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2 May 2024

TO: Shane Jeffries, Ochoco Forest Supervisor, Objections Reviewing Officer
VIA: https://cara.fs2c.usda.gov/Public/CommentInput?Project=58081

Subject: 36 CFR 218 objection of the Mill Creek Dry Forest Restoration Project

Dear Forest Service:

In accordance with 36 CFR 218, Oregon Wild hereby objects to the project described below. Oregon Wild appreciates that the Forest Service has made some adjustments to this project that we support, such as dropping logging of large trees >21" dbh, and dropping most of the logging in riparian areas, but we still have concerns about this project and we think it could be further modified to meet a broader set of public values from our National Forest.

DOCUMENT TITLE: draft Decision Notice for the Mill Creek Dry Forest Restoration Project

PROJECT DESCRIPTION: Modified Alt. 4 of the Mill Creek Project involves: Commercial thinning up to 21" dbh across 7,749 acres; biomass thinning on 1,182 acres; non-commercial thinning only on 4,432 acres; prescribed underburning or handpiling and underburning only on 4,286 acres; riparian restoration and floodplain enhancement on 23 miles of stream channel; 49 miles of temporary road construction (9 miles of which is new disturbance), closure or decommissioning of about 6 miles of road; opening of 1 mile of road; and reinforcement of road closures at about 26 locations. Logging and road construction will affect two significant uninventoried roadless areas >1,000 acres. Logging will emit 7811 metric tons of CO_2.

PROJECT LOCATION (Forest/District): Lookout Mountain Ranger District, Ochoco National Forest

PROJECT URL: https://www.fs.usda.gov/project/ochoco/?project=58081

NAME AND TITLE OF RESPONSIBLE OFFICIAL: Slater Turner, Lookout Mountain District Ranger

LEAD OBJECTOR: Oregon Wild. Contact: dh@oregonwild.org

REQUEST FOR MEETING TO DISCUSS RESOLUTION: Oregon Wild hereby requests a meeting to discuss potential resolution of the issues raised in this objection.

NARRATIVE DESCRIPTION OF THOSE ASPECTS OF THE PROPOSED DECISION ADDRESSED BY THE OBJECTION:

Oregon Wild objects to commercial logging and biomass extraction in the unroaded areas adjacent to the Mill Creek Wilderness and in the vicinity of Stein's Pillar.

The EA failed to accurately inventory and describe the unroaded/undeveloped areas within the project area. The EA failed to accurately map and describe the proposed activities within the unroaded/undeveloped areas. The EA failed to take a hard look at the potentially significant adverse effects of logging and roads within unroaded/undeveloped areas. And failed to prepare an EIS to consider those effects. The EA failed to describe the comparative benefits of either the no action alternative that would allow natural processes to flourish, or another reasonable alternative that would focus on non-commercial thinning and prescribed fire within unroaded/ undeveloped areas.

Oregon Wild also objects to the EA's flawed analysis of the effects of logging on greenhouse gas emissions and climate change. The EA failed to consider the social cost of carbon dioxide emissions, offered misleading analysis about the effects of logging and wood products on carbon storage/emissions, failed to properly describe significant cumulative effects, failed to provide an accurate analysis of the effect of wildfire on climate change adaptation, failed to consider an alternative that harmonizes the need to avoid GHG emissions and the need for manage the forest for climate change adaptation/ resilience.

There are potentially significant effects caused by logging and road construction on unroaded/ undeveloped areas and global climate change. This requires preparation of an EIS.

Oregon Wild shares many of the concerns and objections raised by Central Oregon Landwatch and Great Old Broads for Wilderness. We are focusing our objection on a couple of additional issues that we feel strongly about. We hope the FS can resolve our concerns and those of Central Oregon Landwatch and Great Old Broads for Wilderness.

SUGGESTED REMEDIES THAT WOULD RESOLVE THE OBJECTION:

Oregon Wild respectfully requests that the Forest Service —

1. Issue a clear decision that avoids commercial logging, road building, and biomass extraction in the unroaded areas south of the 33 road, adjacent to the Mill Creek Wilderness and Steins Pillar (i.e., all or parts of units 272, 279, 278, 276, 270, 241, 243, 195, 329.2, 212, 189, 329.1, 324, 324.2, 324.1, 92, 93, 102, 117, 118, 125, 137, 319, 146, 154, 182, 202, 218), and conduct any needed restoration in this area using non-commercial thinning and prescribed fire, (Note: this request also mitigates the climate impacts of this project by retaining more live trees and enhancing carbon storage and accumulation.), or
2. Prepare a new EIS to address the significant impacts and unresolved conflicts and fully complies with the requirements of NEPA and the CEQ regulations (and 2023 CEQ Guidance on Consideration of Greenhouse Gas Emissions and Climate Change) on and addresses the specific concerns about the NEPA analysis described in this objection.

DESCRIBE HOW THE OBJECTIONS RELATE TO PRIOR COMMENTS:

Oregon Wild provided a map showing the extent of unroaded/undeveloped areas, and we provided detailed comments during both scoping and EA comment periods urging the Forest

Service to avoid logging and road building in unroaded areas, urging the FS to be inclusive in identifying roadless boundaries, and to carefully consider both the adverse effects of logging and the beneficial effects of natural processes.

Oregon Wild's prior comments on the Mill Creek Project specifically addressed the need to manage the forest to maintain carbon storage, avoid carbon emissions, and harmonize those goals with climate change adaptation/resilience, as well as the need to prepare a NEPA analysis that takes a hard look at the effects of logging on carbon emissions and global climate change.

Our comments on the Mill Creek draft EA said "The agency should follow the latest (2023) CEQ guidance for analysis of global climate change in federal NEPA analyses, including quantification of GHG emissions, quantification of the social cost of GHG emissions, disclosure whether the project makes progress toward or away from climate goals, comparison of effects with-and-without the project, and development of alternatives that avoid, minimize, and mitigate effects of emissions. [*citing*] Council on Environmental Quality 2023. National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change https://www.federalregister.gov/documents/2023/01/09/2023-00158/national-environmental-policy-act-guidance-on-consideration-of-greenhouse-gas-emissions-and-climate."

SPECIFIC ISSUES RELATED TO THE PROPOSED ACTION:

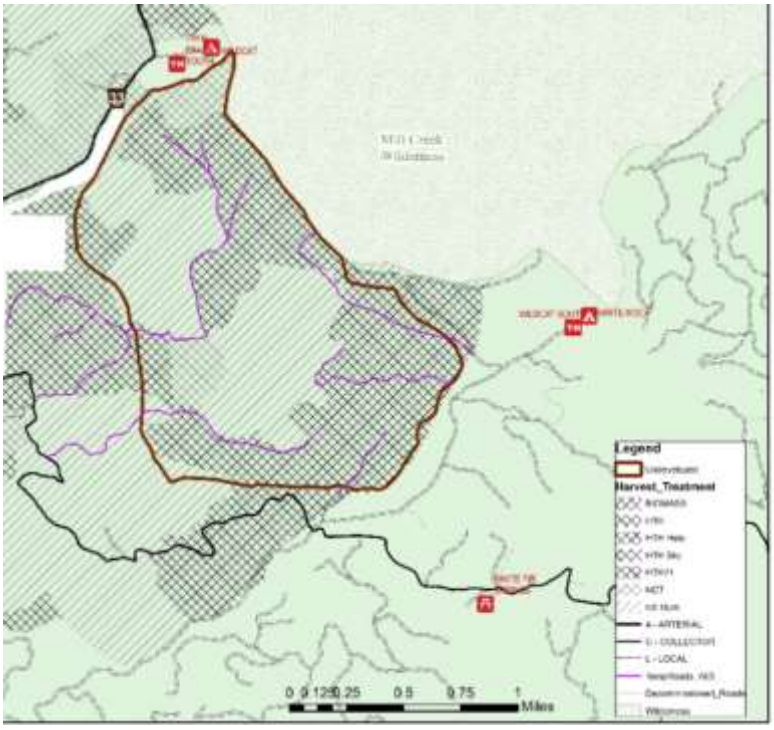
The EA Failed to Take a Hard Look at Effects on Unroaded Areas

The Mill Creek Project proposes hundreds of acres of commercial logging and biomass extraction, and many miles of road construction in unroaded/undeveloped areas. Such areas are rare on the landscape and provide disproportionate ecosystem services. Logging and roads will irreversibly convert these areas from undeveloped to developed resulting in significant adverse effects on soil, water, wildlife habitat, carbon storage, GHG emissions, recreation, weeds, etc.

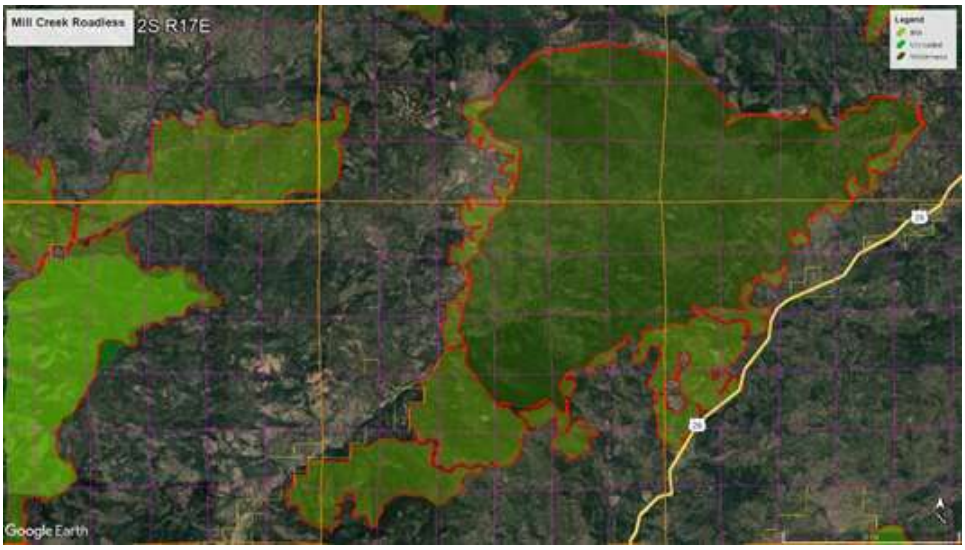
The Mill Creek EA failed to accurately inventory unroaded areas, failed to take a hard look at the potentially significant adverse effects of logging and roads, failed to disclose the benefits of allowing natural processes flourish in such areas, failed to consider alternatives that would minimize and mitigate adverse effects (such as non-commercial thinning and prescribed fire instead of commercial logging and new roads). The consideration of potentially significant effects on unroaded areas requires preparation of an EIS.

The EA Failed to Provide an Accurate Inventory of Unroaded Areas <1,000 Acres.

The Mill Creek EA and Figure 43 (below) state that 596 acres of commercial logging and 4.2 miles of new temporary road construction would occur in a 1,160 acre unroaded polygon.



However, the Mill Creek EA shows only a small subset of the actual unroaded area as unroaded/undeveloped. We think there are a lot more unroaded/undeveloped areas than recognized by the Forest Service, and a lot more logging and road construction in those areas. This map below, produced by Oregon Wild using criteria similar to that used by the Forest Service, shows the Mill Creek Wilderness as dark green polygon, and unroaded/undeveloped areas in lighter green polygons.



This map below, produced by Oregon Wild, zooms in on the significant unroaded/undeveloped areas southwest of the Mill Creek Wilderness and south of the 33 road, where extensive logging and roads are proposed under this project.

The unroaded area that is directly contiguous with the Mill Creek Wilderness is, by the FS' own admission, over 1,000 acres, and the area west of the 3350 road that includes Stein's Pillar is 1,717 acres. We also note that these two unroaded areas are separated by a single road 3350 which is designated as maintenance level 1 and closed to the public. This means the two unroaded areas function as a contiguous block, which means even greater ecosystem services, which increase non-linearly with patch size. The FS should consider an alternative that decommissions that 3350 road so the area can be managed and restored as part of the natural range of variability for unroaded/ undeveloped areas. This would support a variety of important public values and maintain options for future wilderness designation.
This clip below from Map 11 in Appendix D of the Mill Creek EA shows Alternative 4's plans for extensive commercial logging, biomass removal, and temporary roads in the unroaded areas south of the Mill Creek Wilderenss and the 33 road. All or parts of units 272, 279, 278, 276, 270, 241, 243, 195, 329.2, 212, 189, 329.1, 324, 324.2, 324.1, 92, 93, 102, 117, 118, 125, 137, 319, 146, 154, 182, 202, 218 appear to overlap the unroaded areas identified by Oregon Wild.

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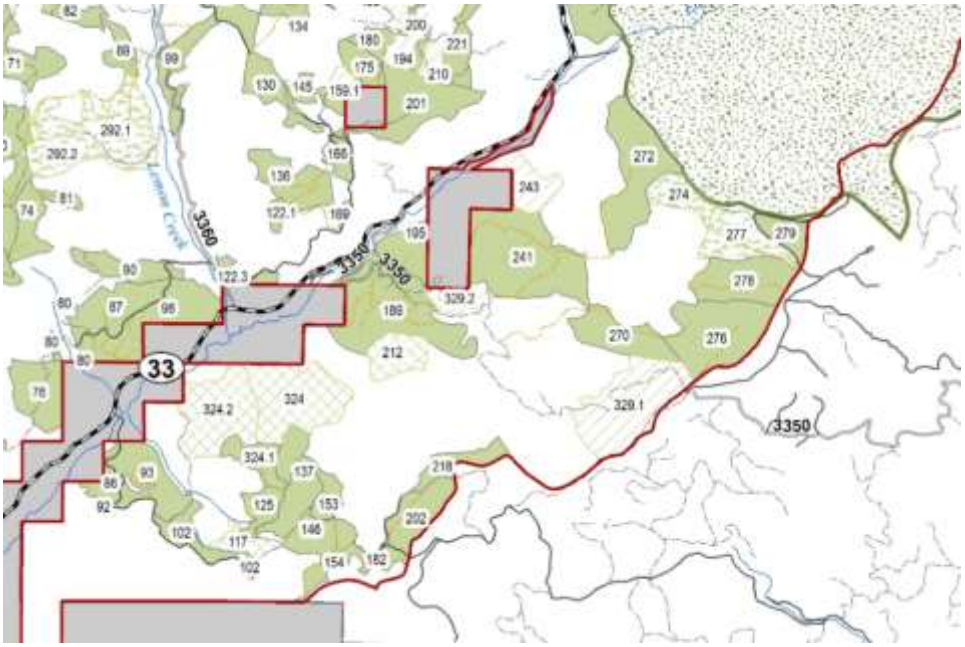


The EA failed to explain why the >1,000 acre unroaded areas identified by Oregon Wild and described in our comments were excluded from the FS inventory of unroaded/undeveloped. It is not clear why the FS came to such a different roadless inventory because the criteria used by Oregon Wild are not very different from those used by the Forest Service. The FS used criteria such as: substantially unnoticeable harvest activity, free of roads, and >1,000 acres. This is pretty much how Oregon Wild developed out inventory. The FS added one more criterion that may be the source of confusion and exclusion, i.e., "the area is configured in a manner that is characteristic of undeveloped lands." We are not sure what that means or how it may have played a role in excluding the areas that Oregon Wild identified as unroaded/undeveloped. In any case, the NEPA analysis is unclear and incomplete and violates NEPA's mandate for accurate scientific analysis.

Our scoping comments made clear that the FS needs to be inclusive when identifying unroaded areas, and our EA comments reminded the FS of that duty. The Forest Service should follow its internal guidance (effective 1/30/2015) for "broad and inclusive" identification of potential wilderness, and public involvement in that process. The FS Planning Handbook says:

> The primary function of the inventory step is to efficiently, effectively, and transparently identify all lands in the plan area that may have wilderness characteristics as defined in the Wilderness Act.
>
> The inventory is intended to be reasonably broad and inclusive, based on the inventory criteria set out in this section and additional information provided to the Responsible Official through the required opportunities for public and government participation (sec. 70.61 of this Handbook). The intent is to identify lands that may be suitable, so that they can be evaluated and to allow for public input and feedback …
>
> …

Include in the inventory areas that contain the following road improvement attributes if the areas also meet the other inventory criteria...

a. Areas that contain forest roads maintained to level 1;
b. Areas with any routes that are decommissioned, unauthorized or temporary, or forest roads that are identified for decommissioning in a previous decision document, or identified as likely unneeded in a travel management plan …

…

f. Areas with historical wagon routes, historical mining routes, or other settlement era transportation features considered part of the historical and cultural landscape of the area.

…

[The following developments should also be included in the inventory]

2. Vegetation treatments that are not substantially noticeable.
3. Timber harvest areas where logging and prior road construction are not substantially noticeable.
4. Permanently installed vertical structures, such as electronic installations that support television, radio, telephone, or cellular communications, provided their impacts, as well as their maintenance and access needs, are minimal.
5. Areas of mining activity where impacts are not substantially noticeable.

…

10. Lands adjacent to development or activities that impact opportunities for solitude. The fact that nonwilderness activities or uses can be seen or heard from within any portion of the area, must not, of itself, preclude inclusion in the inventory. It is appropriate to extend boundaries to the edges of development for purposes of inclusion in the inventory.

…

The Responsible Official shall ensure that the Interdisciplinary Team documents the evaluation … The intent is to ensure that the process for inventory and evaluation is transparent and accessible to the public for input and feedback.

…

Evaluate the degree to which the area has outstanding opportunities for solitude or for a primitive and unconfined type of recreation. The word "or" means that an area only has to possess one or the other. The area does not have to possess outstanding opportunities for both elements, nor does it need to have outstanding opportunities on every acre.

2012 Planning Rule Directives. FSH 1909.12- Chapter 70 – Wilderness. http://www.fs.usda.gov/detail/planningrule/home/?cid=stelprd3828310. (Note: The ML1 road 3350 should be included in the inventory, and all the lands South and west that do not have noticeable harvest or roads. It would make absolutely no sense to include such areas in an inventory of potential wilderness but exclude them from an inventory of unroaded/undeveloped areas which should be even more inclusive, not less).

The map of unroaded areas provide by Oregon Wild is a public comment that needs a response form the Forest Service. The Forest Service's notice-comment-objection regulations state unambiguously "Consideration of comments. (1) The responsible official shall consider all written comments submitted in compliance with paragraph (a) of this section." 36 CFR 218.25 (b). The rules define "*Specific written comments"* as –

> Written comments are those submitted to the responsible official or designee during a designated opportunity for public participation (§218.5(a)) provided for a proposed project. Written comments can include submission of transcriptions or other notes from oral statements or presentation. For the purposes of this rule, specific written comments should be within the scope of the proposed action, have a direct relationship to the proposed action, and must include supporting reasons for the responsible official to consider."

36 CFR 218.2.

In order to assure compliance with the requirements to "consider" comments, it is only logical that the Forest Service must document in writing its fulfillment of the requirement. Without a record of the consideration of comments, administrative and judicial review of these requirements would be impossible, rendering these requirements meaningless.

The EA thus failed to properly inventory the unroaded areas and failed to disclose hundreds of additional acres of logging and many more roads would occur in additional unroaded areas.

The EA Failed to Prepare an EIS to Consider the Potentially Significant Effects on Logging and Road Building on Unroaded Values

The EA says unroaded/undeveloped areas are not a land allocation and the FS has no substantive policy to protect them. This may be true but unroaded areas *are* ecologically significant and the FS has a duty to describe the effects of logging and roadbuilding within such areas, especially when the effects are potentially significant and irreversible. The Mill Creek EA failed to provide such an analysis.

Unroaded areas are rare on the landscape, and provide disproportionate ecosystem services, including habitat, water quality, carbon storage, recreation, soil conservation, weed resistance, natural fire regimes, etc. Converting unroaded/ undeveloped areas to roaded/developed areas sacrifices important values and has potentially significant effects, therefore requiring preparation of an EIS.

"It is well established in this [9th] Circuit that logging in an unroaded area is an 'irreversible and irretrievable' commitment of resources and 'could have serious environmental consequences.'" and therefore requires an EIS. Sierra Club v. Austin No 03-35419; DC No. CV-03- 00022 DWM (9th Circ. 2003), *citing* Smith v. Forest Service 33 F.3d 1072, 1078 (9th Circ. 1994). This project involves activities in such unroaded areas. The NEPA analysis for this project does not adequately discuss the impacts of proposed activities on all the many significant values of roadless/unroaded areas.

The 9th Circuit has held that the agencies have a NEPA obligation to consider the potential for future wilderness designation before conducting management activities in areas that may be eligible for wilderness, even if they are not inventoried roadless areas. The Lands Council v. Martin, (9th Circ, June 25, 2008). http://www.ca9.uscourts.gov/datastore/opinions/2008/06/24/0735804.pdf (The court

enjoined salvage logging that would have affected uninventoried roadless areas less than 5,000 acres in size that were located adjacent and contiguous with an inventoried roadless area.)

Our scoping comments made clear that the NEPA analysis should carefully consider all the important values provided by unroaded areas, but the Mill Creek EA failed to do this. Our comments said:

It is important for the FS to clearly consider both wilderness values AND other unique values provided disproportionately by large unroaded/unmanaged areas.

An international group of scientists has identified a diverse array of important values provided by roadless areas, including:

ROADLESS AREAS - biodiversity conservation

- Preservation of native biodiversity
- Barrier against invasive species
- Preservation of genetic resources
- Maintenance of ecosystem connectivity and integrity
- Ensure habitat for viability of populations
- Provide migration corridors and stopovers

ROADLESS AREAS - ecosystem services

- Water regulation and supply
- Erosion control
- Air quality
- Climate regulation
- Disease control (e.g. Lyme disease)
- Pollination of crops
- High resilience to pest outbreak
- Recreation
- Education and scientific value

ROADLESS AREAS - climate change

- High resilience and buffering capacity
- Protection against catastrophic events (e.g. fires, landslides, floods)
- Carbon sequestration and decrease of greenhouse gases effects
- Support species adaptation

http://www.roadless.online/roadless-areas/ And conserving roadless areas is an efficient and economical way to meet many of these goals. http://www.roadless.online/wp-content/download/docs/Press%20Release%20Protecting%20Roadless%20Areas%20COP11%20CBD.pdf. Impacts to these values should be carefully evaluated before logging, road building, or using heavy equipment in roadless areas.

Our comments reminded that FS that the NEPA analysis must not blur the distinction between the effect of logging on roaded areas and unroaded areas. The effects of logging unroaded areas are qualitatively different and more significant than logging areas previously affected by roads and logging. The NEPA analysis must clearly disclose the fact that provision of water quality,

habitat, scenic values, soil quality, and carbon storage are all better in unroaded areas than roaded areas, and logging and new roads will have disproportionate adverse effects on those values.

Unroaded/undeveloped areas are an important feature of the historic range of variability that needs to be restored so they can to provide the beneficial ecosystem services associated with such areas. The purpose and need should include restoration of unroaded/undeveloped areas (consistent with the natural range of variability) where natural processes can flourish.

Unroaded areas are rare on the landscape and they are one of the places where human influence has been limited and the ecological building blocks remain in place, so it is reasonably possible to achieve restoration of desired ecological conditions by relying on natural self-correcting mechanisms. Natural processes have operated successfully for millennia to achieve dynamic balance between forest growth and mortality. Within unroaded areas the agency should focus on eliminating unnatural stressors (such as livestock and weeds) while reintroducing natural processes such as fire. There may be an opportunity to manually pre-treat fuels before reintroducing fire, but building miles of new roads and removing commercial-sized trees (which serve as valuable habitat structures) would not be appropriate.

One of the important but under-appreciated values of unroaded areas is the long-term creation and maintenance of dead wood habitat due to the fact that unmanaged areas are where natural processes are allowed to flourish, and where natural levels of snags and dead wood might be found. Korol et al (2002) found that large snag habitat is below the historic range of variability across the Interior Columbia Basin and they estimated that even if the agencies apply enlightened forest management on federal lands in the Interior Columbia Basin for the next 100 years, we will still reach only 75% of the historic large snag abundance, and most of the increase in large snags will occur in roadless and wilderness areas. Jerome J. Korol, Miles A. Hemstrom, Wendel J. Hann, and Rebecca A. Gravenmier. 2002. Snags and Down Wood in the Interior Columbia Basin Ecosystem Management Project. PNW-GTR-181. http://www.fs.fed.us/psw/publications/documents/gtr-181/049_Korol.pdf.

Wisdom et al (2008) found that snag abundance in the Pacific northwest forests is inversely related to past harvest and proximity to roads. Wisdom, M.J., and Bate, L.J. 2008. Snag density varies with intensity of timber harvest and human access. For. Ecol. Manage. 255: 2085–2093. doi:10.1016/j.foreco.2007.12.027. http://www.fs.fed.us/pnw/pubs/journals/pnw_2008_wisdom001.pdf ("Our highest snag density … occurred in unharvested stands that had no adjacent roads. … Stands with no history of timber harvest had 3 times the density of snags as stands selectively harvested, and 19 times the density as stands having undergone complete harvest. Stands not adjacent to roads had almost 3 times the density of snags as stands adjacent to roads.")

The Mill Creek EA fails to disclose the existing condition of the unroaded areas, such as the management history if any, the fire history, the current stand ages, the areas current contribution to water quality, wildlife habitat, connectivity, recreation, carbon storage, etc.

The Mill Creek EA provides virtually no analysis of the actual effects of logging and road construction on the significant values provided by unroaded/undeveloped areas. The effects analysis boils down to this statement: "This analysis tiers to the analysis in the FEIS for the Ochoco LRMP (USDA Forest Service 1989a). The FEIS disclosed that active management of forest stands would continue throughout the planning timeframe and would affect environmental components." (EA p 238). The FEIS supporting the LRMP is a programmatic document that does not disclose the site-specific effects of management actions. The Ochoco LRMP (p 1-2) specifically says "Specific activities and projects will be planned and implemented to carry out the direction in this Plan. The Forest will perform environmental analysis on these projects and activities." The EA lacks any meaningful analysis of effects of irreversibly converting the unroaded area from undeveloped to developed, which will cause adverse soil compaction and displacement, soil erosion, water pollution, increase the risk of weeds, emit greenhouse gases, reduce wildlife cover and connectivity, significantly reduce snag recruitment over a long period of time, reduce recreation and solitude, likely prevent the area from ever becoming wilderness, etc. The public has not yet had the opportunity to comment on a credible effects analysis related to logging and road building in the unroaded/undeveloped areas. When we do get the opportunity, we intend to point out that the effects are likely significant and require preparation of an Environmental Impact Statement.

Tiering to the 1989 FEIS is also improper because the LRMP FEIS is more than 30 years old, and there is significant new information on the ecological value of roadless areas >1,000 acres and <5,000 acres in size. This new scientific information was highlighted in our prior comments, including –

World Wildlife Fund and the Conservation Biology Institute summarized the important attributes of small roadless areas (1,000-5,000 acres).

> Small roadless areas share many of attributes in common with larger ones, including:
> • Essential habitat for species key to the recovery of forests following disturbance such as herbaceous plants, lichens, and mycorrhizal fungi
> • Habitat refugia for threatened species and those with restricted distributions (endemics)
> • Aquatic strongholds for salmonids
> • Undisturbed habitats for mollusks and amphibians
> • Remaining pockets of old-growth forests
> • Overwintering habitat for resident birds and ungulates
> • Dispersal "stepping stones" for wildlife movement across fragmented landscapes

DellaSala, Dominick and James Strittholt. 2002. Scientific Basis For Roadless Area Conservation. World Wildlife Fund. Ashland, OR; Conservation Biology Institute. (June 2002 - Updated October 2003)
https://d2k78bk4kdhbpr.cloudfront.net/media/reports/files/Scientific_Basis_For_Roadless_Area_Conservation.pdf.

And, in a 1997 letter to President Clinton, 136 scientists said:

> There is a growing consensus among academic and agency scientists that existing roadless areas–irrespective of size–contribute substantially to maintaining biodiversity and ecological integrity on the national forests. The Eastside Forests Scientific Societies Panel, including representatives from the American Fisheries Society, American

> Ornithologists' Union, Ecological Society of America, Society for Conservation Biology, and The Wildlife Society, recommended a prohibition on the construction of new roads and logging within existing (1) roadless regions larger than 1,000 acres, and (2) roadless regions smaller than 1,000 acres that are biologically significant.... Other scientists have also recommended protection of all roadless areas greater than 1,000 acres, at least until landscapes degraded by past management have recovered.... As you have acknowledged, a national policy prohibiting road building and other forms of development in roadless areas represents a major step towards balancing sustainable forest management with conserving environmental values on federal lands. In our view, a scientifically based policy for roadless areas on public lands should, at a minimum, protect from development all roadless areas larger than 1,000 acres and those smaller areas that have special ecological significance because of their contributions to regional landscapes.

Letter to President Clinton from 136 scientists (Dec. 10, 1997). https://drive.google.com/file/d/0B4L_-RD-MJwrRzhFcm5QcFRoMHM/view?usp=sharing&resourcekey=0-2-sbGMN3bOUBQGGMDBQM1Q

The EA Failed to Consider Low-Impact Alternatives in Unroaded Areas

The FS failed to consider low-impact restoration alternatives that could meet the purpose and need, including but not limited to prescribed fire, mowing, non-commercial thinning, and weed removal which can be compatible with roadless/unroaded areas as long as they will be substantially unnoticeable to the casual observer and leave the area suitable for future wilderness designation.

Our comments provided a detailed explanation of the significant ecological value of natural processes acting upon unmanaged areas. The FS failed to disclose the relative benefits of no action, or a light-touch alternative. We urged the FS to consider an alternative that would exclude commercial logging with all of its trade-offs and instead focus on low-impact restoration tools such as non-commercial thinning and prescribed fire within unroaded areas. The FS failed to consider such an alternative. See more below.

Commercial logging prescriptions are typically designed to exert significant control over fire behavior and tree mortality, and similar prescriptions have been and are being applied across quite a large area of our federal forests. By limiting treatments to low-impact, non-commercial activities in undeveloped areas we are still treating them, and still getting benefits in terms of fire and "forest heath," but we are relaxing our control just a bit and letting natural processes play a bigger role in that subset of the landscape.

Alternatives are the heart of the NEPA process. Exploring and comparing alternatives help shed light on trade-offs and help the agency find ways of harmonizing competing objectives.

NEPA mandates that an agency "shall to the fullest extent possible: use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these action upon the quality of the human environment." 40 C.F.R. § 1500.2(e). NEPA also requires the agency to "study, develop, and describe appropriate

alternatives to the recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources as provided by section 102(2)(E) of the Act [NEPA]."40 C.F.R. § 1501.2 (c).

Environmental analysis documents must "[r]igorously explore and objectively evaluate all reasonable alternatives" to the project. 40 C.F.R. § 1502.14(a). The Council on Environmental Quality (CEQ), which promulgated the regulations implementing NEPA, characterizes the discussion of alternatives as "the heart of the environmental impact statement." 40 C.F.R. § 1502.14. A decisionmaker must explore alternatives in sufficient enough detail to "sharply defin[e] the issues and provid[e] a clear basis for choice among options by the decisionmaker and the public." *Id.* § 1502.14.

If the NEPA document considers only a restricted range of alternatives this would violate the very purpose of NEPA's alternative analysis requirement, which is to foster informed decision-making and full public involvement. 42 U.S.C. §§ 4331, 4332(2)(E); 40 C.F.R. § 1508.9(b).

The EA Failed to Accurately Describe the Effects of Conserving Unroaded Areas

The analysis of the no action alternative failed to disclose all the benefits of natural processes acting on the unroaded areas, as they have for millennia, creating diverse habitat, clean water, a stable climate, etc. Natural processes include fire, insects, wind, competitive mortality, etc. that provide some of the same benefits as thinning, but with more beneficial results, such as greater structural retention and greater spatial variability, and fewer adverse trade-offs associated with logging, such as loss of snag recruitment, soil compaction, greater tendency toward spatial homogeneity.

The analysis of no action failed to disclose that unroaded areas are one of the few places where trees are allowed to fulfill their entire "lifecycle" (including their life-giving role as snags, dead wood, and soil builders) in the forest. Korol et al (2002) found that large snag habitat is below the historic range of variability across the Interior Columbia Basin and they estimated that even if the agencies apply enlightened forest management on federal lands in the Interior Columbia Basin for the next 100 years, we will still reach only 75% of the historic large snag abundance, and most of the increase in large snags will occur in roadless and wilderness areas. Jerome J. Korol, Miles A. Hemstrom, Wendel J. Hann, and Rebecca A. Gravenmier. 2002. Snags and Down Wood in the Interior Columbia Basin Ecosystem Management Project. PNW-GTR-181. http://www.fs.fed.us/psw/publications/documents/gtr-181/049_Korol.pdf.

The ecosystem benefits of abundant wood are quite varied and underappreciated. Rose, C.L., Marcot, B.G., Mellen, T.K., Ohmann, J.L., Waddell, K.L., Lindely, D.L., and B. Schrieber. 2001. Decaying Wood in Pacific Northwest Forests: Concepts and Tools for Habitat Management, Chapter 24 in Wildlife-Habitat Relationships in Oregon and Washington (Johnson, D. H. and T. A. O'Neil. OSU Press. 2001) http://web.archive.org/web/20060708035905/http://www.nwhi.org/inc/data/GISdata/docs/chapter24.pdf. Since wilderness and unmanaged areas are the only place that a healthy population of snags is likely to be recruited and maintained over the long term, they represent invaluable and irreplaceable mitigation for all the places where snags are in short supply due to

logging, hazard tree removal, and other management efforts designed to control and capture mortality.

The Forest Service should consider the analysis presented in the Fuels Report for the 2017 East Hills Project on the Fremont-Winema NF which admits that wildfires are expected to have beneficial effects even under the no action alternative: "Overall expected value of fire effects is moderately beneficial. This assumes that fires burn throughout the range of conditions – actual current practice is to suppress fires that are most likely to be beneficial." https://www.fs.usda.gov/nfs/11558/www/nepa/101283_FSPLT3_4264365.pdf. The Mill Creek EA failed to disclose these beneficial effects of no action, or other lighter-touch restoration methods.

The EA Offered Flawed Analysis of Carbon and Climate Change

The EA analysis of carbon and climate change remains deeply flawed in spite of the detailed NEPA comments submitted by Oregon Wild that should provide the basis for much improved analysis of the effects of logging on carbon and climate change. The effects of logging related GHG emissions are potentially significant and should be considered in the EIS.

NEPA's primary purposes are to ensure informed decision-making by federal agencies and to provide for informed public participation in environmental analyses and decision-making processes. 40 C.F.R. § 1500.1(b) & (c). NEPA requires federal agencies to rely upon "high quality information," "accurate scientific analysis" 40 C.F.R. § 1500.1(b), and "full and fair discussion of significant environmental impacts," 40 C.F.R. § 1502.1. *Portland Audubon Society v. Espy*, 998 F.2d 699, 703 (9th Cir. 1993) (overturning decision which "rests on stale scientific evidence, incomplete discussion of environmental effects… and false assumptions"). The EA analysis of carbon emissions and climate effects violates NEPA because it is inaccurate and rests on incomplete information and flawed assumptions.

Failure to Consider the Social Cost of Carbon Emissions

The social, economic, and environmental costs of unmitigated climate change are astronomical. With a recognition that nature-based carbon storage can help mitigate those costs, it is becoming clear that conservation of nature, especially forests, creates far more value than natural resource extraction. Bradbury, R.B., Butchart, S.H.M., Fisher, B. et al. The economic consequences of conserving or restoring sites for nature. Nat Sustain (2021). https://doi.org/10.1038/s41893-021-00692-9. https://rdcu.be/cgpdK ("At $31/tonne [of carbon] the nature-focused state NPV was greater than the alternative state NPV at 100% of forest sites. … [W]hile these patterns hold for all goods combined and for non-excludable goods, the alternative state was often more valuable when only excludable goods were considered. Our findings thus provide a strong economic justification for incentives to encourage private landowners towards decisions that favour nature-focused land management to enhance overall social value.").

It is important to quantify the total carbon emissions from logging then use proxies such as the social cost of carbon dioxide emissions to help explain the effects of those emissions.

The Mill Creek EA failed to take a hard look at the social cost of carbon dioxide emissions caused by logging. The excuse offered in the EA is that such an analysis would require an "annualized schedule of carbon emissions." This is unacceptable. If necessary, the agency can create a hypothetical (*most likely*) schedule. Regardless, the Biden Administration says it is *essential* that federal decision-making consider the full cost of agency actions that may harm the climate:

> **Sec. 5. Accounting for the Benefits of Reducing Climate Pollution**. (a) It is essential that agencies capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account. Doing so facilitates sound decision-making, recognizes the breadth of climate impacts, and supports the international leadership of the United States on climate issues. The "social cost of carbon" (SCC), "social cost of nitrous oxide" (SCN), and "social cost of methane" (SCM) are estimates of the monetized damages associated with incremental increases in greenhouse gas emissions. They are intended to include changes in net agricultural productivity, human health, property damage from increased flood risk, and the value of ecosystem services. An accurate social cost is essential for agencies to accurately determine the social benefits of reducing greenhouse gas emissions when conducting cost-benefit analyses of regulatory and other actions. …
> (b) There is hereby established an Interagency Working Group on the Social Cost of Greenhouse Gases …
> (ii) Mission and Work. The Working Group shall, as appropriate and consistent with applicable law:
> (A) publish an interim SCC, SCN, and SCM within 30 days of the date of this order, which agencies shall use when monetizing the value of changes in greenhouse gas emissions resulting from regulations and other relevant agency actions until final values are published;
> (B) publish a final SCC, SCN, and SCM by no later than January 2022;

Biden Executive Order on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis; JANUARY 20, 2021. https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-protecting-public-health-and-environment-and-restoring-science-to-tackle-climate-crisis/.

Gifford Pinchot said "Where conflicting interests must be reconciled, the question shall always be answered from the standpoint of the greatest good of the greatest number in the long run." The social cost of carbon dioxide emissions is a useful yardstick for measuring "the greatest good to the greatest number" because it allows the agency to compare the centralized economic value of timber to the decentralized economic costs of greenhouse gases emissions from logging.

GHG emissions from logging, and other land management activities impose significant costs on society, such as the cost of damage caused by climate change and the costs of adapting to climate change and the cost of sequestering carbon to mitigate emissions. The Social Cost of Carbon Dioxide could be referred to as the "climate misery index" related to the human impacts of greenhouse gas emissions. CEQ's draft guidance on NEPA and Climate Change recognizes that the Social Cost of Carbon Dioxide (SCC) is a "harmonized, interagency metric that can provide decision-makers and the public with some context for meaningful NEPA review." 79 Fed. Reg.

77802, 77827. "The SCC estimates the benefit to be achieved, expressed in monetary value, by avoiding the damage caused by each additional metric ton (tonne) of carbon dioxide (CO_2) put into the atmosphere." Ruth Greenspan and Dianne Callan 2011. More than Meets the Eye: The Social Cost of Carbon in U.S Climate Policy, in Plain English (World Resources Institute, July 2011) at 1, http://pdf.wri.org/more_than_meets_the_eye_social_cost_of_carbon.pdf; Wentz, J. 2016. EPA's Use of the Social Cost of Carbon is Not Arbitrary or Capricious http://blogs.law.columbia.edu/climatechange/2016/03/07/epas-use-of-the-social-cost-of-carbon-is-not-arbitrary-or-capricious/. The NEPA analysis should carefully disclose these social costs. The express purpose of SCC analysis is to provide an apples-to-apples basis for comparing a project's economic benefits with GHG pollution impacts (costs). Where SCC is not analyzed and disclosed, these impacts (costs) are hidden from the public and, in fact, often "paid for" by the broader environment and public in the form of degraded ecological resiliency, public health impacts, and more.

Misleading Analysis of the Carbon Stored in Wood Products and Other Alleged Climate Benefits from Logging

The Mill Creek EA also provides misleading analysis of the effects related to logging and wood products, saying "Forest restoration and other treatments that generate long-lived wood products, such as lumber and furniture, transfer ecosystem carbon that remains stored. When carbon is stored in these types of wood products it not contributing to overall GHG emissions." This is highly misleading because wood products do not represent net carbon storage, but rather net GHG emissions. This is because wood products are always a result of logging that causes more carbon emissions than carbon storage. Wood products represent a small subset of the carbon in a living tree. Logging kills the tree, stops photosynthesis, halts forest carbon accumulation, initiates decay processes, and then accelerates the transfer of carbon from the forest to the atmosphere via slash burning, and all the steps in processing logs and manufacturing and using wood products. For every ton of carbon stored in wood products there are many tons of carbon emitted to the atmosphere in order to make those wood products. Furthermore, carbon remains stored in forests longer than wood products. And, the analysis must account for the fact that killing the trees represents a forgone opportunity to continue accumulating carbon if the trees remained unlogged. Hudiberg et al (2019) found "[W]ood product usage is reducing the potential annual sink by an average of 21%, suggesting forest carbon storage can become more effective in climate mitigation through reduction in harvest, longer rotations, or more efficient wood product usage. … Allowing forests to reach their biological potential for growth and sequestration, maintaining large trees (Lutz et al 2018), … will remove additional CO_2 from the atmosphere. Global vegetation stores of carbon are 50% of their potential including western forests because of harvest activities (Erb et al 2017). Clearly, western forests could do more to address climate change through carbon sequestration if allowed to grow longer." Tara W Hudiburg, Beverly E Law, William R Moomaw, Mark E Harmon and Jeffrey E Stenzel 2019. Meeting GHG reduction targets requires accounting for all forest sector emissions. 23 August 2019. Environmental Research Letters, Volume 14, Number 9. https://iopscience.iop.org/article/10.1088/1748-9326/ab28bb/pdf. To use a financial analogy, the Mill Creek EA's assertion that wood products provide beneficial carbon storage is

like saying that a $100 return on investment is good, even though the initial investment was $200.

The Mill Creek EA admits that it will take several decades to recover the carbon emitted by logging. The EA however, fails to disclose how critical the next few decades are in addressing the climate crisis. This time lag between carbon emissions and carbon capture has important climate consequences. Carbon emissions are more harmful in the near-term period while we are in the process of decarbonizing our economy. Dr. Jonathan Foley says "When it comes to climate solutions, it turns out *time* is the most important variable." *citing* https://www.ted.com/talks/jonathan_foley_the_climate_solutions_worth_funding_now. Tim Searchinger of Princeton University reminds us "It takes decades of regrowth to offset the carbon released in burning before the net addition of carbon to the air even equals the amount released if power plants had just used fossil fuels. During these decades, warming increases and permafrost and glaciers continue to melt, among other permanent forms of climate damage. Even worse, utilities using wood to meet clean energy requirements displaces the use of truly clean energy sources such as solar or wind." Searchinger, T. 2020. LA Times Op-Ed: Is burning wood for power carbon-neutral? Not a chance. 28 Dec 2020. https://www.latimes.com/opinion/story/2020-12-28/wood-burning-power-plants-clean-energy. Liz Marshall and Alexia Kelly 2010. The Time Value of Carbon and Carbon Storage: Clarifying the terms and the policy implications of the debate. World Resources Institute. November 2010 http://mpra.ub.uni-muenchen.de/27326/1/MPRA_paper_27326.pdf ("…there is always a positive value to temporary storage of carbon [such as in unlogged forests] (Table 3). These figures suggest that there are positive benefits to society of storing carbon now, even if it is released later.") The Mill Creek EA failed to address the "time value of carbon." Wood products undeniably increase GHG emissions in the short-term, and those effects might arguably be off-set by forest growth in the distant future. This is a terrible climate strategy because we urgently need to decarbonize the economy in the next few decades. Logging will make things worse when we need carbon capture most, while providing potential benefits in 50-100 years after we've (hopefully) already decarbonized our economy.

The Mill Creek EA page 245 describes ways in which "Rates of net carbon sequestration in forests may be enhanced through [forest] management strategies" but it failed to recognize the most obvious tool at its disposal, which is to retain more trees on each acre treated, or by leaving more areas untreated. The EA (p 245) also highlighted a strategy of "restor[ing] and maintain[ing] resilient forests that are better adapted to a changing climate" as a means of "enhancing .. net carbon sequestration", but the EA failed to disclose that the agency's preferred resilience restoration tool is commercial logging which emits more carbon than it saves. This renders the EA highly misleading to the public and the decision-maker so it cannot fulfill its core purpose of supporting informed comments, or informed decision-making.

Law (2014) summarized forest management alternatives most likely to help store carbon and reduce GHG emissions:

- Activities that promote conservation of carbon storage in forests
  – allowing existing forests to accumulate carbon
  – reforestation of lands that once carried forests

> • Natural disturbance has small impact on forest carbon stores compared to intensive harvest regime
> • Full accounting shows thinning results in increased carbon emissions to the atmosphere for at least many decades
> • Carbon returns to atmosphere more quickly when removed from forest and put in product chain

Law, B. 2014. Role of Forest Ecosystems in Climate Change Mitigation. FWS Presentation, Feb 2014. http://forestpolicypub.com/wp-content/uploads/2014/03/Law_presentation-2.pdf. Notably, this list does not include extensive commercial logging to increase "resilience."

The response to comments repeated inaccurate statements from timber interests without correcting them, such as "Not storing that carbon in wood products also poses the risk of losing the carbon in standing trees from high intensity wildfire …" This is a false choice, and it is highly misleading. The Mill Creek EA fails to account for the voluminous evidence that Oregon Wild provided in NEPA comments showing that logging to save carbon from fires simply does not work, because only a small fraction of treated acres experience wildfire, so most treat acres cause substantial logging emissions without saving any carbon from wildfire. The best available science shows that logging to make wood products and reduce wildfire risk (plus the unavoidable emissions from wildfire that occur in spite of treatments) will actually cause more GHG emissions than wildfire alone. For instance, Oregon Wild comments said:

The 2018 US Forest Service Northwest Forest Plan Science Synthesis concluded that fuel reduction is unlikely to be an effective climate mitigation strategy.

> Some studies from other regions in the Western United States (i.e., the Southwest and Sierra Nevada) suggest that thinning and fuel reduction can mitigate carbon loss from fire. Fuel reduction may reduce losses of carbon at stand levels compared with the consequences of high-severity wildfire burning in stands with high fuel loads (Finkral and Evans 2008; Hurteau and North 2009; Hurteau et al. 2008, 2011, 2016; North and Hurteau 2011; North et al. 2009, Stephens et al. 2009). However, because the probability of treated areas burning is generally low (Barnett et al. 2016), and most biomass is not consumed by fire, slight differences in losses resulting from combustion in fire compared with losses from fuel reduction are unlikely to make fuel reduction a viable mitigation strategy (Ager et al. 2010, Campbell et al. 2012, Kline et al. 2016, Mitchell et al. 2009, Restaino and Peterson 2013, Spies et al. 2017).

USDA 2018. Synthesis of Science to Inform Land Management Within the Northwest Forest Plan Area. General Technical Report. PNW-GTR-966 Vol. 1. June 2018. https://www.fs.fed.us/pnw/pubs/pnw_gtr966_vol1.pdf.

Law & Harmon (2011) conducted a literature review and concluded …

> Thinning forests to reduce potential carbon losses due to wildfire is in direct conflict with carbon sequestration goals, and, if implemented, would result in a net emission of CO_2 to the atmosphere because the amount of carbon removed to change fire behavior is often far larger than that saved by changing fire behavior, and more area has to be harvested than will ultimately burn over the period of effectiveness of the thinning treatment.

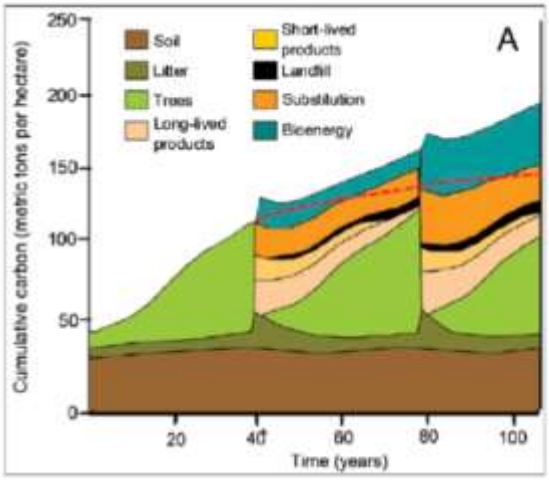
Law, B. & M.E. Harmon 2011. Forest sector carbon management, measurement and verification, and discussion of policy related to mitigation and adaptation of forests to climate change. Carbon Management 2011 2(1). https://content.sierraclub.org/ourwildamerica/sites/content.sierraclub.org.ourwildamerica/files/documents/Law%20and%20Harmon%202011.pdf.

Campbell and Agar (2013) conducted a sensitivity analysis and found robust results indicating that fuel reduction does not increase forest carbon storage.

> … we attempt to remove some of the confusion surrounding this subject by performing a sensitivity analysis wherein long-term, landscape-wide carbon stocks are simulated under a wide range of treatment efficacy, treatment lifespan, fire impacts, forest recovery rates, forest decay rates, and the longevity of wood products. Our results indicate a surprising insensitivity of long-term carbon stocks to both management and biological variables. After 80 years, … a 1600% change in either treatment application rate or efficacy in arresting fire spread resulted in only a 10% change in total system carbon. This insensitivity of long-term carbon stocks is due in part by the infrequency of treatment/wildfire interaction and in part by the controls imposed by maximum forest biomass. None of the fuel treatment simulation scenarios resulted in increased system carbon.

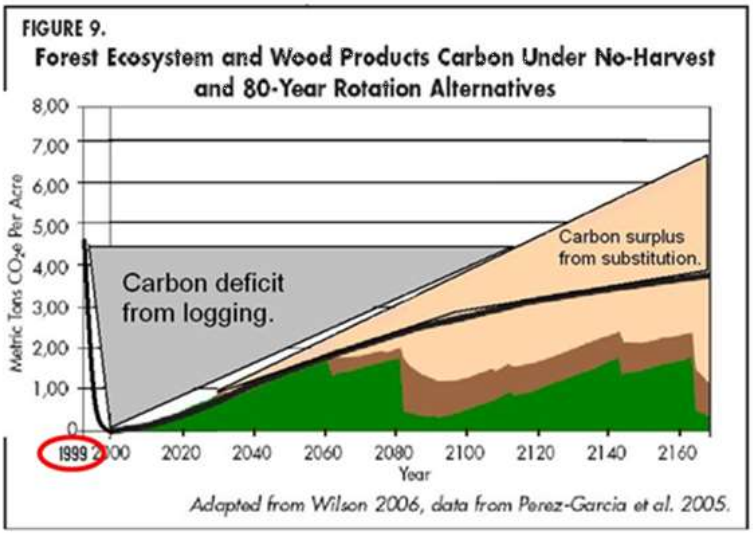
Campbell, J, Agar, A (2013) Forest wildfire, fuel reduction treatments, and landscape carbon stocks: A sensitivity analysis. Journal of Environmental Management 121 (2013) 124-132 http://fes.forestry.oregonstate.edu/sites/fes.forestry.oregonstate.edu/files/PDFs/Campbell_2013_JEM.pdf

The Response-to-Comments also includes this misleading figure provided by the timber industry.



This figure (above) describes the carbon stocks resulting when trees are planted on bare ground and managed as a crop. This is not an appropriate way to view the carbon stocks and flows resulting from managing *existing* mature and old-growth forest ecosystems on public land. Most importantly, the figure fails to account for the significant carbon deficit caused by logging fully stocked mature and old-growth forests as shown below. Put another way, it fails to place a value

on the carbon stored long-term in mature and old-growth forests and kept out of the atmosphere when forests are conserved instead of logged.

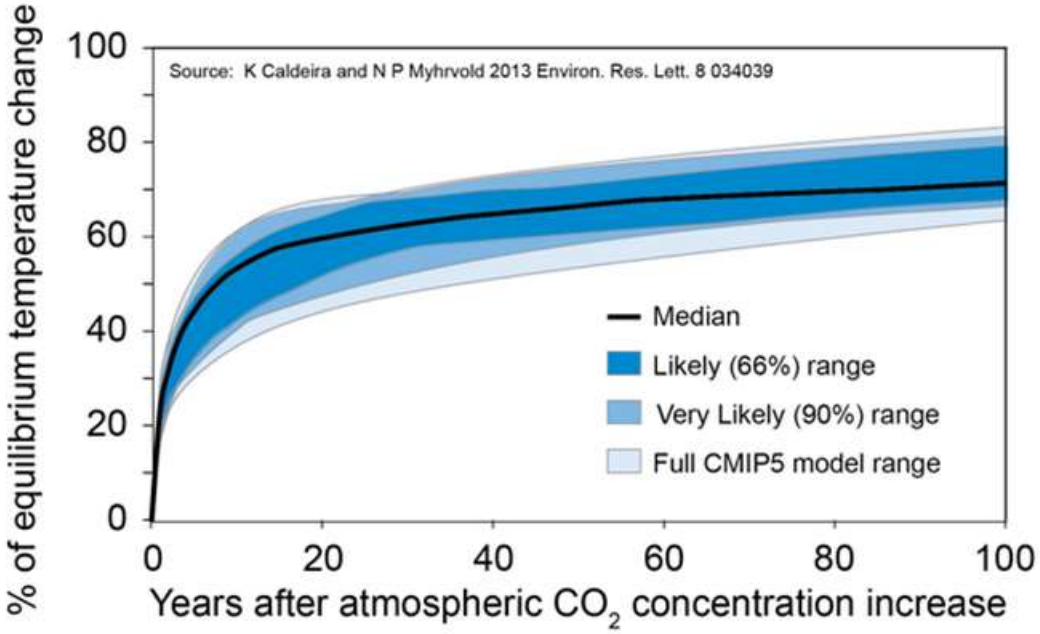


The carbon emissions from logging is a potentially significant effect, especially because it occurs during the critical period when we are urgently trying to eliminate GHG emissions, and the alleged off-setting forest growth must be discounted because most of it does not occur until after we have (hopefully) decarbonized the economy.

In addition, the timber industry figure relies on overly optimistic theoretical maximum value of substitution, and fails to address the many complicating aspects of a credible substitution analysis. Substitution is speculative because the alleged benefits are in the distant future, and it often takes more than a century to off-set the carbon emissions (carbon debt) caused by logging forests.

Only a small fraction of the carbon in a logged forest ends up in long-term storage in wood products. Most of the carbon in a logged forest is subject to an accelerated transferred to the atmosphere where it causes warming and ocean acidification. For every ton of carbon stored in wood products, there are several times more carbon from the forest prematurely transferred to the atmosphere. Since the alleged carbon benefits from substitution are typically realized in the distant future and must be discounted. The life-cycle studies cited by the timber industry appear to assume a 0% discount rate which is inconsistent with rational decision making because it effectively places no value on the carbon stored in forests in the short-term under a no-harvest scenario compared to a harvest scenario. Near-term carbon storage is critically important while the economy transitions to low carbon methods, yet it will take over a century for substitution to off-set the initial carbon deficit associated with logging mature forests.

Under well-established principles of discounting, it is clear that the net present value of current carbon storage in existing mature forests exceeds the net present value of distant future benefits of substitution. This graph shows why the near term matters (most of the warming happens within 20 years and then slowly continues to increase):



The IPCC made a policy decision to place more value on the near-term because the majority of warming happens within 10-20 years after emissions. If it is true that we need to be more concerned about the near-term, then we can also say that forests are more valuable as places to store carbon and wood products are less valuable. This is because every effort to transfer carbon from the forest into wood products results in a net near-term pulse of carbon to the atmosphere, and this carbon "debt" is not repaid until the distant future when the replacement forest grows (not to the point that it stores the same amount of carbon as before harvest) but rather to a point that recaptures all the carbon PLUS mitigates for the climate impacts caused during the "carbon debt" payback period. See Katsumasa Tanaka & Brian C. O'Neill. 2018. The Paris Agreement zero-emissions goal is not always consistent with the 1.5 °C and 2 °C temperature targets. Nature Climate Change (2018) doi:10.1038/s41558-018-0097-x. https://www.nature.com/articles/s41558-018-0097-x#Abs1, *and see* Brack, Duncan 2017. Woody Biomass for Power and Heat: Impacts on the Global Climate. Chatham House. https://www.chathamhouse.org/sites/files/chathamhouse/publications/research/2017-02-23-woody-biomass-global-climate-brack-embargoed.pdf.

Shafer et al (2011) state:

> An alternative to increasing carbon stores within the forest is to harvest wood and store some of this carbon within wood products (Perez-Garcia et al., 2005). Under current manufacturing, use, and disposal practices this alternative is unlikely to increase the overall carbon store of the forest sector, which includes the forest and wood products derived from the forest (Harmon et al., 2009). Manufacturing, use, and disposal of harvested wood all entail significant carbon losses that are either as large as or larger than those in the forest itself (Krankina and Harmon, 2007). Wood products carbon offsets associated with biofuels and substitution of wood for more energy intensive building materials, such as steel and concrete, can theoretically increase the carbon "stores" of wood products beyond that stored in the forest itself (Perez-Garcia et al., 2005; Lippke et al. 2010). However, **several issues need to be recognized**

> **regarding these offsets. First, most analyses have presented theoretical maximum product substitution offsets** and ignored the effects of additionality (i.e., degree to which practices differ from business as usual or statutory requirements), permanence and replacement of existing wood products, and end-user preferences for building materials. If these factors are included, then **substitution effects are substantially lower than the theoretical maximum and unlikely to surpass carbon stores in forests for many centuries if at all**. **Second**, depending on the starting condition of the forest, both product **substitution and forest-related biofuels can create carbon debts that delay carbon benefits**. For example, biofuels harvested from existing forests could offset fossil fuel releases of carbon, but recent studies have indicated that carbon debts associated with the energy used during biofuel harvests, decreased carbon stores in forests, and differences in carbon to energy ratios could persist for decades to centuries, implying a significant temporal lag in net carbon uptake (Fargione et al., 2008; Searchinger et al., 2009). **Third**, being offsets, the **effectiveness of both biofuel and product substitution will vary with the duration of the offset**; the longer the delay in releasing fossil fuel carbon, the more effective offsets become: An offset with a 1 year delay would have little impact on atmospheric CO2 concentrations, whereas an offset of hundreds of years would have a much greater impact. **Unfortunately, the duration of offsets is not well understood at this point, but it is unlikely to be infinite as tacitly assumed in many current analyses**. Finally, while offsets are often counted as carbon stores, they are difficult to directly inventory because they are not physically in an identifiable location, whereas carbon stored in forests can be more directly inventoried and quantified.

Sarah L. Shafer, Mark E. Harmon, Ronald P. Neilson, Rupert Seidl, Brad St. Clair, Andrew Yost 2011. Oregon Climate Assessment Report (OCAR) http://occri.net/ocar Chapter 5. The Potential Effects of Climate Change on Oregon's Vegetation. http://occri.net/wp-content/uploads/2011/04/chapter5ocar.pdf.

If the agency wishes to rely on substitution to justify carbon emissions from logging (or if they wish to elevate the timber industry's misleading comments without providing any corrections) , they cannot assume the project will result in the theoretical maximum substitution benefits. They must instead consider and analyze the real world substitution effects based on several key factors. Fain et al (2018) explain--

> [S]ubstitution is a key variable in determining cumulative carbon benefits over time. Franklin et al. discuss 6 key factors in determining the magnitude of substitution effects through time: (1) the amount of product-in-use created from the harvest, (2) the displacement factor, (3) percent of the harvest that will substitute for non-wood products like concrete or steel, (4) the cumulative nature of the substitution effects, (5) the length of time the substitution effect accumulates, and (6) the effect on the average lifespan of buildings if wood is substituted for fossil fuel intensive materials. ... The displacement factor ... varies depending on the building system and the embedded GHG emissions factor within displaced materials. ... [E]ngineering studies found the average displacement factor value to be 2.1, ... [T]his number is a global reference average and likely not accurate for any given place and time. Uniquely local and dynamic biological

> and socio-economic factors such as, silvicultural systems, tree species, form and age of trees, amount of wood degrade, mortality rates, market demand, economics of transporting to processing facilities, and supply quota agreements, greatly influence commercial wood products and thus any attempts to quantify substitution rates and life cycles. … [A]s technology, wood use, and energy sources evolve into the future, so will the displacement factor associated with substitution, most likely declining.

Fain, S.J.; Kittler, B.; Chowyuk, A. Managing Moist Forests of the Pacific Northwest United States for Climate Positive Outcomes. Forests 2018; 9(10):618. https://www.mdpi.com/1999-4907/9/10/618 *citing* Franklin, J.; Johnson, N.; Johnson, D. Ecological Forest Management; Waveland Press: Long Grove, IL, USA, 2018.

> Substitution of more energy intensive building materials with less energy intensive ones can in theory result in a fossil fuel offset, but important considerations suggest that the substitution effect is substantially lower than estimated, and is subject to saturation.

Beverly Elizabeth Law & Mark E Harmon 2011. Forest sector carbon management, measurement and verification, and discussion of policy related to mitigation and adaptation of forests to climate change. Carbon Management 2011 2(1). https://content.sierraclub.org/ourwildamerica/sites/content.sierraclub.org.ourwildamerica/files/documents/Law%20and%20Harmon%202011.pdf.

> Although we estimated the stores in forest products, we did not include the so-called substitution effects of using wood versus other more energy intensive materials for construction. As pointed out by Hennigar and others (2008), there is little consensus on the values to be used (that is, they vary 10-fold). The other issue is that these estimates represent maximal values that assume that all future buildings will be primarily constructed of materials other than wood. Thus, it counts the substitution effect over and over even when a wooden building is replaced by a wooden building.

Mark E. Harmon, Adam Moreno, and James B. Domingo. 2009. Effects of Partial Harvest on the Carbon Stores in Douglas-fir/Western Hemlock Forests: A Simulation. Ecosystems (2009) 12: 777-791. DOI: 10.1007/510021-009-9256-2 ECOSYSTEMS. https://www.fs.fed.us/pnw/pubs/journals/pnw_2009_harmon001.pdf.

The Forest Service not only repeats the inaccurate information from the timber industry without correcting it, the Forest Service responds to the inaccurate information by saying "Thank you for the recommendations." This sounds like an endorsement. Why does the EA repeat the inaccurate information from some commenters but fail to correct those statements, or at least include other public comments reciting a more accurate summary of the available science? These misleading statements are now part of the record that the decision-maker will rely on in making a decision. That's a problem.

The EA Failed to Consider Mitigating Alternatives that Would Harmonize Competing Goals of Forest Resilience and Climate Change Mitigation

The primary purpose of The Mill Creek Project is to "Increase Resilience to Insects, Disease, Fire, and Drought." The EA (p 2) even says that climate change is going to make things worse for

the forest. “These departures from more sustainable conditions means the risk to forested stands from insects and disease and other disturbances has increased, is ongoing, and is expected to be further impacted by climate change and recent drought. Density management is one of the few tools land managers can use to reduce, but not eliminate, these risks …”

Unfortunately, the FS has decided that increasing resilience to climate change requires extensive logging that will emit 7,811 tonnes of CO2 to the atmosphere and which will exacerbate global climate change, and ironically increase the climate stress imposed on the Ochoco National Forest. These are very significant effects that require an EIS and consideration of mitigating alternatives. The FS could mitigate this effect by retaining more trees, thinning less aggressively, forgoing logging in unroaded/undeveloped areas, etc. The FS violated NEPA by failing to consider such a mitigating alternative.

Alternatives are the heart of the NEPA process. Exploring and comparing alternatives help shed light on trade-offs and help the agency find ways of harmonizing competing objectives.

NEPA mandates that an agency “shall to the fullest extent possible: use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these action upon the quality of the human environment.” 40 C.F.R. § 1500.2(e). NEPA also requires the agency to “study, develop, and describe appropriate alternatives to the recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources as provided by section 102(2)(E) of the Act [NEPA].”40 C.F.R. § 1501.2 (c).

Environmental analysis documents must “[r]igorously explore and objectively evaluate all reasonable alternatives” to the project. 40 C.F.R. § 1502.14(a). The Council on Environmental Quality (CEQ), which promulgated the regulations implementing NEPA, characterizes the discussion of alternatives as “the heart of the environmental impact statement.” 40 C.F.R. § 1502.14. A decisionmaker must explore alternatives in sufficient enough detail to “sharply defin[e] the issues and provid[e] a clear basis for choice among options by the decisionmaker and the public.” *Id.* § 1502.14. All reasonable alternatives must receive a “rigorous exploration and objective evaluation… , particularly those that might enhance environmental quality or avoid some or all of the adverse environmental effects.” *Id.* § 1500.8(a)(4). The analysis of the alternatives must be “sufficiently detailed to reveal the agency’s comparative evaluation of the environmental benefits, costs and risks of the proposed action and each reasonable alternative.” *Id.*

Our comments urged the Forest Service to rethink its focus on climate adaptation/resilience actions (such as density reduction with commercial log removal) that will actually increase carbon emissions and exacerbate global climate change and reduce climate resilience, not just in the treated stands but around the world. The Mill Creek EA failed to consider an alternative that meaningfully harmonizes climate change adaptation and climate change mitigation, such as non-commercial thinning + prescribed fire, increased riparian protection, mature and old-growth forest conservation, and road system rescaling and storm-proofing.

The Forest Service should develop alternatives that harmonize potentially competing objectives of climate change mitigation, and climate change adaptation. Climate change mitigation involves keeping carbon in the forest and avoiding GHG emissions to the atmosphere from logging. Climate change adaptation may involve a variety of actions that range from reducing stand density to reduce water stress in a warming world to providing habitat redundancy and connectivity, and maintaining cool/moist habitat refugia for wildlife that thrive in dense forests.

The Biden Administration has adopted a policy to both mitigate AND prepare for global climate change.

> "It is, therefore, the policy of [the Biden] Administration to listen to the science; to improve public health and protect our environment; to ensure access to clean air and water; … to **reduce greenhouse gas emissions; to bolster resilience** to the impacts of climate change; … To that end, this order directs all executive departments and agencies (agencies) to immediately review and, as appropriate and consistent with applicable law, take action to address the promulgation of Federal regulations and other actions during the last 4 years that conflict with these important national objectives, and to immediately commence work to confront the climate crisis."

Executive Order on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis. JANUARY 20, 2021 https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-protecting-public-health-and-environment-and-restoring-science-to-tackle-climate-crisis/. This requires careful balancing of sometimes competing objectives, such as retaining trees to store carbon, and thinning to reduce climate stresses. The best harmony among these objectives is to retain medium and large trees that store the most carbon and provide the greatest ecosystem services, while thinning small trees removal of which will reduce climate stresses on the larger trees while emitting less carbon.

The forest management agencies need to stop focusing on climate adaptation actions (such as density reduction with commercial log removal) that will actually increase carbon emissions and exacerbate global climate change. The agencies instead need to work on actions that meaningfully harmonize climate change adaptation and climate change mitigation, such as non-commercial thinning + prescribed fire, increased riparian protection, mature and old-growth forest conservation, and road system rescaling and storm-proofing.

The agency should develop alternatives that harmonize potentially competing objectives of climate change mitigation, and climate change adaptation. Climate change mitigation involves keeping carbon in the forest and avoiding GHG emissions to the atmosphere from logging. Climate change adaptation may involve a variety of actions that range from reducing stand density to reduce water stress in a warming world to providing habitat redundancy and connectivity, and maintaining cool/moist habitat refugia for wildlife that thrive in dense forests.

President Obama established a clear policy mandate to avoid, minimize, and rectify impacts of federal land use:

> Section 1. Policy. It shall be the policy of the Departments of Defense, the Interior, and Agriculture; the Environmental Protection Agency; and the National Oceanic and Atmospheric Administration; and all bureaus or agencies within them (agencies); to

avoid and then minimize harmful effects to land, water, wildlife, and other ecological resources (natural resources) caused by land- or water-disturbing activities, and to ensure that any remaining harmful effects are effectively addressed, consistent with existing mission and legal authorities. Agencies shall each adopt a clear and consistent approach for avoidance and minimization of, and compensatory mitigation for, the impacts of their activities and the projects they approve.
... Sec 2. Definitions ... (f) "Mitigation" means avoiding, minimizing, rectifying, reducing over time, and compensating for impacts on natural resources. As a practical matter, all of these actions are captured in the terms avoidance, minimization, and compensation. These three actions are generally applied sequentially, and therefore compensatory measures should normally not be considered until after all appropriate and practicable avoidance and minimization measures have been considered.
...
Sec. 3. Establishing Federal Principles for Mitigation. ... (b) Agencies' mitigation policies should establish a net benefit goal or, at a minimum, a no net loss goal for natural resources the agency manages that are important, scarce, or sensitive, or wherever doing so is consistent with agency mission and established natural resource objectives. When a resource's value is determined to be irreplaceable, the preferred means of achieving either of these goals is through avoidance, consistent with applicable legal authorities. Agencies should explicitly consider the extent to which the beneficial environmental outcomes that will be achieved are demonstrably new and would not have occurred in the absence of mitigation (i.e. additionality) when determining whether those measures adequately address impacts to natural resources.

Presidential Memorandum: Mitigating Impacts on Natural Resources from Development and Encouraging Related Private Investment. Nov 3, 2015. https://www.whitehouse.gov/the-press-office/2015/11/03/mitigating-impacts-natural-resources-development-and-encouraging-related
In the context of climate change this means that greenhouse gas emissions should be avoided and that the climate forcing effects of any emissions that do occur must be mitigated.

Stein et al (2014) make the distinction between climate change mitigation and adaptation and the potential conflict between the two.

Climate change adaptation is the discipline that focuses on addressing these impacts. In contrast, climate change mitigation addresses the underlying causes of climate change, through a focus on reductions in greenhouse gas concentrations in the atmosphere. **Confronting the climate crisis requires that we both address the underlying causes of climate change and simultaneously prepare for and adapt to current and future impacts. Accordingly, adaptation and mitigation must be viewed as essential complements, rather than as alternative approaches**. Because greenhouse gas emissions and concentrations will dictate the type and magnitude of impacts to which we will need to adapt, the ability to successfully accomplish adaptation over the long term will be linked to the success of climate mitigation efforts (Warren et al. 2013).
...
Climate-smart conservation strategies must also take climate mitigation considerations into account. Although adaptation is about addressing the impacts of rapid climate

> change, adaptation actions should not aggravate the underlying problem of global warming. Indeed, minimizing the carbon footprint of adaptation actions can help society avoid the "worst-case" scenarios for climate change, which would make successful adaptation in human and natural systems difficult, if not impossible, to achieve. Ideally, adaptation efforts should contribute to meeting climate mitigation goals both by minimizing or reducing the greenhouse gas emissions from project operations, including from any construction and ongoing maintenance, as well as by managing natural systems in ways that sustain or enhance their ability to cycle, sequester, and store carbon.
> ...
> Some of the most obvious synergies between adaptation and mitigation are those aimed at enhancing carbon stocks in natural forests, ... Strategies for increasing the capture and storage of forest carbon include: avoiding deforestation; afforestation (i.e., establishment of trees in areas have not been forests or where forests have not been present for some time); decreasing forest harvest; and increasing forest growth (McKinley et al. 2011). Managing natural systems to provide carbon benefits must be carefully balanced, however, with other conservation and adaptation goals. ... Recent research, however, indicates that old trees "do not act simply as senescent carbon reservoirs" but actively fix larger amounts of carbon than smaller trees (Stephensen et al. 2014). This recognition highlights the important role that biodiversity-rich old-growth forests can play in sequestering carbon.
> ...
> It is not always obvious, however, when conservation and climate mitigation efforts might be in alignment or in conflict. ... Although there are clear synergies between adaptation and mitigation focused activities, managers will also need to carefully consider any trade-offs.

Stein, B.A., P. Glick, N. Edelson, and A. Staudt (eds.). 2014. Climate-Smart Conservation: Putting Adaptation Principles into Practice. National Wildlife Federation, Washington, D.C. https://www.nwf.org/~/media/PDFs/Global-Warming/2014/Climate-Smart-Conservation-Final_06-06-2014.pdf.

Sometimes climate change mitigation and adaptation are in complete harmony, such as protecting riparian forests that both store carbon and buffer streams from hydrological extremes caused by climate change. See Justice et al. 2017. Can stream and riparian restoration offset climate change impacts to salmon populations? Journal of Environmental Management 188 (2017) 212e227 https://www.critfc.org/wp-content/uploads/2017/01/JournalPost_Justice_etal2017.pdf. However, there are also times when efforts directed at climate change adaptation conflict with climate change mitigation goals. For instance, some people argue that we should reduce the density of federal forests so they are more resilient to soil-water stress caused by global warming. However, forest density reduction will accelerate the transfer of carbon from the forest to the atmosphere where it will contribute to global climate change.

Logging and the entire wood products supply chain causes significant emissions of CO_2, this makes fire worse in several ways. It not only warms the atmosphere and extends the fire season, CO_2 is also a "floating fertilizer" that stimulates the growth of hazardous fuels. When the agency

says they are logging to make the forest more resilient to climate change, they must address these countervailing risks, and consider alternatives that better harmonize climate change resilience/adaptation and climate change mitigation (emissions avoidance). Allen, R. J., Gomez, J., Horowitz, L. W., & Shevliakova, E. (2024). Enhanced future vegetation growth with elevated carbon dioxide concentrations could increase fire activity. *Communications Earth & Environment*, *5*(1), 1-15. https://doi.org/10.1038/s43247-024-01228-7. ("… the spatial pattern of the NPP response is quite similar to the corresponding spatial pattern of the fFire response (Fig. 2)-not only for 1% per year CO_2 and 1% per year CO_2-bgc, but interestingly also for 1% per year CO_2-rad. This is also the case for other vegetation parameters, including leaf area index (LAI; Supplementary Figs. 10–11 and Supplementary Note 4). This implies that the increase in fFire is largely due to the increase in biomass production (i.e., more fuel to burn) and likewise for decreases. The corresponding correlations (between the NPP and fFire responses) across grid boxes yield significant positive MMM correlations at 0.34, 0.26 and 0.17 for 1% per year CO_2, 1% per year CO_2-bgc, and 1% per year CO_2-rad, respectively. ").

Federal agencies must strive to harmonize climate change mitigation (carbon storage or avoided emissions) and climate change adaptation (making ecosystems more resilient to climate change). For example, if the agency uses climate change adaptation as a rationale for forest thinning, they must not only fully disclose the increased GHG emissions caused by their proposal, they must also consider alternatives that harmonize these competing goals, such as by thinning very lightly and retaining all of the medium and large trees that store most of the carbon.

Failure to Properly Describe the Significant Cumulative Effects of Logging Emissions on the Climate

The Mill Creek EA inappropriately minimizes the effects of this project on the climate when it says "GHG emissions from this project in all action alternatives as presented are determined to be not-significant because emissions of the project area are estimated to be one to three-hundredths of a percent of the estimated total carbon stocks on the Ochoco National Forest." This is an improper and highly misleading way to describe the significance of carbon emissions from logging. To say that adding 7811 tonnes of CO2 to the atmosphere is insignificant because it is a small part of the carbon in the Ochoco National Forest, is like saying the damages from a destructive tsunami are insignificant because only a small fraction of the water in the ocean came onshore. (This is not a perfect analogy but it captures part of the problem with the EA analysis). It's not the size of the forest carbon pool that matters; it is the total amount of carbon in the atmosphere, and because the carbon has a long residence time in the atmosphere and atmosphere is well mixed, every increment of additional carbon emissions (including emissions from logging the Mill Creek Project) adds to a persistent cumulative problem that we know as the climate crisis. The EA has not analyzed this issue correctly.

A proper analysis would recognize that the climate crisis is a global problem caused by the cumulative emissions of greenhouse gases to our well-mixed atmosphere. Every bit of GHG added to the atmosphere adds to the cumulative problem. If *de minimus* emissions didn't matter, then everybody could say they are not part of the problem. That is just not an accurate framing of the problem. It does not matter what fraction of the carbon in the forest is emitted.

What really matters is the net carbon transferred to the atmosphere, and whether those emissions mitigate the climate crisis or exacerbate the climate crisis. The climate crisis is undeniably a significant effect, and logging proposed under the Mill Creek EA will emit 7811 metric tons of CO2 and make the climate crisis worse. This has effects on the natural resources of Mill Creek planning area, the Ochoco National Forest, and the entire world. Another way of looking at the significance of logging related emissions is to consider the effects of climate change on pages 247-248 of the EA and then consider that 7811 tonnes of additional emissions will make all those effects incrementally worse.

The Mill Creek EA improperly minimized this project's contribution to carbon emissions and global warming by saying the effects of this project would be non-significant. This is not an appropriate framework. Global climate change and ocean acidification are the result of the **cumulative** effects on the **global** carbon cycle which is spatially distributed. There is no single culprit, nor is there a silver bullet solution. All emissions are part of the problem, and all land management decisions must be part of the solution. Since the global carbon cycle is spatially distributed, carbon storage and carbon emissions will always we spread out around the globe, and the carbon flux at any given place and time may appear small, but *cumulatively* they help determine the temperature of our climate and the pH of our oceans. Given the current carbon overload in the atmosphere and oceans, the carbon consequences of every project must be carefully considered (rather than dismissed as negligible).

The Forest Service argues that logging a few small patches of forest won't make a difference in the global scheme of the climate problem, but as Voltaire said, "No snowflake in an avalanche ever feels responsible." The NEPA analysis must recognize that global warming will not be solved by one miraculous technological fix or by changing one behavior or one economic activity. The whole global carbon cycle must be managed to reduce carbon emissions and increase carbon uptake. Recent evidence supports the conclusions that all net emissions of greenhouse gases are adverse to the climate. None can be considered *de minimus*. "We show first that a single pulse of carbon released into the atmosphere increases globally averaged surface temperature by an amount that remains approximately constant for several centuries, even in the absence of additional emissions. We then show that to hold climate constant at a given global temperature requires near- zero future carbon emissions. Our results suggest that future anthropogenic emissions would need to be eliminated in order to stabilize global-mean temperatures. As a consequence, any future anthropogenic emissions will commit the climate system to warming that is essentially irreversible on centennial timescales." H. Damon Matthews and Ken Caldeira. 2009. Stabilizing climate requires near-zero emissions. Nature Vol 455 | 18 September 2008 | doi:10.1038/nature07296.

Every ton of CO_2 emitted to the atmosphere contributes to global climate change and ocean acidification. There is a single global carbon budget for cumulative GHG emissions for the period from the present to the end of the carbon economy which (because we have been slow to act) must occur in the next few decades. Those budgets require significant reductions in carbon emissions and an eventual end to GHG emissions. See Richard Millar, Myles Allen, Joeri Rogelj, Pierre Friedlingstein. 2016. The cumulative carbon budget and its implications. Oxford Review of Economic Policy, Volume 32, Issue 2, SUMMER 2016, Pages 323–342,

https://doi.org/10.1093/oxrep/grw009; http://pure.iiasa.ac.at/id/eprint/12738/1/The%20cumulative%20carbon%20budget%20and%20its%20implications.pdf. "The carbon budget is a key concept in the climate-policy sphere. It arises directly from the finding that the increase in global mean surface air temperature is proportional to cumulative CO_2 emissions over time. This finding is far from trivial, and together with the long-lived nature of CO2 as a greenhouse gas leads to two simple but powerful conclusions: 1. We need to cut emissions to zero in order to stop the increase in global temperature. 2. The amount of CO_2 that can be emitted globally in order to a stay within a certain warming limit is finite – the carbon budget." CONSTRAIN, 2019: ZERO IN ON the remaining carbon budget and decadal warming rates. The CONSTRAIN Project Annual Report 2019, DOI: https://doi.org/10.5518/100/20; https://constrain-eu.org/wp-content/uploads/2020/02/CONSTRAIN-Zero-In-On-The-Remaining-Carbon-Budget-Decadal-Warming-Rates.pdf. The agency has no basis for concluding that emissions from logging are more important than (and belong in the constrained cumulative carbon budget) than other activities that emit GHG. When the agency says that emissions from logging are *minimal* or *infinitesimal* on a global scale, it is effectively saying that its emissions belong outside the budget rather than inside the budget. This is fatally wrong. All GHG emissions are part of the cumulative emissions from all sources. None are outside the budget.

In deciding the NEPA case against the Kootenai NF's Black Ram Project (which includes 3900 acres of commercial logging), the court said:

> ... the USFS is required to determine "the extent to which this particular project's [carbon emissions] will add to the severe impacts of climate change." Id.
>
> In light of the above, the USFS's consideration of the Project's climate impacts fails NEPA in two ways. First, by relying almost entirely on the cookiecutter and boilerplate Project Climate Report to analyze the carbon impact of the project, the USFS did not utilize high quality and accurate information which NEPA requires. See 40 C.F .R § 1500.1. Second, even though the USFS posited that the short-term loss of carbon from logging would be outweighed by the net increase in carbon sequestration resulting from a healthier forest, this assertion is not backed up by a scientific explanation. Rather, the USFS generally concludes that carbon as a result of the Project's activities make up "only a tiny percentage of forest carbon stocks of the Kootenai National Forest, and an infinitesimal amount of total forest carbon stocks of the United States." FS-020743. Under this logic, the USFS could always skirt "hard look" analysis when doing a carbon impacts review by breaking up a project into small pieces and comparing them to huge carbon stocks such as those contained within the over two million acres of land in the Kootenai National Forest.
>
> ...
>
> the EA discusses how the USFS plans to ameliorate root disease from a selection of trees in the Project area, which will lead to growth of trees that can store more carbon than diseased trees. See FS-002243 (noting that a purpose and need of the Project is to "[p]romote" root disease-resistant tree species like "western larch, ponderosa pine, and western white pine"). However, like its analysis of the net carbon loss resulting from logging, the EA does not sufficiently provide scientific evidence indicating why this

> benefit would offset the carbon loss leading to an overall "minor" impact on the environment.
>
> Ultimately, "[greenhouse gas] reduction must happen quickly" and removing carbon from forests in the form of logging, even if the trees are going to grow back, will take decades to centuries to re-sequester. FS-038329. Put more simply, logging causes immediate carbon losses, while re-sequestration happens slowly over time, time that the planet may not have. FS-020739…
>
> While the USFS did address climate change in the EA through the Forest and Project Carbon Plans, merely discussing carbon impacts and concluding that they will be minor does not equate to a "hard look." NEP A requires more than a statement of platitudes, it requires appraisal to the public of the actual impacts of an individual project. With all in agreement that climate change as a result of carbon emissions is an increasingly serious national and global problem, see FS- 020739, the USFS has the responsibility to give the public an accurate picture of what impacts a project may have, no matter how "infinitesimal" they believe they may be. They did not do so here. Accordingly, the agency failed to take a "hard look" at the Project's carbon emissions, violating NEPA.

CBD v. USFS, Case 9:22-cv-00114-DWM Filed 08/17/23 (D. Mont.) https://www.biologicaldiversity.org/programs/public_lands/forests/pdfs/Black-Ram-093-ORDER-Granting-MSJ-2023-08-17.pdf.

Misleading Analysis of Project Effects on Atmospheric GHG Concentrations

The Mill Creek EA is confusing, misleading, contradictory, and incorrect when it says, that project activities will increase carbon storage and reduce climate effects. “Some actions, such as proposed in Alternatives 2, 3, and 4 that involve ecosystem restoration (Figure 48) can generate short-term biogenic emissions while resulting in overall long-term net reductions of atmospheric GHG concentrations through increases in carbon stocks or reduced risks of future emissions” (EA p 248). This statement cites EA Figure 48 which lists various actions that might increase forest resilience or increase tree vigor, but it does NOT say that these actions will result in “overall long-term net reductions of atmospheric GHG concentrations.” The EA fails to make a proper distinction between climate adaptation and climate mitigation. See the section above. The EA provides no logic path that connects logging and emissions reductions.

Oregon Wild comments on the EA provided detailed refutations of the misleading statements in the draft EA that risk reduction logging will reduce GHG emissions, and that logging will increase forest productivity. We incorporate those comments by reference. Some of the key points include statements from forest carbon scientists who say:

> “I am unaware of a single study, or plausible mechanism, by which tree removal increases stand-level productivity (and by extension carbon stocks). For instance, the CFCP fairly cites Battles et al. (2015) as empirical evidence that thinned forests can “within a decade or two” regain the carbon lost due to the removal of smaller trees, but fails to acknowledge that the un-thinned control forests in this same study continued to grow over this period

> and, at all times, contained more carbon that the thinned ones. Even when one considers the protection thinning affords forests from carbon losses in high-severity fire, thinned forests contain less carbon over space and time than do fire suppressed ones (provided conditions afford timely post-fire regeneration). Such is well-established in several reviews of the subject, all of which are notable missing from the CFCP citations (Campbell et al., 2012; Restaino and Peterson 2013; Young, 2015; Kalies and Kent 2016)."

Campbell, J.L. 2017, Comments on the Jan 2017 draft California Forest Carbon Plan. http://www.fire.ca.gov/fcat/downloads/FCAT_PublicComment/Campbell_CFCP_Review_Final-2nd.pdf. The "capacity to grow trees" (i.e., net ecosystem productivity) on this landscape will actually be adversely affected by the proposed action to the extent the FS builds roads, compacts soil, removes biomass, etc.

Law et al (2013) showed that logging to address climate change does not increase forest productivity. Beverly E. Law, Tara W. Hudiburg & Sebastiaan Luyssaert (2013): Thinning effects on forest productivity: consequences of preserving old forests and mitigating impacts of fire and drought, Plant Ecology & Diversity, 6:1, 73-85 http://dx.doi.org/10.1080/17550874.2012.679013; https://terraweb.forestry.oregonstate.edu/sites/terraweb/files/Law_PED13.pdf ("The regional analysis indicates that proposed climate change mitigation actions to reduce impacts in Pacific Northwest US forests that included a treatment of sparing mesic mature forests, clear-cutting mesic young forests (<50 years, reducing harvest cycle from 80 to 50 years, which is already being planned) and thinning all age classes of dry forests to minimise drought and fire impacts on carbon (<650 mm precipitation per year) resulted in a 29% decrease in NPP over the 20-year treatment period compared with NPP resulting from current practices. … The zero-order estimate of fire-induced loss in NPP (11%) was less than that of large-scale prevention of forest fires (12.5%) over the 20-year treatment period (Sparing/Sharing treatment for dry forest only) … This and other studies suggest that the net effect of thinning the drier forests would be reduced NPP compared with NPP after fires").

Misleading Analysis of Fire Effects

The Mill Creek EA (p 249) says "Uncharacteristically severe wildfire is a clear and present danger to our nation's forests, including our mature and old-growth forests. Such fires also diminish the ability of many forests to adapt to climate Change." This is highly misleading and fails to account for the fact that fire is a natural process that forest ecosystems have evolved with for millennia. Furthermore, fire is a direct mechanism for ecosystems to adapt to climate change, not an impediment to adaptation.

The EA failed to recognize the beneficial role of fire in climate change adaptation. As mentioned earlier, the Forest Service should consider the analysis presented in the Fuels Report for the 2017 East Hills Project on the Fremont-Winema NF which admits that wildfires are expected to have beneficial effects even under the no action alternative: "Overall expected value of fire effects is moderately beneficial. This assumes that fires burn throughout the range of conditions – actual current practice is to suppress fires that are most likely to be beneficial." https://www.fs.usda.gov/nfs/11558/www/nepa/101283_FSPLT3_4264365.pdf.

In fact, if the FS is too successful in moderating fire effects, it could perpetuate a mismatch between the current and future climate and the climate-compatible vegetation communities. The Forest Service failed to use accurate science in its analysis of fire effects. For instance,

> *Use wildfires as an opportunity to facilitate establishment of current and future climate-adapted species and communities*
> While increased wildfires can be a threat to biodiversity, especially in landscapes where habitat has been altered by logging and land-use change, they also provide a benefit by creating diverse early successional conditions and opportunities for natural or artificial regeneration of new genotypes and species that may be better adapted to the climate than those in existing stands. The challenge to planners and managers is deciding when and where to allow fires to burn and what to do afterwards. The challenge is especially great where federal lands border state and private lands where wildfires can threaten commercial timber crops and homes.

Spies, Geisen, Franklin, Swanson, Lach, Johnson 2010. Climate change adaptation strategies for federal forests of the Pacific Northwest, USA: ecological, policy, and socio-economic perspectives. Landscape Ecol. DOI 10.1007/s10980-010-9483-0. https://www.fs.fed.us/pnw/pubs/journals/pnw_2010_spies001.pdf.

> Wildfire is a global Earth system process that both integrates and influences many other interactions between ecosystem and the climate system. Fire mediates other ecosystem responses to changing climate, for example by modulating forest density and composition, and thus providing a mechanism by which ecosystems adapt to changing climate conditions. Uncertainties in key elements of climate projections could be compounded by nonlinear responses of fire to climate variability. Fires may also act as triggers for abrupt and irreversible change to novel configurations under Direct and indirect controls on annual wildfire area burned future climate [44], [83]. As climate change progresses, the projected changes in the area affected annually by fire may be an important multiplier of these effects in coming decades.

Kitzberger T, Falk DA, Westerling AL, Swetnam TW (2017) Direct and indirect climate controls predict heterogeneous early-mid 21st century wildfire burned area across western and boreal North America. PLoS ONE 12(12): e0188486. https://doi.org/10.1371/journal.pone.0188486.

Wildfire helps forests adapt to global climate change by accelerating adaptive range shifts.

> As the climate changes, animal and plant species are shifting their ranges toward conditions suitable for their growth and reproduction. Past research has shown that plant ranges are shifting to higher, cooler elevations at an average rate of almost five feet per year. In many studies, these range shifts lag behind the rate of climate change, suggesting that some species may become stranded in unsuitable habitats. The factors that impact plant species' ability to keep up with climate change are key to maintaining healthy populations of the dominant trees in western forests, yet have remained largely mysterious.

> To better understand the distance, direction and rate at which tree ranges are shifting, Hill and study co-author Chris Field, the Perry L. McCarty Director of the Stanford Woods Institute for the Environment, looked at how the phenomenon is affected by wildfire, a potent and widespread driver of ecosystem structure and composition in the western United States.
> Using U.S. Forest Service data collected from over 74,000 plots across nine Western states, the researchers identified tree species that are shifting their ranges toward cooler, wetter sites – an expected response to the recent warming and drying. Then, they compared the rate of these range shifts between places that were burned by wildfire and places that were not.
> Of eight species that had seedlings growing in climates significantly different from mature trees of the same species, Hill and Field found strong evidence that two – Douglas fir and canyon live oak – had larger range shifts in areas that burned than in areas that did not.

ROB JORDAN. Nov 15, 2021. Trees on the Move: Stanford researchers reveal how wildfire accelerates forest changes. https://woods.stanford.edu/news/trees-move-stanford-researchers-reveal-how-wildfire-accelerates-forest-changes *citing* Hill, A.P., Field, C.B. Forest fires and climate-induced tree range shifts in the western US. *Nat Commun* **12,** 6583 (2021). https://www.nature.com/articles/s41467-021-26838-z.pdf. ("Here, we show that the potential range shift rates of two of eight tree species are significantly faster in plots with a recent fire. … Our results contribute to the exploration of the hypothesis that forest fires can facilitate climate-induced range shifts, providing some of the first empirical evidence of contemporary climate-induced potential range shifts being facilitated by wildfire").

Natural disturbances like fire produce better results than logging in terms of restoring resilience and adaptive capacity.

> [F]ailing command-and-control approaches (CACA) are leading to calls for new approaches in dry forests.
>
> Working with natural processes is the premise of nature-based approaches. We recognize widespread concern that disturbances in dry forest are outside historical variability, so they are damaging. However, we found they are not; instead, they are effectively restoring and adapting dry forests to climate change.
>
> The central constraint on using natural disturbances is an insufficiently protected nearby built environment, which can be remedied by redirecting CACAs to focus on protecting the built environment.
> … we have shown that high-severity fire is recently operating at rates and patterns within the range of historical variability.
> …
> Why are nature-based disturbances more restorative and adaptive to climate change than CACAs are? Wildfires provide strong selective pressure for trees to survive the fire itself, so they restore historical forest resistance, and select for adaptation to hotter and drier post-fire environments as climate changes. … In contrast, CACAs select tree winners and losers without any knowledge of their genetic adaptations to future disturbances or climate change. … Ecological heterogeneity from natural disturbances is also essential for species to adapt to climate change. Nature-based disturbances best

> provide essential natural selection, genetic adaptation, and spatial heterogeneity needed for forest resistance, resilience, and adaptation to future climate change.
> ...
> We also think it is sensible to work with droughts/beetles as they are more consistently low- to moderate in severity and do not threaten the built environment as wildfires can.
> Recent rates suggest natural disturbances alone could accomplish restoration and adaptation within ~40 years. However, if prescribed burning and managed fire for resource benefit were enhanced to be more natural, full restoration and adaptation could feasibly be met in ~30 years, by mid-century, a significant achievement.

William L. Baker, Chad T. Hanson, and Dominick A. DellaSala 2024. A nature-based solution to restore and adapt western US dry forests to climate change. Physorg Jan 19, 2024. https://phys.org/news/2024-01-nature-based-solution-western-dry.html *citing* William L. Baker et al, Harnessing natural disturbances: A nature-based solution for restoring and adapting dry forests in the Western USA to climate change, Fire (2023). DOI: 10.3390/fire6110428. https://www.mdpi.com/2571-6255/6/11/428

See also, Falk, D. A., Van Mantgem, P. J., Keeley, J. E., Gregg, R. M., Guiterman, C. H., Tepley, A. J., JN Young, D., & Marshall, L. A. (2022). Mechanisms of forest resilience. Forest Ecology and Management, 512, 120129. https://doi.org/10.1016/j.foreco.2022.120129.

If the Forest Service is concerned about climate driven type conversion, they should not be. It seems likely that climate change may cause some unknown fraction of the landscape to experience uncharacteristic frequent stand-replacing fire and convert to shrub species that are more adapted to that pattern. Yet, so much is unknown about where when and how much. Conversion to non-forest is highly speculative. We might be able to predict where it is relatively likely to occur (conversion-vulnerable sites), but we can't confidently predict specifically where or when it will occur, because type-conversion is disturbance driven and the location, timing, and severity of disturbance is highly unpredictable.

Baker (2023) showed that type conversion is unlikely within a wide range of temperate coniferous forest types, even when climate change is considered. Baker, W.L. 2023. Tree-Regeneration Decline and Type-Conversion after High-Severity Fires Will Likely Cause Little Western USA Forest Loss from Climate Change. Climate 2023, 11, 214. https://doi.org/10.3390/cli11110214. "Using the fire projections of Abatzoglou et al. [1] based on increasing aridity, that there will be a 107% increase in fire, and only about 9.9–17.0% would be burned at high severity by 2050 (Table 3)." And within that 10-17% subset of high severity fire, only 21.7% of areas burned at high severity were more than 90 meters from live seed sources where successful tree regeneration may be unlikely or delayed. "[R]ates of reburning from 2000 to 2020 were so low, with rotations from 14,351 to 30,010 years indicating that reburning will likely remain an insignificant effect (Table 3)." Anecdotes about reburn and type-conversion should not trump more credible estimates of the risk of these phenomena.

We should not manage the whole landscape aggressively to prevent this from happening on a small subset. Our ability to avoid type conversion by logging is quite limited. Even thinned forests can experience stand-replacing fire when it's hot, dry, and windy.

We should probably accept this successional path as something we cannot control, a new part of the future/natural range of variability. We probably should treat Shrublands as another diverse ecosystem type, not something inferior to forests.

Don't forget type-conversion is a form of climate adaptation that maybe we should not interfere in. We need to appreciate severe fire when it clears a less-adapted vegetation type to make way for a different vegetation type more adapted to the future climate. (Cheat grass is not an example of this, but forest to chaparral arguably is).

Some suggest that we can save carbon by thinning to avoid forest type-conversions such as from forest to shrublands. This brings up several considerations. There is only a small spatial overlap between fuel treatments and wildfire, so, the amount of carbon emitted from thinning vastly exceeds the carbon that might be saved by avoiding type conversion. When type-conversion is a concern, efforts are better spent carefully choosing whether and what to replant after it burns, and maybe doing non-commercial thinning of the smallest fuels and conducting prescribed fire. "Even if forests do switch to a net carbon source from increased climate-related tree mortality, logging them will only exacerbate the rate of carbon released to the atmosphere." Dominick A. DellaSala, 2023. Determining Threats and Conservation Needs for Mature-Old Growth (MOG) Forests: White Paper. Wild Heritage. August 3, 2023. https://wild-heritage.org/wp-content/uploads/2023/08/MatureOldGrowththreats-conservation-dellasala-8-3-2023.pdf. This is because the combined emissions from climate-related tree mortality, plus logging to control such mortality, are higher than the emissions from climate-related tree mortality alone.

Sincerely,

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