags over 20" dbh for the white-headed woodpecker, flammulated owl and pygmy nuthatch, which may be living in the project area. Many Sensitive species require older forest structure, and all require relatively undisturbed habitats, even snag habitat, for at least some part of their life cycle.

It is beyond due time that the agency performs surveys and create site-specific plans for Sensitive species. Please retain large legacy trees wherever they occur on this landscape to provide for the multitude of species surviving in these post-fire habitats.

Based on the extensive literature provided herein, the USFS cannot claim that post-fire logging would make the forest more "resilient to large scale stand replacement fire" nor "provide for future habitat" when it is proposing to remove the very essential components (legacies) that are necessary for forest development. These components are produced only by a natural disturbance in a forest already having structure and provided for the structural characteristics and related functions in those forests for decades to centuries. Simply stated, biological legacies cannot be replaced by timber harvest and tree planting given the long-time lines for development.

BEST MANAGEMENT PRACTICES

"NEPA procedures must ensure that environmental information is available to public officials and citizens before decisions are made and before actions are taken." 40 CFR 1500.1(b). NEPA was enacted to ensure that important environmental effects "will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast." Robertson v. Methow Valley Citizens, 490 US 332, 348, 109 S.Ct. 1835. "...NEPA requires consideration of the potential impact of an action before the action takes place." Tenakee Springs v. Clough, 915 F.2d 1308, 1313.

Project Design Features (PDFs) and Best Management Practices (BMPs) are developed to reduce environmental effects and ensure project activities are implemented to comply with standards and guidelines. Here they have been utilized as a substitute for site-specific analysis as a gross planning tool that fosters post fire logging under the assumptions that the BMPs and PDFs will protect all resources. Numerous studies[61] and assessments in USFS Region 5, have documented post-fire logging on public forests as the primary causal mechanism for loss, degradation, and inhibited recovery of aquatic and terrestrial ecosystems.

The EA fails to disclose and analyze the likely impacts of the proposed logging, yarding, road construction and reconstruction, road maintenance, landing construction, mastication and tractor piling on the environment. The agency cannot rely on PDFs and BMPs to eliminate impacts. The USFS should be aware that the National Marine Fisheries Service (NMFS) criticizes the use of Best Management Practices (BMPs) and mitigation as poor surrogates for addressing cumulative watershed effects because BMPs are addressed to individual actions and fail to do limit the totality of individual actions within a watershed. In a 1997 Position Paper on the Oregon Forest Practices Act, NMFS points out that:

> Cumulative effects of forest practices may include changes in sediment, temperature, and hydrological regimes, resulting in direct, indirect or eventual loss of key habitat components (e.g., clean gravel interstices, large woody debris, low temperature holding pools, and protected off-channel rearing areas) necessary for spawning and rearing of anadromous salmonids. These changes often are not expressed "immediately" at the project site, but instead may occur subsequent to triggering events (fire, floods, storms) or are manifested off-site (downstream) of where the effects are initiated.

[61] Beschta, R.L., J.J. Rhodes, J.B. Kauffman, R.E. Gresswell, G.W., Minshall, J.R., Karr, D.A. Perry, F.R. Hauer, and C.A. Frissell. 2004. Postfire management on forested public lands of the western United States. Conservation Biology 18:957-967.

Please note that the prevention of potentially adverse impacts at the project site is indeed necessary, but not sufficient to avoid cumulative effects (CEQ 1971). As Reid (1993)[62] states:

The BMP approach is based on the premise that if on-site effects of a project are held to an acceptable level, then the project is acceptable, regardless of activities going on around it. Interactions between projects are beyond the scope of BMP analysis, and operational controls are applied only to individual projects.

However useful site specific BMPs are in minimizing effects of individual actions, they still do not address the cumulative effects of multiple actions occurring in the watershed which, though individually "minimized" through application of site-specific BMPs, may still be significant, in their totality, and have undesirable consequences for beneficial uses such as salmon populations and salmon habitat.

The argument that applying a BMP while conducting a specific forest practice minimizes site-specific effects and thus also minimizes cumulative effects is logically flawed. Every BMP is an action and has an effect ... thus generally, the more the BMPs are applied the greater the cumulative effect. Only by minimizing the number of actions, i.e., the number of individual applications of BMPs, would cumulative effects by minimized. This is precisely why a cumulative effects assessment is needed—to establish the watershed-specific limits and excesses of BMP applications. Every BMP is an action and has an effect and hence the more the BMPs are applied the greater the cumulative effect.

FAILURE TO ENGAGE WITH BEST AVAILABLE SCIENCE

The Ninth Circuit Court of Appeals has strongly cautioned the agency that reliance upon traditional forestry studies that are called into question by a wide range of current studies will not suffice for NEPA purposes. "NEPA requires agencies to consider all important aspects of a problem,"[63] and failing to address contrary science violates that requirement.

> The effects analysis in the EA did not engage with the considerable contrary scientific and expert opinion; it instead drew general conclusions such as that "[t]here are no negative effects to fuels from the Proposed Action treatments."
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> [. . .]

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[62] Reid, Leslie M. 1993. Research and cumulative watershed effects. Gen. Tech. Rep. PSW-GTR- 141. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 118 p.

[63] *Bark v. U.S. Forest Serv.*, 958 F.3d 865 (9th Cir. 2020).

> Throughout the USFS's investigative process, Appellants pointed to numerous expert sources concluding that thinning activities do not improve fire outcomes. In its responses to these comments and in its finding of no significant impact, the USFS reiterated its conclusions about vegetation management but did not engage with the substantial body of research cited by Appellants. Failing to meaningfully consider contrary sources in the EA weighs against a finding that the agency met NEPA's "hard look" requirement as to the decision not to prepare an EIS.[64]

ROADS

A better understanding of the existing primary and secondary roads and skid trail network construction histories is needed in these areas to perform a proper analysis of impacts, the previous condition of the forest in some areas were imperiled by 3 to 4 cycles of logging and mismanagement. Increasing sediment inputs and fragmenting habitat by disturbing thousands of acres of damaged and erodible watersheds with heavy machinery, road reconstruction, construction road and use, landing construction, machine pilling, mastication, ripping and the creation of thousands of skid trails must be avoided after such intense and widespread fire, especially in watersheds that have already suffer degradation from past management activities.

Road and skid trail use and new construction impede forest ecosystem regeneration when it compacts soils, removes "biological legacies" (e.g., large dead standing and down trees) introduces or spreads invasive species like highly flammable cheat grass, causes significant and often irreparable impacts to soil health. Planting nursery trees and restocking after wildfire with conifers does not offset the negative cumulative effects associated with logging, machine pilling, ripping, road and landing construction and/or temporary roads.

CUMULATIVE EFFECTS

EAs are required to consider the cumulative impacts of a project in combination with other related projects that will contribute to the proposed project's "reasonably foreseeable" environmental impacts. 40 C.F.R. §1508.1(g); *see Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt.*, 387 F.3d 989, 1001 (9th Cir. 2004). Consideration of cumulative impacts must discuss the actual "impacts that will be caused . . . including how the combination of those various impacts is expected to affect the environment." *Id.* at 1001. The conclusions made must be supported by "quantified or detailed information" and that information must be made available to the public. *Id.* at 996.

[64] Id., citations omitted.

The Ninth Circuit recently cautioned the Forest Service against performing the type of cumulative impacts analysis that this EA reflects. In *Bark v. USFS*, the Court stated that the EA's cumulative-impacts analysis was insufficient because it merely listed other projects in the area and made conclusory statements regarding impacts without quantifying potential impacts of this project as well as ongoing and future impacts of related projects. It failed to make any factual findings on actual, expected impacts, instead relying primarily on BMPs to mitigate impacts and avoid overall impacts analysis. "These are the kind of conclusory statements, based on vague and uncertain analysis,' that are insufficient to satisfy NEPA's requirements."[65] The revised EA/EIS should attempt to differentiate larger-scale cumulative impacts from the direct impacts of the action, given the Court's concern, also noted in *Bark*, that the spatial scale of cumulative-impacts analysis for the timber project at issue was nearly identical to the scale used for direct impacts analysis, rendering the cumulative impacts analysis meaningless.[66]

INVASIVE NON-NATIVE PLANT SPECIES

Invasive non-native weeds are a primary threat to our nation's forests and grasslands. One of the requirements contained in the FSM 2900 is for a determination of "the risk of introducing, establishing or spreading invasive species associated with any proposed action, as an integral component of project planning and analysis, and where necessary provide for alternatives or mitigation measures to **reduce or eliminate** that risk prior to project approval."

Although the impacts of the fire (canopy loss, soil disturbance, etc.) have created a suitable habitat for invasive plant species, it is indisputable that further soil disturbance that would occur as a result of the proposed project would increase the spread of invasive species across the project area, even with a marginal improvement of canopy trees. Even with the use of the Project Design Features the chance of spreading and establishing invasive species, would greatly increase if the proposed action is carried out.

In addition, the EA should reflect and analyze the significant danger of spreading highly flammable cheatgrass. The Klamath National Forest must address and take this threat seriously and better yet avoid spreading this highly flammable invasive species throughout the project area. It is not sufficient to merely monitor the spread, claim the pre-existing presence as the problem, disturb over 20,000 acres with heavy machinery and rely on PDFs to mitigate the known risk.

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[65] *Id*. (*citing Ocean Advocates v. U.S. Army Corps of Eng'rs*, 402 F.3d 846 at 869).
[66] *See id.* at 872-73.

TRIBAL CONSULTATION

Decision makers must have regular, meaningful and robust consultation with affected Tribes. Please see this January 26, 2021, Memorandum concerning Tribal Consultation and Strengthening Nation-to-Nation Relationships.

Executive Order 13175 of November 6, 2000 (Consultation and Coordination with Indian Tribal Governments), charges all executive departments and agencies with engaging in regular, meaningful, and robust consultation with Tribal officials in the development of Federal policies that have Tribal implications. Tribal consultation under this order strengthens the Nation-to-Nation relationship between the United States and Tribal Nations. The Presidential Memorandum of November 5, 2009 (Tribal Consultation), requires each agency to prepare and periodically update a detailed plan of action to implement the policies and directives of Executive Order 13175.

We urge the KNF to have regular, robust and meaningful consultation with *all* affected Tribes. Sending a letter is not sufficient. Further, the list of Tribes reflected in the EA is incomplete. This area is culturally significant to multiple Indigenous Tribes across Northern California, including but not limited to the Hupa and Yurok peoples.

ARCHEOLOGY AND CULTURAL RESOURCES

Again, we are concerned that the EA is void of any analysis concerning cultural resources. It alone relies on PDFs and future monitoring. This is contrary to the spirit and direction of NEPA.

BORAX

Borate compounds (Borax- sodium tetraborate decahydrate) are a fungicide that is being applied by the US Forest Service (USFS) throughout our public forestlands to prevent the spread of Heterobasidion annosum, a root rot disease. It also has insecticide and herbicide properties. Human health concerns include: it is an extreme eye irritant; can cause inhalation irritation; is easily absorbed through broken skin; can be lethal when digested; and it may be a reproductive toxin. Borate acts as a nonselective herbicide that can persist unchanged in the soils for years. It can leach rapidly during heavy rains. Borate is lethal to plants, including endangered and threatened species. Studies show it may not be as effective as believed. Many annosus root disease prevention alternatives exist. These include limiting logging activities; removing and burning infected stumps; seasonal cutting to avoid reproductive basidiospores; pre and post cut prescribed burns, and applying the competitive fungus Phlebiopsis gigantea to stumps as a biocontrol agent. The USFS is failing to evaluate non-borax annosus prevention alternatives and in most cases failing to conduct project specific environmental effects analysis. This is of concern because the agency is applying large quantities of borax during multiple projects on public lands.

Please provide site-specific information on the proposed use and harm of Borax application. At what proximity to water sources might it be applied? At what proximity to sensitive and non-targeted native vegetation would borax be applied? At what proximity to wildlife, including TE&S, MIS, and species of special concern, would it be applied? What safety precautions would be taken to protect all these resources? What time of year and under what weather conditions would it be applied? Are there times that borax use would not be needed (like hot dry times)? Are there weather conditions that would prohibit the use of borax (rainy or wet and causing it to easily wash off stumps)? This information along with application criteria and safety designs should be clearly defined and made accessible within the planning documents. Borate compounds are considered as pesticides, there must be a Pesticide Use Proposal completed and approved prior to any decision, as well as a spill plan.

CLIMATE AND BIODIVERSITY CRISIS

The preliminary EA fails to address the project's impacts on climate change and greenhouse gases (GHGs), including GHGs and direct and indirect short- and long-term impacts on the environment; additionally, it ignores the science demonstrating the importance of charcoal, carbon release during post-fire logging, and the connection between post-fire logging and increased release of GHGs.

The "Executive Order on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis" stated: "the policy of [the] Administration [is] to listen to the science; to improve public health and protect our environment [...] to reduce greenhouse gas emissions; [and] to bolster resilience to the impacts of climate change." The EA fails to address key points of the EO.

The Forest Service must quantify direct and indirect impacts as well as short and long-term impacts of the project. The EA does not even attempt to quantify direct or indirect impacts, short- and long-term impacts.

Post-Fire Logging Releases GHGs

We ask that the Forest Service contend with the science stating that post-fire logging is harmful and releases GHGs. A study of GHG emissions in Oregon found that the "wood products sector generated about one and a half times more emissions than [...] transportation or energy sector emissions [...]. Wood product emissions are the result of fuel burned by logging equipment, the hauling of timber, milling, wood burned during forestry activities, and the ongoing decomposition of trees after they are cut. Forest fire emissions were less than a quarter of all forest sector emissions in each of the five-year increments studied between 2001 and 2015."[67] There is ample evidence that logging causes GHG emissions.

Post-Fire Logging Increases the Release of Carbon

The Forest Service also failed to acknowledge the array of scientific literature that has found that carbon emissions are increased by post-fire logging.

> [Post-fire logging] expedites the release of carbon into the atmosphere and directly exacerbates climate change. First, the amount of carbon harvested necessary to change fire behavior is often far larger than that saved by changing fire behavior. Second, there is a very low likelihood that a forest will burn again before carbons stocks naturally regenerate. This eliminates any GHG benefit that logging could have theoretically conferred. [...] [t]his is not merely a minor amount of carbon released during logging. Campbell, Harmon, & Mitchell (2011) found that 'protection of one unit of C[arbon] from wildfire combustion comes at the cost of removing three units of C[arbon] in fuel treatments.'

Carbon stored in snags and soil represents a large storage pool that should be protected from post-fire logging.[68]

Carbon Storage in Snags

Snags are a critical source of storage of C, as they are less prone to loss compared to C storage in soil, which is more vulnerable to erosion.[69] Salvage logging causes a loss of C stored in the area being logged.[70] Additionally, snags and decaying wood generally keep soils productive, "enhancing carbon sequestration capacity over time."[71] Critically, forests keep most of their stored carbon even after severe wildfires, as long as snags were not targeted by [post-fire] logging.[72]

Carbon Storage in Soil

This EA calls for thousands of acres of ground-based disturbance. C storage in soil "offers numerous benefits related to nutrient retention, below-ground biological activity, and water holding capacity."[73] A 2018 study found that there is long-term sink capacity in carbon stored in soil and sediment.[74] There is valuable carbon stored in post-fire soils that would be irreparably harmed by commercial logging.

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[67] https://www.hcn.org/issues/50.11/climate-change-timber-is-oregons-biggest-carbon-polluter
[68] https://www.sciencedirect.com/science/article/pii/S0378112712004513
[69] https://agupubs.onlinelibrary.wiley.com/doi/epdf/10.1002/2017JG003832
[70] https://www.nrs.fs.fed.us/pubs/jrnl/2012/nrs_2012_bradford_001.pdf
[71] https://www.earthisland.org/journal/index.php/articles/entry/logging-carbon-emissions-us-forests/
[72] https://oregonwild.org/forests/climate-change/forest-carbon-101
[73] http://greenyourhead.typepad.com/files/biochar_for_forest_restoration_wba.pdf
[74] https://agupubs.onlinelibrary.wiley.com/doi/epdf/10.1029/2018JG004490

Post-Fire Logging Damages Charcoal and Critical C Storage

The Forest Service should consider the importance of charcoal for carbon storage, its contribution to soil health and forest regeneration in its EA.

> Charcoal represents a super-passive form of carbon (C) that is generated during fire events and is one of the few legacies of fire recorded in the soil profile; however, the importance of this material as a form of C storage has received only limited scientific attention. Charcoal produced during wildfire events represents an important form of long-term C storage in forest ecosystems. Forest management practices, such as salvage logging or thinning without prescribed fire, may reduce soil charcoal content, and, thus, long-term C storage in mineral soils.

Post-fire logging impacts soil charcoal levels. By removing burned trees, it "removes a lot of char that would otherwise fall to the ground and become incorporated into soil over time. [...] This is one of the ways that charcoal can get incorporated into soil." [75] Charcoal improves nutrient cycling, soil's water holding capacity, and improves tree growth.[76] The removal of burned trees negatively impacts the charcoal levels in soil. This must be weighed as a real consequence of the proposed project.

The Truth About Wood Products

Post-fire logging hinders the re-establishment of forests, increases the risk of forest loss, and results in a loss of C storage. When we use active forest management, which itself is ecologically unnecessary, we run the risk of "creating new problems before we solve the old ones."[77]

A large amount of emissions are caused by cutting, logging, hauling and milling is a factor. Much of the carbon-storing biomass from trees is contained within the tops and branches, which are often burned or left to deteriorate. Then, a significant portion of the tree is lost during milling. The carbon emissions of hauling lumber to outlets and then manufacturing is another addition in the total emissions. Include the actual lifespan of the product that is made from the wood that often ends up in a landfill. The myth —concerning wood products storing carbon in the long-term— that is perpetuated by the agency and timber industry needs to stop and consider

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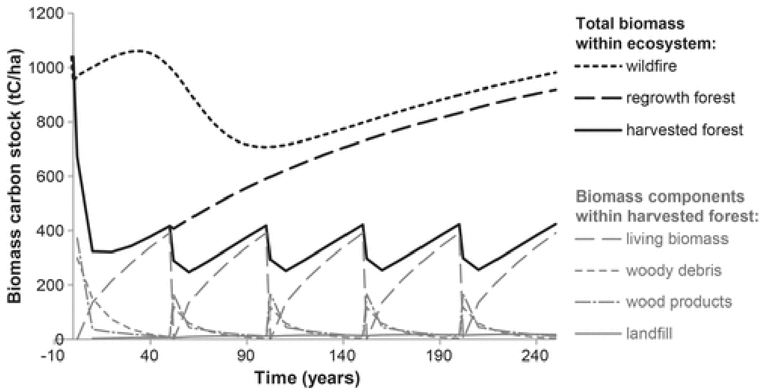
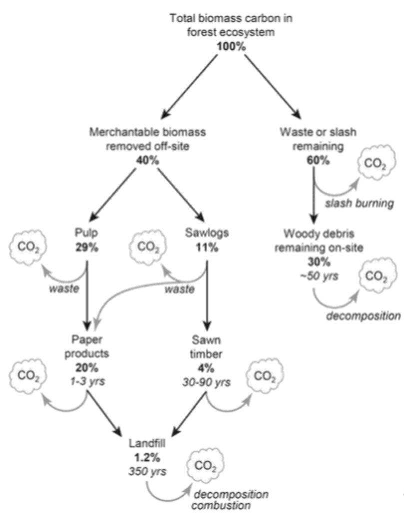
[75] https://greenyourhead.typepad.com/files/biochar_for_forest_restoration_wba.pdf
[76] https://greenyourhead.typepad.com/files/biochar_for_forest_restoration_wba.pdf

[77] Beschta et al. Wildfire and Salvage Logging. Recommendations for Ecologically Sound Post-Fire Salvage Management and Other Post-Fire Treatments On Federal Lands in the West 1995.

the reality of the and carbon lost and emissions cast into the atmosphere to make wood products.



"Changes in total biomass carbon stock of the ecosystem over time under three scenarios (shown as black lines) from an initial stock of a native forest: (1) wildfire that occurred at time 0 years and then the forest regenerated and dead biomass decomposed over time, (2) regrowth forest after logging once and regeneration, and (3) harvested forest under a regime of repeated logging rotations consisting of clearcutting and slash burning on a 50 year cycle. The carbon stock within the harvested forest is separated into biomass components (shown as grey lines): (1) living biomass, (2) dead and downed woody debris, (3) wood products, and (4) landfill. These biomass components constitute part of the harvested forest system but are not all located at the same site; living biomass and dead and downed woody debris occur at the forest site, but wood products and landfill occur in different locations."[78]



[79]

"Transfer of biomass carbon during harvesting and processing of wood products. Numbers in bold represent the proportion of the total biomass carbon in the forest that remains in each component. Numbers in italics are the average lifetime of the carbon pool (see data sources in Appendix E: Table E1)."[80]

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[78] https://esajournals.onlinelibrary.wiley.com/doi/10.1890/ES14-00051.1
[79] https://esajournals.onlinelibrary.wiley.com/doi/10.1890/ES14-00051.1
[80] https://esajournals.onlinelibrary.wiley.com/doi/10.1890/ES14-00051.1

Harvesting trees for wood products results in net emissions and is not an energy-neutral process.[81] Transferring C from forest biomass to wood product carbon pools is inefficient and leads to an overall loss of C storage. C is lost when forests are harvested compared to old growth forests, "even when storage in wood products and landfill are included."[82] Additionally, C stocks are younger and have less longevity in logged forests compared to old growth forests."[83]

The EA Fails to Take a Hard Looks at Climate Impacts

Please note, the Ninth Circuit has made clear that merely concluding that a given quantity of emissions is a small part of global GHG emissions is not a sufficient analysis under NEPA. *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1217 (9th Cir. 2008). "[T]he fact that climate change is largely a global phenomenon that includes actions that are outside of the agency's control does not release the agency from the duty of assessing the effects of *its* actions on global warming." *Id.* (internal quotation marks and citation omitted).

There are two cases where courts have held that the Forest Service met their obligation to analyze climate impacts associated with logging projects with relatively minimal analysis. Both cases have reached that conclusion on the argument that NEPA only requires that "[i]mpacts shall be discussed in proportion to their significance." *Hapner v. Tidwell*, 621 F.3d 1239, 1245 (9th Cir. 2010); *Earth Island Inst. v. Gibson*, 834 F. Supp. 2d 979, 990 (E.D. Cal. 2011), *aff'd sub nom. Earth Island Inst. v. U.S. Forest Serv.*, 697 F.3d 1010 (9th Cir. 2012). However, in both cases, the impacts at issue were significantly less than those threatened by the proposed project. *See Hapner,* 621 F.3d at 1242, 1245 (project only planning to take actions, which primarily involved thinning and not clearcutting trees, on 1,010 acres); *Earth Island Inst.*, 834 F. Supp. 2d (project proposing postfire recovery on 1,149 acres). Additionally, the Forest Service still did at least some meaningful analysis in both cases, while the short analysis of the proposed project relied only on faulty assumptions. *See Hapner,* 621 F.3d at 1245 (Forest Service "addressed comments regarding climate change"); *Earth Island Inst.*, 834 F. Supp. 2d at 990 (Forest Service calculated the amount of emissions). The proposed project involves much more forested land than the other two cases and the Forest Service failed to supply any meaningful analysis of the impacts.

The Forest Service is obligated to quantify the amount of greenhouse gas emissions from this project in combination with related projects and must "evaluate the 'incremental impact' that these emissions will have on climate change or on the environment more generally in light of other past, present, and reasonably foreseeable action." *Id.* at 1216. This analysis must include the "*actual*

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[81] https://carbon2018.globalchange.gov/chapter/9/
[82] https://esajournals.onlinelibrary.wiley.com/doi/10.1890/ES14-00051.1
[83] https://esajournals.onlinelibrary.wiley.com/doi/10.1890/ES14-00051.1

environmental effects resulting from those emissions." *Id.* at 1216 (emphasis in original).

The only discussion of climate change in the EA purports that artificial replanting would provide forests in the future. The EA did not calculate cumulative GHG emissions from this proposed project and other related projects or describe the actual effects of those emissions. Thus, the Forest Service failed to look at the impacts of the proposed action with regards to climate change, including the cumulative impacts of its emissions from similar actions.

<u>CONCLUSION</u>

Again, there is almost universal agreement that salvage logging does not leave watersheds and forests in a healthier more resilient state. The post-fire ecosystems surrounding Medicine Lake, home to one of only three of California's know gray wolf packs, have more to offer than simply another opportunity for "salvage" logging and plantation forestry. We urge the Klamath National Forest to greatly reduce the

Antelope Tennant project impacts by: diminishing the footprint; retaining live trees, biological legacies and meaningful snag numbers and; to allow for a well-informed public comment opportunity for better decision making.

Thank you for considering our concerns.

Sincerely,

Kimberly Baker
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Klamath Forest Alliance
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Arcata, CA 95521