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19 December 2024

TO: Wallowa-Whitman National Forest
ATTN: Brian Anderson, Wallowa Valley District Ranger
VIA: https://cara.fs2c.usda.gov/Public//CommentInput?Project=58961

Subject: Morgan Nesbit Project EA — comments

Please accept the following comments from Oregon Wild, Central Oregon Bitterbrush Broadband/Great Old Broads, Juniper Group/Sierra Club, WildEarth Guardians, and Eastern Oregon Legacy Lands concerning the Morgan Nesbit Forest Resiliency Project draft Environmental Assessment, https://www.fs.usda.gov/project/wallowa-whitman/?project=58961.

- **Oregon Wild** represents 20,000 members and supporters who share our mission to protect and restore Oregon's wildlands, wildlife, and water as an enduring legacy. Our goal is to protect areas that remain intact while striving to restore areas that have been degraded. This can be accomplished by moving over-represented ecosystem elements (such as logged and roaded areas) toward characteristics that are currently under-represented (such as roadless areas and complex old forest). Oregon Wild's contact for this project is Rob Klavins | Northeast Oregon Field Coordinator | PO Box 48, Enterprise OR 97828 541.886.0212 | rk@oregonwild.org | | www.oregonwild.org.

- **Central Oregon Bitterbrush Broadband / Great Old Broads for Wilderness** focus areas include: Wild Lands Protection—We work to protect the wild nature that is the intrinsic value of our public lands through stewardship, education and advocacy. Issues we work on include off-highway vehicles, fish and wildlife species and their habitats, livestock grazing, roads, habitat fragmentation, and general mismanagement. Wildlife Issues—We create habitat for monarch butterflies and pollinators, and work to increase habitat connectivity for all fish and wildlife in Oregon. We educate each other and the public about the importance of beaver, large trees, and top predators. Bitterbrush Broadband's contact for this project is co-leader Amy Stuart, 13501 NW Grizzly Mountain Road, Prineville, OR 97754, 541-233-8215, amystuart63@gmail.com.

- **Juniper Group / Oregon Chapter Sierra Club** is dedicated to preserving Central and Eastern Oregon's environment, natural resources, and quality of life. The Juniper Group is composed of Sierra Club members from Baker, Crook, Deschutes, Grant, Harney, Jefferson, Malheur, Morrow, Umatilla, Union, Wallowa, and Wheeler counties. Juniper Group's contact for this project is Mathieu Federspiel, the Group Vice Chair and Federal Projects

Review Coordinator. The Juniper Group's address is 16 NW Kansas Ave., Bend, OR 97703, juniper.group@oregon.sierraclub.org.

- **WildEarth Guardians** is a non-profit organization dedicated to protecting and restoring the wildlife, wild places, wild rivers, and health of the American West. WildEarth Guardians has 7,900 members and more than 187,000 supporters across the western states and maintains offices in Portland, Oregon, and Seattle, Washington. WildEarth Guardians' contact for this project is Chris Krupp, Public Lands Attorney, 10015 Lake City Way NE #414, Seattle, WA 98125, (206) 417-6363, ckrupp@wildearthguardians.org.

- **Eastern Oregon Legacy Lands** is dedicated to expanding public awareness of greater Eastern Oregon's natural and cultural history, and accelerating the pace of land conservation throughout the Blue Mountains ecoregion. We embrace the key role of scientific research and public education in helping rural communities better understand and manage the landscapes they call home. Contact for this project is David Mildrexler, PhD, Systems Ecologist, 508 North Main Street, PO Box 666, Joseph, Oregon 97846, (541) 432-3044, d.mildrexler@gmail.com.

Oregon Wild and other groups signed onto these comments provided detailed scoping comments (dated 4-6-23) on the Morgan Nesbit Project which remain relevant. We hereby incorporate those comments by reference.

Contents

Project Description 3

How is the Forest Service Recognizing and Respecting Public Priorities? 4

Fundamental Concern: Over-Reliance on Timber Sales as a Restoration Tool in this Special Landscape 8

EIS needed 11

National Recreation Area 16

Shaded Fuel Breaks 16

Logging in RHCAs will retard riparian management objectives and impair fish and wildlife habitat 19

Logging Steep Slopes 27

Unroaded/Undeveloped Areas 27

Road Construction 35

Connectivity 35

Fuel Reduction via Commercial Logging is Not Appropriate in Cool/Moist Forests. 36

The EA Should Consider the Relative Efficacy of Removing Canopy Fuels vs Surface and Ladder Fuels. 39

Thinning will push stands outside HRV 43

Regen harvest and high-intensity thinning will violate Eastside Screens 43

Scat Surveys 44
ESA Compliance: Avoid Take, Advance Recovery 45
New Information on Goshawk Habitat Selection 48
New information on Pileated Woodpeckers 52
Carbon Emissions and Global Climate Change 53
Trees Evolved with Climate Variability 67
Retain and Restore Genetic Diversity of Trees 69
New information on Snags 76
Disclose, Weigh, and Mitigate Trade-offs 79
Consider All Reasonable Alternatives. 84

Project Description

- 13,900 acres of commercial logging (applying 21" dbh limit)
    - 2,700 acres moderate-intensity thinning, retaining average stocking densities between 35 and 45 percent of the focal management species maximum SDI, or between 45 and 55 percent of full stocking for the stand's plant association and QMD.
    - 10,600 acres high-intensity thinning, retaining average stocking densities between 25 and 35 percent of the focal management species maximum SDI, or between 35 and 45 percent of full stocking for the stand's plant association and QMD
    - 1,597 acres on steep slopes
    - 1,522 acres thinning w/ patch cuts up to 5 acres (on up to 20 percent of a stand's total acreage)
    - 445 acres include irregular shelterwood (residual density of 10 to 20 trees per acre (TPA) or a basal area of 40 square feet per acre)
    - 303 acres thinning in RHCAs (none on steep slopes)
        - No mechanized harvest or heavy machinery operation will occur within 50' of the stream channel in Category 4 RHCAs, 75' of the stream channel in Category 2 and 3 RHCAs, and 150' of the stream channel in Category 1 RHCAs
        - 48 acres of RHCA thinning in Category 1 or 2 RHCAs
    - 310 acres of commercial logging in connectivity corridors
- 7,837 acres non-commercial thinning and shaded fuel breaks (3,515 acres on steep slopes)
- 74,840 acres prescribed fire

- 393 acres of aspen and meadow enhancement
- 18 miles temporary road construction
- 17.4 miles road decommissioning
- 367 miles road maintenance
- 34 culvert replacements or removals

See EA Table 3 below.

Table 3. The Proposed Actions to be implemented to meet the purpose and need.

Commercial Thinning	**Slopes <30% (acres)**	**Slopes >30% (acres)**	**Total Acres**
Commercial	10,254	1,366	**11,620**
Commercial w/patch cuts	1,305	217	**1,522**
Irregular Shelterwood	431	14	**445**
RHCA Category 1	17	0	**17**
RHCA Category 2	31	0	**31**
RHCA Category 4	265	0	**265**
		Total Commercial Thinning Treatments	**13,900**
Noncommercial Thinning		**Slopes >30% (acres)**	**Total Acres**
Noncommercial	1,599	1,088	**2,687**
Noncommercial in RHCAs	264	17	**281**
Shaded Fuel Breaks	1,722	2,334	**4,056**
Shaded Fuel Breaks in RHCAs	737	76	**813**
		Total Noncommercial Thinning Treatments	**7,837**
Other Treatments			**Total Acres**
Aspen Enhancement			**264**
Meadow Enhancement			**129**
Prescribed Fire			**74,840**
Transportation			**Total Miles**
Temporary Road Construction			**18**
Road Maintenance			**367**
Road Decommissioning			**17.4**
Road Storage			**3.4**
Culverts			**Total Culverts**
Culvert Replacement			**16**
Culvert Removal			**18**

How is the Forest Service Recognizing and Respecting Public Priorities?

During the NEPA process, the Forest Service conducted a public survey about management priorities for the project area. We do not see the results of that survey reflected in the EA. Please disclose what the public said about this special area. Based on information we received regarding the survey results, please consider the following:

1) The main task of the survey was to rank the importance of "ecosystem services" of the project area on a bell curve from -4 to +4.

The Forest Service summary only notes that at least one person thought everything was a -3 or -4 and at least one person thought everything was a +3 or +4. They use it to make the case to say people are divided and it's hard to balance these perspectives:

*"...This reflects a major challenge for the Morgan Nesbit project decision-makers...*any change within the Morgan Nesbit area that negatively influences the ecosystem services will have a meaningful impact on at least one person in the sample of 74 people and, it stands to reason, additional people in the population at large."

The agency summary also lump folks into three different groups, describes them, and then makes a specious claim that everyone supports an active management project:

"While those people who align with the wood products archetype, generally, have a somewhat opposite view to those held by people who align with the traditional use archetype (indeed, statistically, the two perspectives come from a bi-polar factor; one where people load positively and negatively onto the same factor), ***there appears to be agreement around the need for active management and intervention."*** [emphasis added].

Looking at the actual numbers paints a very different picture. The results are very in line with conservation values and prioritizing natural values and processes over resource extraction, logging, development, grazing, and active management. From most important to least important, here are the averages. Those above 1 are in green, those below -1 in red, and those between -1 and 1 in blue.

Wildlife habitat and connectivity	2.39
Biological diversity of plants and animals	1.94
Water quality	1.82
Climate change adaptation and mitigation (for example – through carbon sequestration, refuge for wildlife)	1.58
Federally threatened Chinook salmon habitat	1.51
Forest health and resistance and resiliency to insects and disease	1.34
Native American use of the area (for example – exercising treaty rights, collection of culturally relevant plants)	1.05
Large diameter trees (those larger than 21" diameter)	0.94
Water quantity (amount of water)	0.74
Native vegetation	0.66
Air quality	0.6
Rare and sensitive plants	0.52
Fire and drought tolerant vegetation	0.38
Elk habitat	0.16
Non-motorized Recreation	0

Archeological and paleontological sites	[0.16]
Dispersed camping	-0.56
Economic value from recreation and tourism	-0.69
Fishing	-0.84
Materials for personal use (for example – Christmas trees, firewood, mushroom picking)	-1.17
Hunting	-1.19
Developed camping	-1.44
Economic value from forest products and/or active management, for example-	-1.64
Timber harvesting	-1.99
Motorized Recreation	-2.69
Livestock grazing	-2.74

2) The second of two tasks is interesting. However, given how it is set up, it is of very little practical value. It asks participants to choose the top three management actions/approaches that will most influence their priority ecosystem services. However, it notes the impact can be positive or negative. So it doesn't really say what people want or don't want or what they think is good or bad. It simply asks what they think is impactful. In this case, I think the report does a fine job summarizing the data in Table 2.

3) Lastly, there are general comments which are not shared in the Forest Service summary and seem to undermine the agency's claim that most everyone supports "active management" and "intervention". Below, they are lumped together in what are pretty clearly "conservation, passive restoration, and cultural values" in green, "extractive and aggressive veg management" in red, and everything else in blue. It's pretty overwhelmingly in favor of conservation with 11 comments clearly in the conservation camp, only 2 in the extractive camp and three that are something else or in between.

> This is precious land that has been inhabited by humans over 16000 years it is an integral part of who we are. This is phenomenally important habitat for many species. Its loss would be a tragedy on every level. It's vital we find ways to protect this precious ecosystem for generations to come and honor the ancient human heritage it holds by maintaining biodiversity and its wildness.
>
> This is an area rich in biodiversity. Decisions must take this into account to assure that biodiversity will not be compromised.
>
> Reducing road density and non-system road travel will increase snag density while improving wildlife habitat connectivity and resiliency by reducing anthropogenic stressors. Reducing stand density via thinning and prescribed fir will help promote earl seral restoration. Fish passage and enhancement projects will improve riparian buffers, replenish the water table, and provide important water for downstream communities (agriculture, towns, livestock, etc.).
>
> This area is vital for wildlife migration and wolf habitat and should be preserved.

Wildlife and preserving forests in their natural state is most important to me.

Climate change increases the need for a connected landscape that can facilitate the dispersal of plants and animals responding to these rapidly changing conditions. The ecology of the area should be the top priority.

This is an area that I love that I do not want to see harmed by logging

Please limit commercial logging. Please limit logging to restoring forests that were previously logged in the past and cut only smaller trees. Please do not log roadless areas of any kind or designation. Please enhance connectivity of wildlife habitat. Please remove any barriers to fish passage and enhance fish habitat. Please retain all large trees of all species for their value in local forest ecology as well as their value for carbon sequestration. Thank you for the opportunity to comment on this proposed project.

I had the great privilege of participating in a wolf rendezvous and that involved observing and learning about nature, local resources and learning about the history of the area, the amazing contribution wolves provide to the environment, breath taking scenery and soul restoring time in the beautiful environment. Please do not destroy this with timber harvesting and other activities that disturb the habitats.

Management should prioritize protections for old growth and mature trees, as well as biological diversity of native plants and wildlife. Reducing road density within the Wallowa-Whitman should be a core feature of any future management.

I am very concerned about losing wildlife habitat including large trees, and very concerned about destruction of native plants

Nature photographer, backpacker, lover of nature and natural beauty

Establish a fully vested research and effectiveness monitoring program at local project and landscape spatial/temporal scales.

None

All of our forests should be thinned. Logging is also acceptable.

This was on FB. I have ridden this (and many Natl Forests) and we need to be very worried about the ground fuels that ˜Policy" has allowed to develop. These are PUBLIC LANDS I have a vested interest in seeing the destruction mitigate d through intervention!

The scoping period generated an unusually large number of comments that showed this project is of tremendous public interest locally and across the region. The majority of comments there also showed a public in favor of restoration of and through natural processes and minimizing logging, road building, resource extraction, and other disturbance on the landscape.

We appreciate that some changes have been made in that direction. Despite some very loud and hostile contrary voices, all evidence leads us to believe the majority of the public continues to feel this project is misguided and should continue to see major changes that prioritize natural processes, quiet recreation, and protecting natural values over logging, road-building, habitat fragmentation, and extractive activities.

Fundamental Concern: Over-Reliance on Timber Sales as a Restoration Tool in this Special Landscape

As noted in our scoping comments …

Yet again, the agency is putting forth a nominal restoration project that will aggressively log and build roads in one of the wildest and most globally-important unprotected landscapes in the Continental United States. Rather than focus on the primary restoration needs or the underlying causes of that need, the project – which has largely been developed prior to scoping and with far too little field work and data – is another series of backcountry timber sales with some non-commercial activities included.

This is right on the heels of a series of similarly packaged and ongoing "restoration", "safety", "collaborative", and similar projects that have been controversial and destructive. In those projects we have seen the commercial logging occur, but many of the legitimate restoration activities dropped.

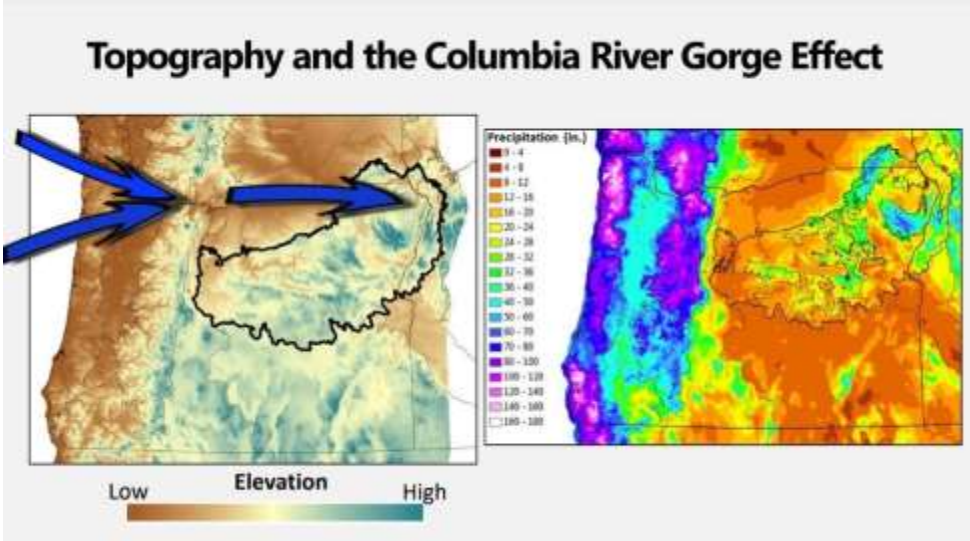
The project is silent on the biodiversity crisis and, while it acknowledges the reality of climate change, it uses that crisis to justify logging that will undoubtedly make climate change worse.

Additionally, this landscape spans many types of demarcated land management types including those designated for timber and grazing but also old growth areas, Wild and Scenic Rivers, and a National Recreation Area full of Indigenous history. There are many undesignated and undeveloped areas with no less value. Much of the project area has been proposed for additional protections from Wilderness to National Park status. The landscape is mind-bogglingly diverse and complex. It includes Canyonlands hosting cacti, grasslands, and dry, wet, and subalpine forests…and everything in between. However, in analyzing the project, specious assumptions have been made that lump all these landscapes together into the categories that best justify aggressive logging.

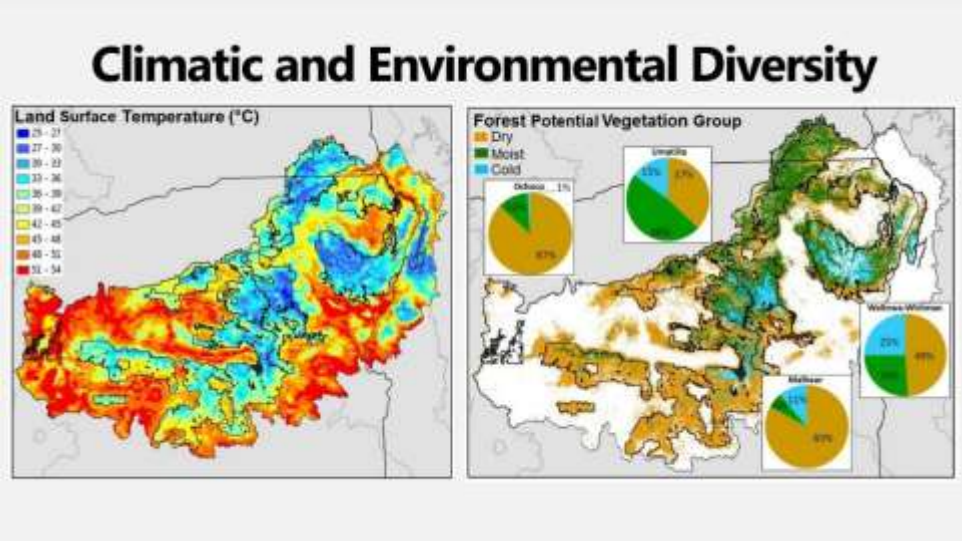
A view of the Morgan Nesbit Project area.

A stand of moist-mixed conifer forest that has been targeted for aggressive regeneration harvest and large tree removal. It currently provides invaluable habitat for many species of wildlife.

This slide from a presentation by Dr. David Mildrexler shows that while many of the forests in Eastern Oregon are dry, the forests in the Morgan Nesbit project area are wetter, more diverse, and more complex. Treating them with principles from central Oregon and the Southern blues is inappropriate.



This slide from a presentation by Dr. David Mildrexler shows that the forests in the Morgan Nesbit Area are far wetter than most in Eastern Oregon and therefore support a different forest type. This is largely a result of topography and climate.



While many of the forests in Eastern Oregon are dry, the Morgan Nesbit Project area is dominated by moist forests. While parts of the project do include dry forests, that is not the case here. In its descriptions and plans, however, the agency has treated the area like it is much more homogenous and erred toward lumping it together with dry forests found elsewhere.

EIS needed

NEPA requires a "detailed statement" (an EIS) for major federal actions significantly affecting the human environment.

This is a large logging project in a beloved area of the Wallowa-Whitman National Forest. There are potentially significant impacts which necessitate preparation of an EIS to carefully consider relevant impacts and alternatives that resolve trade-offs in different ways.

Spies et al (2006) said "[F]uel-reduction activities may have undesirable environmental effects (e.g., the need for periodic treatments, introduction of weeds, soil disturbance, or maintenance of some roads)."[1]

Federal agencies have previously recognized the complexities and uncertainties of forest management:

> The management of large forest landscapes is a complex and developing discipline. There is less than complete information about many of the relationships and conditions of fire ecology, wildlife and plant species, forest habitats, the economy, and conditions in rural communities."[2]

Similar complexities have been recognized in the peer-reviewed literature:

> Climate change, fire policy, and fuel-treatment strategies are complex biosocial issues, and integrating them with wildlife conservation objectives is challenging. Conservation of taxa that live in late-seral forest and riparian habitat has been a dominant management paradigm for the past two decades, but this emphasis is often incompatible with increased use of fire and mechanical thinning for ecosystem restoration (Cissel et al. 1999). For example, fuel treatments and natural fires that remove a portion of the overstory, understory, and surface fuels reduce the risk of subsequent crown fire but also preclude habitats required for some plant and animal species.[3]

The complexity and uncertainty of modern forest management, especially multiple-objective projects like this, require careful consideration in an EIS.

This project proposes a wide variety of actions that can have both positive and negative effects over a variety of temporal and geographic scales. The NEPA document does not adequately

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[1] Spies, Thomas A.; Hemstrom, Miles A.; Youngblood, Andrew; Hummel, Susan. 2006. Conserving old-growth forest diversity in disturbance-prone landscapes. Conservation Biology. 20(2): 351-362. http://www.fs.fed.us/pnw/pubs/journals/pnw_2006_spies001.pdf.

[2] Medford BLM, South Deer EA, July 2005.

[3] Donald Mckenzie, Ze'ev Gedalof, David L. Peterson, and Philip Mote. Climatic Change, Wildfire, and Conservation. Conservation Biology 18(4), Aug 2004. http://www.uoguelph.ca/cedar/Pubs/McKenzie_et_al_ConsBio.pdf

consider these significant complexities and an EIS is needed to properly consider, analyze, and disclose these complex issues.

Significant impacts include:

- Over 10,000 acres of high-intensity thinning that leaves too few trees for habitat, LOS forest restoration, carbon storage, etc.
- Logging in unroaded areas that causes disproportionate adverse impacts on areas that provide disproportionate ecosystem services;
- Soil disturbance, water pollution, and habitat degradation from logging steep slopes;
- Soil degradation, erosion, water pollution, loss of wood recruitment, loss of shade and wildlife cover from logging in sensitive areas such as Hells Canyon National Recreation Area, RHCAs and undeveloped areas;
- Likely adverse effects on ESA-listed chinook, steelhead, bull trout, and whitebark pine;
- Extensive thinning along roads could have significant adverse effects on the ability of big game to feel secure and move freely across the landscape;
- Removing too much basal area via commercial logging will adversely affect wildlife cover and snag recruitment that are beneficial for species like marten, goshawk, and pileated woodpecker;
- Different effects of commercial logging as a restoration tool (with heavy equipment, roads, and removal of valuable habitat trees) compared to non-commercial thinning and prescribed fire;
- Regen harvest that sets back successional development processes and fails to retain and recruit LOS components as required by the Eastside Screens;
- Removal of canopy trees in shaded fuels breaks will adversely modify microclimate, reduce fuel moisture, stimulate growth of hazardous surface and ladder fuels, and exacerbate roads as a barrier to wildlife crossings;
- Road construction required by commercial logging will cause long-term adverse effects on soil, vegetation, water, etc.;
- Carbon emissions from logging that kills trees that are actively photosynthesizing, initiating decay and combustion processes, and moving carbon from the forest to the atmosphere;
- Logging that reduces climate resiliency for many species of wildlife that depend on forest cover and dead wood;
- The cumulative effects of this project and other large logging projects on the Wallowa-Whitman National Forest;
- Uncertainty about the effects of logging on fuels, fire behavior, climate resilience, future recruitment of large trees and snags, weeds, human caused fire ignitions, etc.; and
- This project is controversial because of its sensitive location and large size and aggressive logging methods.

As explained in more detail below, this project presents a number of significant trade-offs that must be considered in an EIS, such as:

- Commercial logging and road construction versus unroaded/undeveloped values. Large unroaded/unmanaged areas provide disproportionate ecosystem services such as clean abundant water, high quality habitat, carbon storage / climate change mitigation, soil conservation, scenic values, quality of life, intact plant communities with fewer weeds, etc. Unroaded areas are rare and under-represented across the landscape and need to be restored, not further degraded. Building more roads and treating such a large fraction of the landscape move this landscape in the wrong direction;

- Commercial logging and road construction versus carbon storage. Climate change is a significant issue facing humanity. Our forests are an important part of the global carbon cycle. Logging will make climate change worse, while forest conservation will help store more carbon across the landscape and over time. This project is part of the cumulative global problem of carbon emissions. The global carbon cycle is globally distributed. There is no single place, or single activity that can fix the climate problem. All agencies must take steps to reduce GHG emissions. We can't point the blame and solution elsewhere;

- Commercial logging and road construction versus long-term recruitment of snags and dead wood habitat. Snags and dead wood habitat are critically important to forest ecosystems. Dead wood serves a wide variety of ecosystem services, not just habitat. Snags and dead wood habitat has been significantly reduced and degraded by decades of forest management on public and private lands. Logging kills trees and exports the wood unavoidably reducing dead wood values. This is a particular concern when such a large fraction of the landscape will be treated. The LRMP is based on outdated "potential population" methodology. New science indicates that wildlife need more snags and dead wood for a wider variety of life functions and more green trees are needed to serve as a recruitment pool for continuous snag recruitment through the life of the stand. The agency has not (but needs to prepare an EIS and plan amendment to) adopt new standards to replace the outdated standards. The agency should use DecAID as the best available science but should use this tool appropriately: prepare a stand simulation that project snag recruitment under the action and no action alternatives, not just rely on the reference stand conditions, but instead compares future snag conditions to the DecAID tolerance levels for individual species who's viability depends on high snag abundance;

- Commercial logging and road construction versus habitat for wildlife that prefer complex forest and dense forest cover. Many wildlife, including goshawk, marten, pileated woodpecker, marten, three-toed woodpecker, black-backed woodpecker, and fish that need well-shaded streams and abundant dead wood, etc. Logging across such a large fraction of this landscape will remove and degrade habitat for these fish & wildlife. The NEPA analysis needs to carefully disclose and weigh these impacts and provide mitigation to ensure species viability;

- Commercial logging and road construction versus fire hazard. Logging has complex effects on fire and fuels with some effects tending to reduce hazard, and other effects tending to increase hazard. When forest "restoration" treatments involve significant reduction of canopy cover it can have complex effects on fire hazard with potential to increase fire hazard by making the stand hotter/drier/windier, generating more

hazardous slash, stimulating the growth of future surface and ladder fuels, and additional roads increase human ignition risks. These trade-offs require an EIS.

There are many unresolved issues surrounding management of forest ecosystems. For instance:

How can we balance the need to thin overly dense forests in order to grow more big trees and the need to provide habitat for species that depend on dead wood and dense canopy cover? This is a particular concern in terms of species associated with dead wood and those associated with complex riparian areas. There is evidence that capturing mortality has adverse consequences for these species that have not been fully integrated into our management approaches. Some might argue that our forests are suffering more from a lack of management, but we would strenuously argue that our forests are still more threatened by too much of the wrong forms of management, past, present and future (roading, logging, grazing, mining, fire suppression) and there is still too little recognition of this.

How can we balance the competing effects of canopy removal that both reduces fire hazard by reducing canopy bulk density and increases fire hazard by making the stand hotter, drier, and windier? Canopy reduction has competing effects on fuels and microclimate that need to be more carefully examined. Recognizing that "The fire environment is thus an integration of the effects of all of its components" (Countryman 1972) the agencies lack a comprehensive model that integrates the effects of logging on both fuel structure (rearranging fuels, moving the canopy to the ground) and microclimate (making the stand hotter, drier, windier). "The evaluation of biomass removal alternatives on fire potential is complex and many-faceted. … Treatments can alter many aspects of a stand and thus of fire potential. … In fact, fuels and fire potential change dynamically and continuously— and not always consistently. The relative success of treatments in reducing fire potential may change as stands and fuels develop. … In the long run, opening a stand and removing biomass alters stand dynamics and fuel dynamics. Effects on potential fire behavior may vary with time since treatment …"[4]

How do we integrate and balance terrestrial and aquatic restoration objectives which can sometime be in conflict. Terrestrial restoration often involve manipulation of vegetation, while aquatic restoration more often benefits from minimal anthropogenic ground disturbance. Terrestrial restoration often requires road systems which are almost universally harmful to aquatic systems.

Is fire-regime condition-class (FRCC) a sound basis for describing and prioritizing fuel treatments. FRCC is a widely used tool which assumes that "time since fire" is an accurate indicator of fire hazard, but there is conflicting evidence showing that closed canopy forests that develop in the absence of fire can help suppress the growth of surface and ladder fuels

[4] Reinhardt, Elizabeth D.; Holsinger, Lisa; Keane, Robert 2010. Effects of biomass removal treatments on stand-level fire characteristics in major forest types of the northern Rocky Mountains. Western Journal of Applied Forestry. 25(1): 34-41. http://www.fs.fed.us/rm/pubs_other/rmrs_2010_reinhardt_e001.pdf.

and maintain a cool, moist microclimate that helps reduce fire hazard. Dense canopy cover might actually help suppress fire rather than spread it.[5]

How much dead wood habitat should we be leaving, and how do we ensure that enough is provided through time? The current forest plan standards for snag-associated wildlife (based on "biological potential") are scientifically outdated and need to be updated. DecAID is a start, but it has its own limitations and DecAID has not been officially adopted as a management standard with appropriate tolerance levels clearly specified for each land allocation. See

- Franklin, J.F., Lindenmayer, D., MacMahon, J.A., McKee, A., Magnuson, J., Perry, D.A., Waide, R., and Foster, D. 2000. Threads of Continuity. Conservation Biology in Practice. [Malden, MA] Blackwell Science, Inc. 1(1) pp9-16. https://andrewsforest.oregonstate.edu/sites/default/files/lter/pubs/pdf/pub2815.pdf.
- William F. Laudenslayer, Jr., Patrick J. Shea, Bradley E. Valentine, C. Phillip Weatherspoon, and Thomas E. Lisle Technical Coordinators. Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests. PSW-GTR-181. http://www.fs.fed.us/psw/publications/documents/gtr-181/.
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- 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.
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- Bruce G. Marcot 2017. Ecosystem Processes Related to Wood Decay. PNW Research Note 576. https://www.fs.fed.us/pnw/pubs/pnw_rn576.pdf

If the agency decides NOT to prepare an EIS, the agency must supply a "convincing statement of reasons" to explain why the action will not have a significant impact on the environment. "The statement of reasons is crucial to determining whether the agency took a hard look at the

[5] Odion, D.C., E.J. Frost, J.R. Strittholt, H. Jiang, D.A. DellaSala and M.A. Moritz. 2004. Patterns of fire severity and forest conditions in the western Klamath Mountains, California. Conservation Biology 18(4): 927-936. http://nature.berkeley.edu/moritzlab/docs/Odion_etal_2004.pdf.

potential environmental impact of a project."[6] The Court is to defer to the agency's decision not to prepare an EIS only when that decision is "fully informed and well considered."[7]

The scale of this project is large and will cause significant effects including long-lasting detrimental changes to soil and water quality, degradation of the unique values represented by large unroaded areas or areas with low road density, killing of mature and old-growth forests, felling snags and reducing future snag recruitment, loss of wildlife habitat, exacerbating the project area's deviation from the historic range of variability, etc.

This project is clearly of interest to a great number of people who find it controversial.

National Recreation Area

A large fraction of the proposed commercial logging is located within the Congressionally-designated Hells Canyon National Recreation Area. The legislation creating the Hells Canyon National Recreation Area, and the subsequent plans for the area include limitations on logging and roads. These need to be carefully followed.

The Forest Service should fully explain how any proposed activities are consistent with all provisions of the HCNRA Comprehensive Management Plan, the HCNRA legislation, and all other relevant management direction, such as the Wallowa-Whitman National Forest LRMP, and provide any such documents as part of a publicly-accessible project file available on the project website

Shaded Fuel Breaks

If done correctly, fuel breaks can be a useful tool. Done incorrectly they can make the situation worse. Shaded fuel breaks implemented non-commercially with significant canopy retention may be an effective fuel treatment, IF they are maintained over time. If fuel breaks remove too much canopy and are accomplished with heavy equipment that disturbs too much soil, fuel breaks can stimulate the growth of hazardous fuels and weeds, making fire hazard worse instead of better, while making long-term maintenance more difficult and more expensive. Fuel breaks also have significant trade-offs that need to be avoided, minimized, and mitigated, including spreading weeds, habitat fragmentation, exacerbating barriers to wildlife, impaired wildlife connectivity, loss of wildlife cover, loss of snag habitat, facilitating unauthorized OHVs, carbon emissions, etc. Extensive thinning along roads could have significant adverse effects on the ability of big game to feel secure and move freely across the landscape. NEPA analysis is needed to carefully address these issues.

Fuel breaks are largely untested with potentially uncertain ecological effects.

> Shinneman *et al.* (2019) reported that there is little scientific information available regarding their [fuel breaks] ecological effects. They report that fuel breaks can: (1) directly alter ecosystems; (2) create edges and edge effects; (3) serve as vectors for

[6] *Blue Mountains*, 161 F.3d at 1212; *see also* 40 C.F.R. § 1501.4(e); 40 C.F.R. § 1508.13.

[7] *Jones v. Gordon*, 792 F.2d 821, 828 (9th Cir. 1986).

wildlife movement and plant invasions; and (4) preemptively fragment otherwise contiguous sagebrush landscapes.[8]

PODs and fuel breaks should be explicitly planned and designed to facilitate the return of fire to the landscape, not to perpetuate the failed policy of continued suppression of wildfire. If the fuels breaks are intended for continued fire suppression, then the NEPA analysis should disclose the adverse environmental effects of that outdated policy.[9]

Shaded fuels break with well-spaced trees is bad fuel break design.

Shaded fuel breaks should be ***well shaded***. The prescription should focus on removal of surface and small ladder fuels, and retain high canopy cover to --

(1) reduce slash production and reduce costs of slash disposal,
(2) maintain cool/moist microclimate and prolong fuel moisture,
(3) suppress the growth of future surface and ladder fuels,
(4) reduce future maintenance costs, and
(5) provide better wildlife cover which mitigates for making roads an even greater barrier to wildlife movement.

When harvest units overlap with shaded fuel breaks, the FS should not remove canopy trees. Removal of canopy trees from shaded fuel breaks will undermine objectives for the fuel break in a variety of ways:

(1) moving more fine fuels from the canopy to the ground will result in greater slash production, and more difficult slash disposal,
(2) reduced shade from canopy trees will create a hotter, drier, windier microclimate, and drier fuels,
(3) the growth of surface and ladder fuels will be stimulated by the increased availability of light, water, and nutrients,
(4) faster growth of surface and ladder fuels will increase future maintenance costs,
(5) roads are already a barrier to wildlife. Removing trees that provide cover will exacerbate connectivity problems.

Be sure to disclose the numerous adverse effects of thinning too heavily and opening the canopy.

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[8] Kauffman, Beschta et al 2020. Comments on Boise BLM's Tri-State Fuel Break Project. 22 Dec 2020. https://drive.google.com/open?id=1AEA3PTs31Sv_-RZZnMsduhHCb1hniZ_e *citing* Shinneman, Douglas J.; Germino, Matthew J.; Pilliod, David S.; Aldridge, Cameron L.; Vaillant, Nicole M.; Coates, Peter S. 2019. The ecological uncertainty of wildfire fuel breaks: examples from the sagebrush steppe. Frontiers in Ecology and the Environment 17(5):279-288. https://doi.org/10.1002/fee.2045. ("Fuel breaks are increasingly being implemented at broad scales (100s to 10,000s of square kilometers) in fire-prone landscapes globally, yet there is little scientific information available regarding their ecological effects (e.g. habitat fragmentation). … Given uncertain outcomes, we examine how implementation of fuel breaks might (1) directly alter ecosystems, (2) create edges and edge effects, (3) serve as vectors for wildlife movement and plant invasions, (4) fragment otherwise contiguous sagebrush landscapes, and (5) benefit from scientific investigation intended to disentangle their ecological costs and benefits."). See also Shinneman, D.J., Aldridge, C.L., Coates, P.S., Germino, M.J., Pilliod, D.S., and Vaillant, N.M., 2018, A conservation paradox in the Great Basin—Altering sagebrush landscapes with fuel breaks to reduce habitat loss from wildfire: U.S. Geological Survey Open-File Report 2018–1034, 70 p., https://doi.org/10.3133/ofr20181034.

[9] Timothy Ingalsbee 2005. Fuelbreaks for Wildland Fire Management: A Moat or a Drawbridge for Ecosystem Fire Restoration? Journal of Fire Ecology, Pages: 85-99. DOI:10.4996/fireecology.0101085. https://web.archive.org/web/20070818123112/http://www.fireecology.net/pdfs/7_ingalsbee.pdf.

We think some of the trade-offs of shaded fuel breaks and PODs can be minimized by following guidelines, such as:

- Well-shaded fuel breaks will be much more effective than linear clearings. Maintaining a reasonably dense canopy will mitigate habitat fragmentation effects, as well as lower maintenance costs by suppressing growth of surface and ladder fuels. Focus on small (<9" dbh) surface and ladder fuels within 150 feet of roads;
- Focus fuel break treatments near roads. Fire management goals can typically be met by focusing on small fuels within 150 feet from roads. In a survey of fuel breaks in California "average width of fuel breaks in this sample was 116.9 meters" which is less than 200 feet from roads.[10]
- Focus on treating plantations and previously logged stands. Avoid/minimize treating mature & old-growth, riparian areas, and roadless/unroaded areas.
- Treatments in reserves and land allocations with an ecological mandate should be avoided where possible, and minimized/modified to retain more large wood and diverse vegetation to meet objectives for the RMP.
- Use manual treatments (hand felling, lop-and-scatter, burning small piles) instead of heavy equipment. This will protect soil, water quality, and fire resilient native plants;
- Retain dense, mid-to-high canopy to help maintain a cool, moist microclimate, retain fuel moisture, help suppress the growth of surface and ladder fuels (which also minimizes maintenance costs), and provide a bit more cover to mitigate for adverse effects on wildlife mobility;
- Retain deciduous hardwoods which can serve as heat sinks during fires;
- Adjust prescriptions in response to different forest types, retaining a bit more density in moist forest types, and a bit less in dry forest types;
- Retain important elements of diversity where possible, such as Pacific yew, and some patches of shrubs that produce berries, nuts, nectar, etc. (food for wildlife), and to provide intermittent opportunities for wildlife crossing the road;
- Consider and minimize the effects on large and small wildlife that need to cross roads. Opening the forest reduces cover and increases barriers to safe movement of wildlife;
- Treat a well-planned network of roads that ideally create polygons with a high ratio of area/perimeter. Too much redundancy will create cumulative impacts. Larger PODs have a more favorable ratio of area/perimeter, which reduces cumulative effects. Possibly consider smaller PODs within the WUI, and larger PODs further out. Reduce cumulative effects by avoiding redundant fuel breaks, e.g. avoid treating nearby parallel roads.
- Plan and account for recurring maintenance costs, e.g., manual thinning, prescribed fire, weed control, etc. Avoid commercial logging in the first instance because log values will not be a recurring feature of POD maintenance. The fuels removed should be smaller over time, not larger.

[10] Stephens, Collin, Omi, Johnson 2023. FINAL REPORT: Manager Perspectives on Fuel Break Effectiveness and Configurations. JFSP PROJECT ID: 19-2-01, March 2023. https://mcusercontent.com/5f6de7b069a57255f980944b4/files/68ab7c9b-a224-e68b-a3fa-97077e22b662/19_2_01_1.pdf.

- PODs planning must be truly interdisciplinary, not just in name only.
- NEPA analysis of PODs should be both programmatic and site-specific.

Please develop a NEPA alternative that follows these guidelines.

The NEPA analysis should consider the environmental effects of connected actions, including recurring maintenance and fire suppression activities. The NEPA analysis should disclose the essential connection between fuelbreaks and fire suppression, and disclose what kinds of potential suppression activities, such as fireline construction with hand crews or bulldozers, fire retardant chemical dumping, backfire and burnout operations, hazard tree felling could occur within the fuelbreaks, and disclose the general effects on soils, watersheds, and species of interest.

Weeds are definitely a potential big problem with fuel breaks, especially the combination of frequent disturbance caused by recurring maintenance, and road use as a vector for weeds.

> "[W]e found that 19 of the 24 fuel breaks had significantly higher relative nonnative cover than the adjacent wildland areas.... Time since construction was strongly associated with nonnative abundance when we evaluated all of the fuel breaks together.... A number of different species assumed dominance... suggesting that many nonnative species may be well adapted to take advantage of the conditions provided by fuel treatments.... [F]uel breaks with more canopy and ground cover may be less likely to be invaded.... We found that nonnative cover decreased with distance from the fuel break, suggesting that fuel breaks act as sources of nonnative plant seeds during the invasion of adjacent areas."[11]

Logging in RHCAs will retard riparian management objectives and impair fish and wildlife habitat

The NEPA analysis needs to carefully analyze the trade-offs involved when commercial logging occurs in RHCAs. Logging will remove forest canopy which will reduce shade, increase stream temperatures, and degrade desired microclimate conditions for riparian habitat. Logging will also remove valuable habitat in the form of live green trees, snags, and large down wood. Logging riparian areas will also degrade soil and potentially increase soil erosion and sediment input, and cause instability of streambanks.

Please refer to our April 2023 scoping comments which provided detailed comments on the likely impacts of logging on Riparian Habitat Conservation Areas.

Riparian areas are among the most critical wildlife habitats providing habitat for over 80% of the native fish and wildlife species in Western landscapes. However, riparian areas comprise a relatively small percentage 7% of the Project area, so that nearly all forest management activities have direct or indirect effects on riparian areas and water quality. INFISH established Riparian Habitat Conservation Areas ("RHCAs"), which are areas of watersheds where riparian-dependent resources receive primary emphasis, and where management activities are subject to

[11] Merriam, K.E., Keeley, J.E., and Beyers, J.L., 2007, The role of fuel breaks in the invasion of nonnative plants: U.S. Geological Survey Scientific Investigations Report 2006-5185, 69 p. http://pubs.usgs.gov/sir/2006/5185/pdf/sir_2006-5185.pdf.

specific Standards and Guidelines. These areas include traditional riparian corridors, wetlands, intermittent streams, springs and seeps, and other areas to help maintain the integrity of the aquatic ecosystems. The timber harvest standard TM-1 prohibits timber harvest in RHCAs except for application of silvicultural practices to acquire desired vegetation characteristics where needed to attain RMOs. Silvicultural practices must be applied in a manner that does not retard attainment of RMOs and that avoids adverse effects on native fish.

From a wildlife perspective, RHCAs are unsuitable for conducting large scale land management treatments due to their importance for fish and wildlife populations as habitat and migration corridors, importance for water quality, and connectivity for terrestrial and aquatic resources. Most target basal areas for forest stand density are based on silvicultural prescriptions rather than addressing the needs of fish and wildlife species.

For example, riparian areas are critical components for reproductive habitats of big game species and provide important thermal and hiding cover. For example, elk habitat needs to be of adequate size and arrangement on the landscape to meet an animal's requirement for any particular season, such as breeding, wintering, calving, lactating/rearing, summering, and migration. Elk calving structural components are typically aspen stands and wet meadow complexes interspersed in coniferous cover and riparian woodlands that serve as calving grounds. This type of elk security habitat is preferred by cow elk to birth their calves. Elk habitat also needs to be relatively free of disturbances such as noise from motor vehicles that can cause diminished or negated habitat effectiveness.

Elk calving and wallow habitat are important to ensure the reproductive viability of the local elk populations (Washington Department of Fish and Wildlife (WDFW) 2005[12]). Elk calving (and deer fawning) areas with low disturbance are needed for birthing to ensure population recruitment. Lehman et al. (2015)[13] found that "At the fine scale in forests and grasslands, female elk selected sites in areas with intermediate slope (19%), closer to water (355–610 meters), and far from roads (541–791 meters)." Likewise, bull elk create and use wallows (wet muddy areas near seeps, springs, wetlands and riparian areas) with low disturbance, to cover themselves in mud laced with their urine and feces (their perfume) to attract and breed with cow elk in the fall of the year. Both life history functions for breeding and reproduction are essential to the health, productivity and vitality of an elk herd, and require proximity to riparian areas or springs and seeps. From the above description of the importance of riparian habitat for big game breeding, and dropping and rearing young, any treatments in RHCAs need to be minimal and dispersed.

RHCAs were established and require the federal agencies to manage buffers where riparian-dependent resources (streams and lakes in anadromous fish watersheds) receive primary emphasis. RHCAs are a separate land allocation with separate goals, desired conditions, and

[12] Washington Department of Fish and Wildlife (WDFW) 2005. Living with elk. Adapted from "Living with wildlife in the Pacific Northwest. Russell Link, Wildlife Biologist. 8 pp.

[13] Lehman, Chadwick P.; Rumble, Mark A.; Rota, Christopher T.; Bird, Benjamin J.; Fogarty, Dillon T.; Millspaugh, Joshua J. 2015. Elk resource selection at parturition sites, Black Hills, South Dakota. Journal of Wildlife Management. 80(3): 465-478.

standards & guidelines. The FS cannot justify applying upland logging prescriptions in RHCAs. PACFISH includes riparian management objectives (RMOs) that were established to quantitatively assess 1) pool frequency, 2) water temperature, 3) large woody debris, 4) bank stability, 5) lower bank angle and 6) width depth ratio. The EA does not appear to include an analysis of where these RMOs are currently met, where they are currently deficient, and whether logging makes things better or worse. With no information or analysis on trends for the six RMOs, the agency cannot possibly justify any riparian harvest.

Logging is a subtractive endeavor. There is no "bonus wood" from thinning. Even though there may be some additional growth on the trees that are retained, there will be more forgone growth on the trees that are killed and removed. There is no way to conclude that logging will enhance dead wood habitat. It will unavoidably degrade habitat and retard attainment of RMOs. If RMOs are already being met, then there is no need for logging.

Removing trees near streams will degrade water quality via several mechanisms - (a) trees shade the water surface from direct solar insolation, (b) trees shade soils and shallow groundwater before it is discharged to surface streams; (c) trees reduce wind penetration and air mass mixing over the water surface, insulating the stream from summer daytime warming or winter night time cooling, and (d) trees stabilize streambanks and floodplain surfaces and provides a supply of downed wood that helps keep channels narrow and establishes and maintains internal hydrologic complexity (vertical and lateral flow exchange between surface water and hyporheic waters) that buffers stream temperature against the effects of solar insolation and airmass mixing.

Thinning in riparian reserves does in fact raise ambient air temperatures that the microclimate effects must be accounted for.[14]

Roon et al. (2018):

> … concern about cumulative effects of thinning, which involves an understanding of the spatial and temporal dimensions of the issue in whole-stream networks. To address these cumulative effects we are studying experimental riparian thinning treatments in adjacent stream networks and forests managed by the Green Diamond Resource Company and the National Park Service (Redwood National Park) in northern California. Thinning was implemented in multiple locations, allowing us to evaluate effects of these local treatments in the context of larger stream networks. To track local treatments, we followed a before-after-control-impact approach to quantify spatial and temporal patterns of riparian shade, light, and stream temperatures as possible responses to riparian thinning. To evaluate how the potential effects of these local treatments resonate at broader extents, we have quantified shade, light, and stream temperatures across entire networks. Spatial statistical models were applied to these data to determine the spatial extent to which localized thinning propagated through stream networks. Preliminary results from tracking local treatments indicate an immediate response in stream temperature associated with the reductions in shade and increases in light associated with riparian thinning. At the

[14] Anderson, Paul D.; Larson, David J.; Chan, Samuel S. 2007. Riparian Buffer and Density Management Influences on Microclimate of Young Headwater Forests of Western Oregon. Forest Science, Volume 53, Number 2, April 2007 , pp. 254-269(16). http://www.ingentaconnect.com/content/saf/fs/2007/00000053/00000002/art00012.

> network extent this resulted in variable downstream propagation of the effects of upstream thinning.[15]

Climate change is expected to increase stream temperatures and reduce fish habitat quality and quantity. Gordy Reeves said "Riparian vegetation can potentially off-set future increases in water temperature [related to global climate change]."[16]

Fuel reduction using commercial logging methods is not necessary or desired in riparian reserves, because large wood serves important biophysical functions in riparian reserves.

> [W]e suggest that managers proceed with caution in altering fuel loads near streams, particularly in watersheds that have been logged.... There is little ecological justification for the direct removal of large wood from riparian areas or riparian trees or snags that would create it.[17]

Dead wood is important to meeting many aquatic and terrestrial wildlife habitat values. Dead wood is also important for ecological services such as the capture, storage and release of water, sediment, and nutrients including, carbon. Most riparian reserves are short of dead wood due to past and ongoing logging, roads, fire suppression, etc. Natural processes of stand growth and mortality will correct this shortage, whereas logging will capture and export mortality and reduce and delay recruitment of wood to both streams and uplands within riparian reserves. This is not a minor short-term effect, but rather a significant long-term effect. Such effects are inconsistent with the Aquatic Conservation Strategy which prohibits logging in riparian reserves unless it is needed to meet objectives, and requires that management actions "maintain" and "not retard" ACS objectives, including dead wood. Any proposal to log riparian reserves must address these factors, develop clear goals, provide clear linkages between proposed actions and desired outcomes. Any alleged benefits of logging must be weighed against likely adverse effects on dead wood recruitment.

Fisheries scientist, Peter Moyle said in the Sacramento Bee on May 16, 2006:

> Logging after fire reduces the ability of streams to support desirable aquatic life, including salmon and steelhead. When logging roads are put through burned areas, erosion increases and streams may become clogged with sediment, which covers gravel needed by fish for spawning. A heavily logged watershed can produce streams with increased peak flows and decreased summer flows, severely reducing fish populations.
>
> When large logs fall into streams, they stabilize banks and create complex habitat for fish and a host of other creatures. The logs function directly as cooling shade and cover and indirectly as hard surfaces that cause the scour pools in which most fish live. It is now standard practice when restoring salmon streams to haul in large logs to increase the ability of the stream to support large numbers of fish. Post-fire logging removes the very logs that sustain such streams, reducing their ability to support large fish populations for

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[15] David Roon, Jason Dunham. 2018. Spatial Patterns of Riparian Shade, Light, and Stream Temperature in Response to Riparian Thinning in Redwood Headwater Streams. Speed Talks. 2018 Oregon Chapter of the American Fisheries Society 54th Annual Meeting. http://orafs.org/wp-content/uploads/2017/10/2018-Annual-Meeting-Abstracts.pdf.

[16] Gordy Reeves, 4-22-2020 Presentation to the Oregon Board of Forestry. https://www.oregon.gov/odf/board/bof/20200422-bof-handouts.pdf (p 63/132).

[17] Elliot, William J.; Miller, Ina Sue; Audin, Lisa. Eds. 2010. Cumulative watershed effects of fuel management in the western United States. Gen. Tech. Rep. RMRS-GTR-231. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 299 p. https://web.archive.org/web/20220120071251/http://www.fs.fed.us/rm/pubs/rmrs_gtr231.pdf.

> decades to come. It is important to leave not only large dead trees, but also those that have been damaged as well as the largest living trees, which often survive fires. Together, these trees provide the continuous supply of logs that a stream requires to replace those that have been moved downstream or rotted away.[18]

New science indicates that in landslide prone landscapes almost half of instream wood comes from outside the riparian area (>90 meters from the stream). This indicates that the total watershed must be managed to meet the aquatic objective of healthy streams.

Rose et al. (2001):

> **Mass Wasting and Surface Erosion.** … Large wood helps to anchor snowpacks, limit the extent of snow avalanches, and may even stabilize debris flows, depending on the depth of the unstable area … By covering soil surfaces and dissipating energy in flowing and splashing water, logs and other forms of coarse wood significantly reduce erosion. Large trees lying along contours reduce erosion by forming a barrier to creeping and raveling soils, especially on steep terrain. Material deposited on the upslope side of fallen logs absorbs moisture and creates favorable substrates for plants that stabilize soil and reduce runoff.[19]

Lancaster et al. (2002):

> Our results suggest that abundant wood plays a key role in moderating sediment flux from small basins following debris flow events. Debris flow events coincident with a lack of abundant wood, such as might occur following forest harvest, could lead to more episodic sediment flux to downstream, fish-bearing reaches.[20]

Everett et al. (2001):

> Historical stand structure results suggest that conservation of old trees is as important on sideslopes as in riparian forest and there is connectivity both in disturbance and structure across the riparian-sideslope ecotone.[21]

In the BMNRI soil seminar Dr. Alan Harvey makes the unequivocal statement that underground wood is the main source of late season moisture and nitrogen fixing activity on warm dry sites and that capturing and removing mortality from the above ground wood pool will eventually deprive the below-ground wood pool of a long term supply of large persistent wood.[22]

Deschutes NF:

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[18] Moyle, P. B. 2006. Burned logs aid forest ecology. Op-ed. Sacramento Bee May 16, 2006.

[19] 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

[20] LANCASTER, Stephen, HAYES, Shannon K., and GRANT, Gordon E. 2002. Modeling Sediment And Wood Storage And Dynamics In Small Mountainous Watersheds; http://gsa.confex.com/gsa/2002CD/finalprogram/abstract_34646.htm.

[21] Everett, Schellhaas, Ohlson, Spurbeck, Keenum; 2001; Continuity in Fire Regimes Between Riparian and Adjacent Sideslopes in the Douglas-fir Forest Series; http://www.srs.fs.usda.gov/pubs/viewpub.jsp?index=4740.

[22] http://maps.wildrockies.org/ecosystem_defense/Resources_Species_Topics/Soils/Harvey%20on%20%20Soils.doc.

> The presence of LWM within a stream channel is critical to maintaining the integrity of the system, in fact, there cannot be an overabundance of LWM. … Riparian Reserves provide important wildlife habitat, which justifies the heavy loading of LWM in the creeks and the floodplains. … In the Riparian Reserves … it is desirable to maintain healthy forest stands over the long-term while maintaining high snag densities and green tree replacements. … It is recognized that Riparian Reserves constitute an area where higher risks are taken (including reduced fire suppression efforts) in order to allow natural processes to occur and continue without human intervention.[23]
>
> In an undisturbed forest ecosystem, wood is naturally "recruited" to streams in various ways. Riparian trees growing along the channel fall into the channel when they are undercut by the stream, toppled by beavers, burned by fire or blown down during storms. Upslope trees can be transported into the channel by events such as avalanches or landslides. Flooding can wash trees into the channel and during high-water they may be pushed downstream.
>
> In-stream woody debris has been drastically reduced in some streams by historical forest management practices. Logging near rivers and streams limited the number of trees that could fall into streams. Road building that channeled streams through culverts prevented downstream wood recruitment. "Stream cleaning" was sometimes conducted to remove fallen trees from streams, for beautification, to prevent damage to infrastructure downstream, or in a misguided attempt to assist fish migration.
>
> Scientists have now come to understand that in-stream LWM [large woody material] is ecologically important for a number of reasons:
>
> 1. LWM can help spawning gravels accumulate by stopping the gravel from moving downstream;
> 2. Pools can form behind LWM, which provide important juvenile rearing habitat, as well as habitat for all fish during periods of low-flows;
> 3. LWM can help slow stream speed which helps adult fish as they move upstream and shelters rearing juveniles from using too much energy fighting currents;
> 4. LWM provide shade offering pockets of cooler water, and can help to lower the temperature of an entire stream;
> 5. LWM provides fish with refuge from predators;
> 6. LWM can help to stabilize banks, prevent erosion and decrease sediment movement that can harm downstream fish habitat;
> 7. LWM is important to the aquatic food chain, because it traps organic matter and provides habitat for insects and invertebrates, which are both food for fish.
>
> All of these elements add "complexity" to a stream. When it comes to fish habitat, complexity is a good thing. And one of the best ways to make a stream complex is to simply add wood.[24]

The agency should not manage for *minimum* levels of dead wood because *optimal* levels of dead wood are much higher than minimums. In fact, there may not be any maximum. "The presence of LWM within a stream channel is critical to maintaining integrity of the system, in fact, there cannot be an overabundance of LWM."[25] The Regional Ecosystem office recommends managing dead wood in young stands within reserves to attain *biologically optimal* levels, not just

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[23] Deschutes NF 1999. Odell Watershed Analysis, pages 164-165. https://hdl.handle.net/1794/7220

[24] Hannah Ettema 2014. Seven Reasons Why Fish Need Wood. https://www.nationalforests.org/blog/seven-reasons-why-fish-need-wood.

[25] Deschutes NF, 1997. Big Marsh Watershed Analysis. https://hdl.handle.net/1794/7225.

average or *reference* levels. REO said "CWD objectives should be based on research that shows optimum levels of habitat for late-successional forest-related species, and not be based simply on measurements within natural stands."[26]

The effects of logging in riparian reserves should be described in terms of the number of pieces and the volume of wood, not just the size wood. Scientists recommend wood volume as a more meaningful measure of wood's value instream. "Total volume of wood through time was reported for all simulations, which is a more conservative measure of wood abundance than the number of pieces."[27]

NMFS (2008):

> "Available research (et al., Beechie and Sibley 1997, Bilby and Ward 1989) indicates that trees as small as 5-6 inches in diameter can form pools in small streams. Thinning along small streams with wood deficits can significantly reduce recruitment of wood to streams (Beechie et al. 2000), and the risks of this happening appear to be significantly increased by the above management actions. [i.e. "thinning in riparian areas for all stream sizes"]
> ...
> Alternatives 2 and 3 will substantially decrease the large wood contribution to fish bearing streams relative to the No-Action Alternative, and the decreases will be long-term. This is because thinning will remove wood large enough to form pools from the riparian zone (if the term large wood is defined by its ability to form pools rather than the arbitrary value of >20 inches diameter) (Beechie et al. 2000)."[28]

Roni (2002):

> "Beechie et al. (2000) provided guidance for determining when thinning is appropriate and when it will result in a loss of near-term recruitment of LWD that may create fish habitat."[29]

Beechie (2000) found that

> "The models predict that thinning of the riparian forest does not increase recruitment of pool-forming LWD where the trees are already large enough to form pools in the adjacent channel and that thinning reduces the availability of adequately sized wood. Thinning increases LWD recruitment where trees are too small to form pools and, because of reduced competition, trees more rapidly attain pool-forming size"

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[26] REO 7-9-1996 Criteria to Exempt Specific Silvicultural Activities in Late-Successional Reserves, http://www.reo.gov/library/policy/REO-694_comm_thin_criteria.doc.

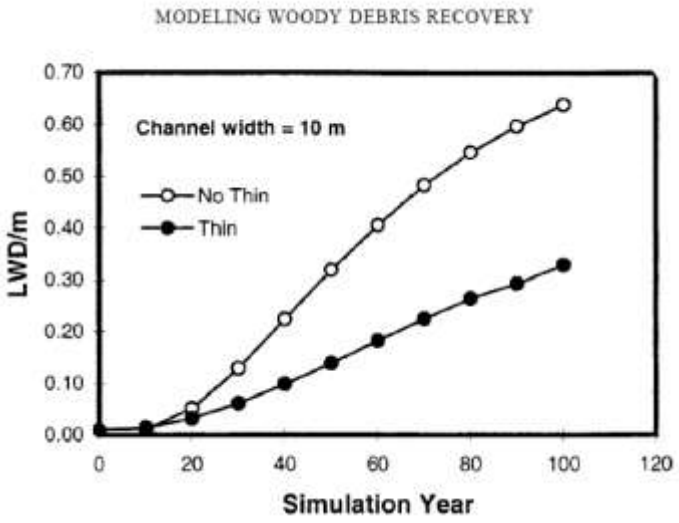
[27] Mark A. Meleason, Stanley V. Gregory, And John P. Bolte. 2003. Implications Of Riparian Management Strategies On Wood In Streams Of The Pacific Northwest. Ecological Applications, 13(5), 2003, pp. 1212–1221. http://www.geo.oregonstate.edu/classes/geo582/week_5_1_wood_movement/Meleasonetalstrategies.pdf.

[28] NMFS, Comments on DEIS for the WOPR dated 01-11-2008. pp 8-9, 21. http://www.blm.gov/or/plans/wopr/files/NOAA_comments.pdf.

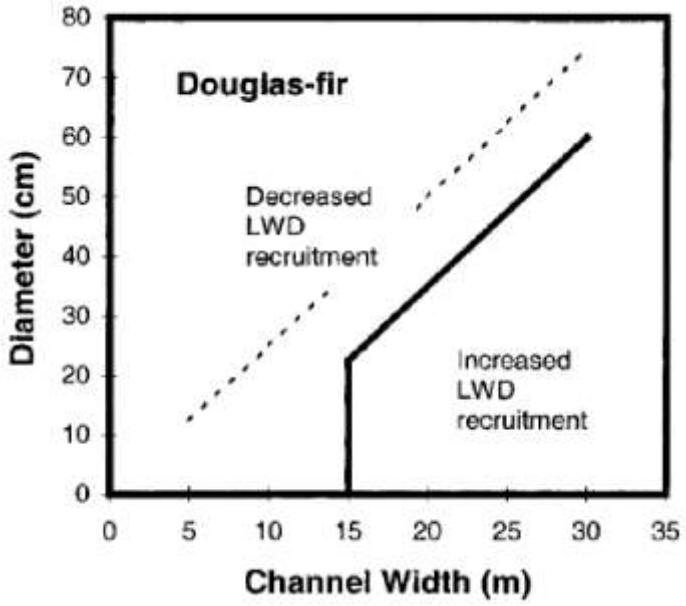
[29] Roni, Philip, Timothy J. Beechie, Robert E. Bilby, Frank E. Leonetti, Michael M. Pollock, And George R. Pess. 2002. **A Review of Stream Restoration Techniques and a Hierarchical Strategy for Prioritizing Restoration in Pacific Northwest Watersheds.** *North American Journal of Fisheries Management* 22:1–20, 2002 American Fisheries Society 2002 http://www.crab.wa.gov/LibraryData/RESEARCH_and_REFERENCE_MATERIAL/Environmental/020923StreamRestoreTechPNW.pdf.

To evaluate effects of various stand treatments on LWD recruitment, we modeled treatments and controls for a range of initial mean diameters and channel widths. We modeled Douglas-fir stands of four different initial quadratic mean diameters (initial DBHq = 12, 23, 38, and 51 cm). For each initial DBHq we applied control (unthinned) and treatment (thinned) scenarios to channels 5, 10, 15, 20, 25, and 30 m wide. We applied three different levels of thinning for each combination of channel width and initial DBHq (Table 2) and selected the treatment providing the most LWD over the next 100 years to compare with the unthinned scenario. Large woody debris recruitment for the thinning treatment was then compared with the unthinned control, and the result was recorded as negative (thinning produced less LWD than control), positive (thinning produced more LWD than control), or neutral. … We estimated the proportion of riparian forests having trees that are large enough to create pools, using three thresholds for pool-forming diameter of LWD (*D*pf = 10, 30, and 38 cm) corresponding to channel widths of 4, 12, and 15 m. … When we compared thinned to unthinned scenarios for a range of initial stand diameters and channel widths in Douglas-fir stands, we found that thinning increases cumulative LWD abundance when the DBHq of the stand is about 10 cm less than the minimum pool-forming diameter for the adjacent channel (Figure 6). … **The models predict that thinning of the riparian forest will not increase recruitment of pool-forming LWD on any channel less than 15 or 20 m wide.** Because relatively small debris can form pools in these channels and the trees reach poolforming size rapidly, thinning simply reduces the availability of adequately sized wood. Thinning may increase LWD recruitment to large channels because thinning reduces competition among trees and increases growth rates.[30]

Related figures below.



[30] Beechie, T., G. Pess, P. Kennard, R. Bilby, and S. Bolton. 2000. Modeling Recovery Rates and Pathways for Woody Debris Recruitment in Northwestern Washington Streams. North American Journal of Fisheries Management. 20:436–452. ftp://frap.cdf.ca.gov/pub/incoming/TAC/ISOR%20references%201-139%20%20KIRSTEN/Beechie%20et%20al.%202000.pdf.



Logging Steep Slopes

This project involves 1,583 acres of logging on steep slopes. This is likely to cause significant effects on soil, water, and wildlife habitat.

Steep slopes that are typically unavailable for logging have been a refuge for wildlife that need more cover and more dead wood. If the Forest Service is going to employ tethered logging that allows access to previously unmanaged steep slopes, there needs to be an analysis of the cumulative loss of habitat for wildlife that previously benefited from the refuge found on steep slopes that were previously infeasible/uneconomical to log.

As seen in the controversial Big Mosquito Project, steep slopes logging equipment (cable, tethered, etc.) is likely to increase the number of large and old trees likely to be cut to create corridors and a sense of safety for loggers. If such systems are put in place, the agency must analyze this eventuality, and provide off-ramps to drop units or adjust treatments so that any laudable project goals are not undermined.

Wildlife don't just need linear connectivity. Many species also require vertical cover connectivity. That is especially true in this landscape where a small horizontal distance may include a tremendous amount of elevation gain and loss.

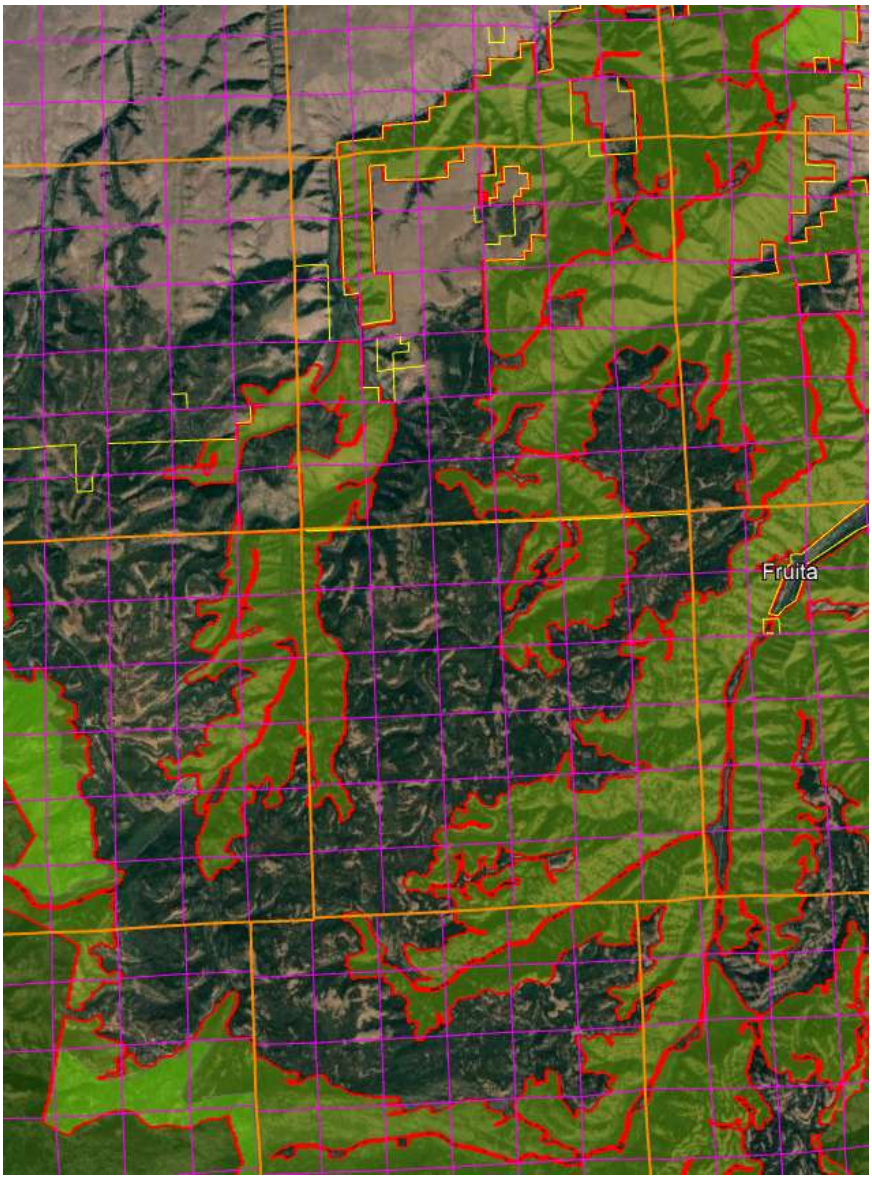
See also, our scoping comments.

Unroaded/Undeveloped Areas

Oregon Wild pointed out the presence of significant unroaded/undeveloped areas in the project area that would be adversely affected by logging. See map below. The Morgan Nesbit EA does

not provide any disclosure of the special values that may be present in these areas, nor does it provide any analysis of effects to these values, nor does it disclose how the special values in these unroaded areas would develop under the primary influence of natural processes, nor does it consider alternative low-impact restoration methods such as non-commercial thinning and prescription in unroaded areas, nor does it respond to public comment in any way.

The map below shows the unroaded areas >1,000 acres outlined in red and filled with partially-transparent green:



This project area includes extensive roadless and unroaded areas that serve important functions as intact watersheds, high quality water, stable stream flows, fish & wildlife refugia, connective habitat corridors, carbon storehouses, reference landscapes, recreation, scenic beauty, cultural significance, places where natural processes can operate unfettered, remnant large trees/large

snags/mature & old-growth forest, etc. In recognition of the many significant values of unroaded areas and the potentially significant effects of logging and roads in unroaded areas, we request that the Forest Service develop NEPA alternatives that conserves these areas without commercial logging or roads to maintain and enhance the diverse roadless values listed in these comments. In addition, we request that the FS take a hard look at significant benefits of conserving roadless values, and the significant impacts of logging and roading them.

Unroaded areas greater than about 1,000 acres, whether they have been inventoried or not provide valuable natural resource attributes that must be protected. These include: water quality; healthy soils; fish and wildlife refugia; centers for dispersal, recolonization, and restoration of adjacent disturbed sites; reference sites for research; non-motorized, low-impact recreation; carbon sequestration; refugia that are relatively less at-risk from noxious weeds and other invasive non-native species, and many other significant values.[31]

The PNW Regional office issued a directive relative to uninventoried roadless areas, aka "undeveloped areas". This 11-24-04 memo from Lisa Freedman wisely instructs the Forest Service to give consideration to "special" features of undeveloped areas regardless of size.

The Forest Service adopted new guidance concerning ecological restoration and resilience which urges managers to "Identify opportunities to sustain ecological refugia that may serve as vital sources of ecological diversity."[32] This is an opportunity to look at uninventoried roadless areas in a fresh new light.

"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.[33] 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 agency cannot limit its analysis of roadless areas to inventoried areas >5,000 acres, because smaller roadless areas that were not inventoried are ecologically relevant and potentially significant. The NEPA analysis must reflect the growing scientific evidence (cited below) indicating the significant value of roadless areas smaller than 5,000 acres and larger than 1,000 acres. Recent scientific literature emphasizes the importance of unroaded areas greater than

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[31] Forest Service Roadless Area Conservation FEIS, November 2000. http://web.archive.org/web/20010729111100/http://roadless.fs.fed.us/documents/feis/glossary.shtml.

[32] FSM 2020.3. http://web.archive.org/web/20090511091720/http://www.fs.fed.us/im/directives/fsm/2000/id_2020-2008-1.doc.

[33] *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).

1,000 acres as strongholds for the production of fish and other aquatic and terrestrial species, as well as sources of high quality water. Commercial logging and/or road building within large unroaded areas threatens these significant ecological values.

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.[34]

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.[35]

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[34] 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.

[35] Letter to President Clinton from 136 scientists (Dec. 10, 1997). https://drive.google.com/file/d/0B4L_-RD-MJwrRzhFcm5QcFR0MHM/view?usp=sharing&resourcekey=0-2-sbGMN3bOUBQGGMDBQM1Q

There are tremendous co-benefits from conserving large blocks of unmanaged forests, such as climate mitigation and biodiversity conservation. As noted by Roberts et al (2020):

> Based on the species–area relationship, regarded as one of ecology's few universal laws, protection of [too] little habitat will condemn thousands of species to extinction if habitat outside them is converted, degraded or lost. It is this logic that underpins calls for 'Nature Needs Half' [26], together with an understanding that ecosystem processes and services of the scale needed to sustain the well-being of life on Earth require large wildlife populations and huge expanses of intact and restored habitat. ... Climate change adds a new dimension to the question of how much protected area coverage is needed to assure conservation of wild nature.
>
> Climate change is already reducing wildlife population sizes and forcing range shifts as conditions alter [28,29]. Protected areas counter such stresses by building up populations, and connectivity of populations and habitats is emerging as a key property in securing species persistence and resilience to rapid change [5]. Hence networked protected areas, especially where embedded within well-managed land or seascapes, provide crucial stepping stones to accommodate range shifts and, where no further movements are possible, refuges of last resort [5]. Analyses suggest that adequate levels of population viability and connectivity can be achieved only with marine protected area coverages of 30% or more [27]. ... [G]iven that many ecosystems are already degraded, ensuring continued provision of ecosystem services requires not only the precautionary protection of currently intact habitats, but also large-scale habitat restoration.
>
> Providing greater space for recovery of intact, vibrant nature is not altruistic conservation, but is, we argue, an indispensable act of self- preservation, producing a cascade of benefits that will help maintain the habitability of the biosphere as the climate changes, thereby securing the well-being of generations to come.[36]

Law et al (2022) make a strong case that conservation of intact forests advances the twin goals of protecting the climate and biodiversity, and that broad-scale thinning to reduce fire severity conflicts with climate and biodiversity goals:

> Instead of regularly harvesting on all of the 70% of U.S. forest land designated as "timberlands" by the U.S. Forest Service, setting aside sufficient areas as Strategic Reserves would significantly increase the amount of carbon accumulated between now, 2050 and 2100, and reestablish greater ecosystem integrity, helping to slow climate

[36] Roberts CM, O'Leary BC, Hawkins JP. 2020 Climate change mitigation and nature conservation both require higher protected area targets. Phil. Trans. R. Soc. B 375: 20190121. http://dx.doi.org/10.1098/rstb.2019.0121. See also, Soto-Navarro C et al. 2020 Mapping co-benefits for carbon storage and biodiversity to inform conservation policy and action. Phil. Trans. R. Soc. B 375: 20190128. http://dx.doi.org/10.1098/rstb.2019.0128 showing the congruence of high carbon value and high biodiversity value in PNW forests.

> change and restore biodiversity. The 2022 IPCC AR6 report stated that "Recent analyses, drawing on a range of lines of evidence, suggest that maintaining the resilience of biodiversity and ecosystem services at a global scale depends on effective and equitable conservation of approximately 30% to 50% of Earth's land, freshwater and ocean areas, including currently near-natural ecosystems (high confidence)." Continuing commercial timber harvest on a portion of the remaining public lands and tens of millions of hectares of private lands would continue to adequately supply a sustainable forestry sector. Preserving and protecting mature and old forests would not only increase carbon stocks and growing carbon accumulation, they would slow and potentially reverse accelerating species loss and ecosystem deterioration, and provide greater resilience to increasingly severe weather events such as intense precipitation and flooding.
>
> …
>
> Many of the existing forest management practices allegedly protect forests and homes from wildfire and are having severe adverse effects on forest ecosystem integrity and resilience, and are worsening climate change and diminishing biodiversity.
>
> …
>
> To summarize, harvest-related emissions from thinning are much higher than potential reduction in fire emissions. In west coast states, overall harvest-related emissions were about 5 times fire emissions …[37]

Law et al (2022) describe a strategic reserve approach to protect water, biodiversity, and carbon in Oregon's forests. Existing unroaded areas could make a significant contribution to such an approach.

> Our study demonstrated that Oregon has high carbon density forests that also have high biodiversity and connectivity for species movement. When these characteristics were prioritized within each ecoregion, it identified sufficient forestland to meet both the 30% protection by 2030 and 50% by 2050 targets that are important nationally and internationally. … the climate resilience rank highlights large areas within the ecoregions with larger landscape features that are important for resilience (Figure 2D), such as the topography of mountain ranges in southwest Oregon, the Coast Range, Cascades, and Blue Mountains in the northeast. … Meeting the forest preservation targets would substantially increase protection of tree carbon stocks, animal and tree species' habitat, and surface drinking water source areas. … Meeting these forest preservation targets would substantially increase forest habitat protection for threatened and endangered (T&E) species and other species of interest … Mitigation strategies need to explicitly

[37] Law, Beverly E., William R. Moomaw, Tara W. Hudiburg, William H. Schlesinger, John D. Sterman, and George M. Woodwell. 2022. Creating Strategic Reserves to Protect Forest Carbon and Reduce Biodiversity Losses in the United States. Land Vol. 11, no. 5: 721. https://doi.org/10.3390/land11050721, https://www.mdpi.com/2073-445X/11/5/721/htm.

> protect existing oldgrowth forests, and allow mature secondary forests to regrow to their carbon capacity. For climate mitigation using natural climate solutions, effectiveness is based on the time that a unit of biomass carbon is resident in a forest ecosystem stock and thus kept out of the atmosphere (Körner, 2017; Mackey et al., 2020). … We also found that limiting harvest to half of current levels on public lands and doubling harvest cycles to 80 years on private lands was three times more effective as a land use strategy than replanting and reforestation after cutting within current forest boundaries in Oregon (Law et al., 2018). … There is concern that protecting areas that are vulnerable to increased drought and fire will be ineffective, however, species diversity, and threatened and endangered species still need habitat, refugia and connectivity with other protected areas. Wildfires tend to be patchy, and a majority of trees survive low to mixed-severity fires (Halofsky et al., 2011) that can be critical habitat, and burned forests still retain the vast majority of their carbon (Hudiburg et al., 2009; Law et al., 2018). … Older forests in Oregon's watersheds exhibit greater water retention and improved late summer stream flows compared to managed plantations (Segura et al., 2020). Intact forests also tend to harbor more large and old trees, bolstering carbon stores and biodiversity services that large trees provide (Lutz et al., 2018; Plumtre et al., 2021). … The most important action Oregon can take to mitigate climate change, reduce biodiversity losses, and protect watersheds for drinking water is to set aside existing forests.[38]

In 1994, several scientific societies submitted a report to Congress and the President recommending conservation of roadless areas larger than 1,000 acres. This report is described by the Interior Columbia Ecosystem Management Project as a "Major Stud[y] of Eastside Ecosystems and Management":

> Because roads crisscross so many forested areas on the Eastside, existing roadless regions have enormous ecological value. … Although roads were intended as innocuous corridors to ease the movement of humans and commodities across the landscape, they harm the water, soils, plants, and animals in those landscapes. [p 6]
> …
> **4. Do not construct new roads or log within existing (1) roadless regions larger than 1000 acres or (2) roadless regions smaller than 1000 acres that are biologically significant.**
> Roadless regions constitute the least-human-disturbed forest and stream systems, the last reservoirs of ecological diversity, and the primary benchmarks for restoring ecological health and integrity. Roads fragment habitat; alter the hydrological properties of watersheds; discharge excessive sediment to streams; increase human

[38] Law BE, Berner LT, Mildrexler DJ, Bloemers RO and Ripple WJ (2022) Strategic reserves in Oregon's forests for biodiversity, water, and carbon to mitigate and adapt to climate change. Front. For. Glob. Change 5:1028401. doi: 10.3389/ffgc.2022.1028401. https://www.frontiersin.org/articles/10.3389/ffgc.2022.1028401/pdf.

access and thus disturbance to forest animals; and influence the dispersal of plants and animals, especially exotic species, across the landscape. Because many forested areas in eastern Oregon and Washington are heavily dissected by roads, the ecological value of existing roadless regions is especially high. [pp 8, 202]
…
Our analysis defined a roadless region as any region where all points within an LS/OG stand were at least 100 meters from a road or trail.
…
What remains of ponderosa pine and Douglas fir LS/OG is the least protected today. In the four national forests within the Blue Mountains, 48% of the land base above 6000 feet lies in wilderness areas, whereas only 10% of the land below 6000 feet, where ponderosa pine occurs, receives such protection … [p 110]

… Fifth, roads, whose impact on aquatic and terrestrial resources is well documented, are widely distributed in eastside forests. Road densities in western Colville, Winema, and Ochoco National Forests average 2.5, 3.5, and 3.7 miles per square mile, respectively. Densities reach 8.8 and 11.9 miles per square mile in some watersheds. In the national forests of Oregon's Blue Mountains (Table 5.2), less than 10% of roadless regions on slopes steeper than 60% are now protected, less than 15% on slopes of 30-60%. Moreover, roadless regions, like LS/OG patches, are extensively fragmented. In northern Ochoco National Forest, nearly one-third (38,882 acres) of 128,140 acres of roadless region consists of patches smaller than 1000 acres. (RARE II surveys underestimated total roadless area in this region [45,700 acres] because they considered only areas larger than 5000 acres.) [p 110]
…
CONCLUSIONS
Watersheds outside wilderness and roadless regions in eastern Oregon and Washington are highly degraded. Without an intensive restoration effort on federal and private lands, many native aquatic stocks and species risk extinction. [p 160]
…
Because the distribution of many native fishes in Oregon's national forests has receded into steep headwater areas, USFS has a vital role in protecting the few remaining watershed refugia and preventing further damage to already degraded habitats downstream. Critical to securing eastside [aquatic diversity areas] ADAs as aquatic refugia are the remaining roadless regions, sources of large wood from LS/OG forests, and the integrity of riparian corridors on national forestlands. [p 168]
…
7. High road densities harm many forms of wildlife.
The ecological integrity of existing LS/OG patches and other roadless regions can only be maintained if these sites are not disturbed by the construction of roads.

> Roadless regions serve as critical refuges for terrestrial wildlife sensitive to human disturbance. Road densities in LS/OG patches that already have roads should be reduced to less than 1 mi/mi^2. Achieving this goal is vital to rehabilitation of eastside fisheries and terrestrial resources. [p 197][39]

Road Construction

This project involves extensive road construction which can have significant effects on soil, water, wildlife, and carbon. We understand the USFS is closing more roads than were suggested in scoping. That is a positive development, but we understand most of the increase is a paper exercise where they are closing roads that aren't being used and as a practical matter, don't exist. Given the WWNF is overoaded and doesn't have a TMP as required by law, they should do more to actually reduce traffic and road densities.

Log Hauling on wet roads has significant effects on infrastructure, water quality, and fish. The EA needs to disclose this. We strongly urge that log hauling be prohibited during wet weather.

Connectivity

Our scoping comments provided detailed information on the requirements for managing connectivity found both in the Eastside Screens and in recent CEQ Guidance. In spite of this, the EA provides just one paragraph about connectivity. It does not provide a map, does not say if they can meet the connectivity requirements in the Screens, and does not say what the logging prescriptions and residual forest conditions will be in the 310 acres of connectivity areas that will be logged.

The map of connectivity corridors in Appendix F show only a few scattered parcels as "Old-Growth Preserves." This seems to dramatically undercount the areas of LOS forest in this project area. How were these OG Preserves identified? What criteria were used? Were other areas considered and rejected? Why? The EA leaves these critical questions unanswered. The map also fails to show where the 310 acres of logging within connectivity corridors is located. The map also fails to show where connectivity corridors are narrower than 400 feet.

The Forest Service has duties with respect to connectivity that are both procedural and substantive. Agencies have a duty to consider connectivity in their NEPA analyses. Just this year, CEQ issued guidance saying "… agencies should consider and be transparent about the positive or negative impacts of proposed actions and alternatives on connectivity and corridors. Through the NEPA review process, Federal agencies can consider measures to advance corridors

[39] Henjum, M.G., J.R. Karr, D.L. Bottom, D.A. Perry, J.C. Bednarz, S.G. Wright, S.A. Beckwitt and E. Beckwitt. 1994. Interim Protection for Late-Successional Forests, Fisheries, and Watersheds: National Forests East of the Cascade Crest, Oregon and Washington. A Report to the Congress and President of the United States. Eastside Forests Scientific Society Panel.

and connectivity as components of proposed actions, alternatives to proposed actions, or mitigation for proposed actions' effects."[40]

The explicit intent of the Eastside Screens is "to insure that blocks of habitat maintain a high degree of connectivity between them,..."[41]

The connectivity requirements of the screens are detailed and mandatory. Connectivity corridors:

- Must link all late old structure stands in at least 2 directions;
- Must be at least 400 feet wide at their narrowest spot;
- Must be maintained as dense as possible with medium and large trees, or in the top third of site-potential and at least 50% canopy cover;

The Forest Service has a duty to disclose how it will comply with the requirements of the LRMP and other laws. All site-specific activities must comply with the governing forest plan.[42]

NEPA requires disclosure of information necessary to determine compliance with legal requirements such as the Endangered Species Act, Clean Water Act, National Forest Management Act, and applicable Forest Plan Standards & Guidelines.[43]

Fuel Reduction via Commercial Logging is Not Appropriate in Cool/Moist Forests.

Much of the project area is moist and cool forest vegetation types. Almost 12,000 acres of the 13,000 acres of proposed logging are in Douglas-fir, or fir/spruce/mountain hemlock forest types. These forest types tend to develop relatively dense vegetation and experience relatively infrequent fire. Many forest and fire experts recommend that fuel reduction focus on warmer/dryer areas mainly at lower elevations, and they de-prioritize fuel reduction in cool/moist areas. Where resources for fuel reduction are limited, the FS appears to be using

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[40] Mallory, B. 2023. CEQ Guidance for Federal Departments and Agencies on Ecological Connectivity and Wildlife Corridors. https://www.whitehouse.gov/wp-content/uploads/2023/03/230318-Corridors-connectivity-guidance-memo-final-draft-formatted.pdf.

[41] 1995 Eastside Screens, Scenario A, INTENT STATEMENT for connectivity (emphasis added).

[42] National Forest Management Act, 16 U.S.C. § 1604(i).

[43] 40 CFR 1508.27(b)(10) and NW Indian Cemetery Protective Association v. Peterson, 795 F2d 688 (9th Circ. 1986). In the G-O Road case, the NEPA document described water quality changes resulting from a road project in terms of 7-day average changes, whereas the applicable WQ standard was defined by daily peak changes. The court found this to be a NEPA violation. See also, Judge Hogan's ruling in Klamath Siskiyou Wildlands Center v. Boody (D. Or. #03-3124-CO. May 18, 2004) where he held "plaintiffs have raised a serious question as to whether BLM violated NEPA in failing to disclose sufficient information in the EA to confirm compliance with ... the RMP." (Order at page 18). https://casetext.com/case/klamath-siskiyou-wildlands-center-v-boody-2.

scare resources in an inefficient manner. NEPA requires the agency to consider and discuss responsible opposing viewpoints.

Forests with infrequent, stand-replacing fire regimes are not good candidates for fuel reduction.

> Many of the stands where restoration of historical forest conditions is needed are open canopy and located on south facing slopes and at lower elevations. In contrast, many closed canopy stands are often located at higher elevations and on north-facing slopes where restoration of historical forest conditions is not needed.[44]

Halofsky et al. (2018):

> To date, most climate adaptation guidance has focused on recommendations for frequent-fire forests, leaving few published guidelines for forests that naturally experience infrequent, stand-replacing wildfires. Because most such forests are inherently resilient to stand-replacing disturbances, and burn severity mosaics are largely indifferent to manipulations of stand structure (i.e., weather-driven, rather than fuel-driven fire regimes), we posit that pre-fire climate adaptation options are generally fewer in these regimes relative to others. Outside of areas of high human value, stand-scale fuel treatments commonly emphasized for other forest types would undermine many of the functions, ecosystem services, and other values for which these forests are known.[45]

Ho et al. (2019):

> Fewer options exist for reducing fire severity in wetter, high-elevation and coastal forests of the Pacific Northwest, historically characterized by infrequent, stand-replacement fire regimes. In these ecosystems, thinning and hazardous fuel treatments are unlikely to significantly affect fire behavior, because fuels are abundant and fires typically occur under extreme weather conditions (i.e., during severe drought).[46]

Johnson & Franklin (2009):

> Restoration of Moist Forests is not intended to alter their historical wildfire behavior. Rather it is intended to accelerate the development of older complex forest … Forests that have dominantly high-severity fire regimes (Moist Forests) have no ecological requirement for management to alter fuels and fire behavior, including old-growth stands. … Calls to log forests to save them (Tuckey 2001) are overly simplistic. In this case, fire and forest management recipes suitable in one situation (e.g., for restoring the

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[44] R. V. Platt, T. T. Veblen, and R. L. Sherriff. 2008. Spatial Model of Forest Management Strategies and Outcomes in the Wildland–Urban Interface Natural Hazards Review, Vol. 9, No. 4, November 1, 2008. DOI:10.1061/(ASCE)1527-6988(2008)9:4(199) http://public.gettysburg.edu/~rplatt/Platt%20et%20al._NatHazReview08.pdf.

[45] Halofsky, J. S., D. C. Donato, J. F. Franklin, J. E. Halofsky, D. L. Peterson, and B. J. Harvey. 2018. The nature of the beast: examining climate adaptation options in forests with stand-replacing fire regimes. Ecosphere 9(3):e02140. DOI:10.1002/ecs2.2140. https://esajournals.onlinelibrary.wiley.com/doi/pdf/10.1002/ecs2.2140.

[46] Joanne J. Ho, Robert A. Norheim, Jessica E. Halofsky, David L. Peterson, Brian J. Harvey 2019. Changing Wildfire, Changing Forests - How climate change is affecting fire regimes and vegetation in the Pacific Northwest (storymap) https://uw.maps.arcgis.com/apps/Cascade/index.html?appid=9c0f8668f47c4773b56c9b9ae6c301e3 *based on* Jessica E. Halofsky, David L. Peterson, and Brian J. Harvey. 2018. Changing Wildfire, Changing Forests: A Synthesis on the Effects of Climate Change on Fire Regimes and Vegetation in the Pacific Northwest. Seattle: Northwest Climate Adaptation Science Center. https://nwcasc.uw.edu/science/project/changing-fires-changing-forests-the-effects-of-climate-change-on-wildfire-patterns-and-forests-in-the-pacific-northwest/.

> natural fire regime of a dry forest) might be inappropriate (and even counter productive) in another (e.g., a relatively moist forest) (Brown et al. 2004).[47]

The agency has an obligation to respond in the final NEPA document to responsible opposing viewpoints concerning the consequences of the proposed action. The law requires agencies to include a "reasoned discussion of major scientific objections" to the reasoning that underlies an EIS.[48] Indeed, NEPA regulations demand that an agency "insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements."[49]

The Ninth Circuit has repeatedly confirmed that NEPA requires the government to "disclose and discuss" scientific controversy in the NEPA documentation for the proposed project.[50] When the Forest Service claimed that the northern goshawk was a habitat generalist and failed to respond to comments to the contrary, the Ninth Circuit said—

> While the agency is not required to publish each individual comment in the final statement, Cal. v. Block, 690 F.2d at 773 (internal citation omitted); 40 C.F.R. § 1503.4(a), the regulations clearly state that the agency must disclose responsible opposing scientific opinion and indicate its response in the text of the final statement itself. 40 C.F.R. § 1502.9(b). The mere presence of the information in the record alone does not cure the deficiency here. See False Pass v. Watt, 565 F. Supp. 1123, 1141 (D. Alaska 1983) (holding that neither the administrative record outside of the environmental impact statement itself nor any other evidence may be used to remedy deficiencies in the environmental impact statement) (citing Grazing Fields Farm v. Goldschmidt, 626 F.2d 1068, 1074 (1st Cir. 1980)), aff'd sub nom. False Pass v. Clark, 733 F.2d 605 (9th Cir. 1984).
>
> Accordingly, we find that the Final EIS fails to disclose and discuss responsible opposing scientific viewpoints in the final statement itself in violation of NEPA and the implementing regulations.[51]

In *Sierra Club v. Eubanks* the court rejected an EIS where the Forest Service failed to disclose and consider evidence expressed in scientific studies that logging-generated slash could increase fire hazard. The Forest Service relied on various published scientific papers to support the idea that removal of fuels through logging, regardless of fuel size, would reduce fire hazard, but the court said

> [T]here is no indication that any views they expressed contrary to the logging proposed by the Red Star Project were duly weighed. … [W]hile the FEIS concludes that 'the preponderance of peer reviewed scientific information indicates that the proposed activities will help speed the recovery of the burned areas while also reducing future wildland fire severities.' without proper analysis of all the available scientific literature

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[47] Johnson K.N., Franklin, J.F. 2009. Restoration of Federal Forests in the Pacific Northwest: Strategies and Management Implications. https://web.archive.org/web/20170221082525/http://www.blm.gov/or/districts/medford/plans/files/FranklinJohnson.pdf.

[48] *Moseley*, 798 F. Supp. at 1482.

[49] 40 C.F.R. § 1502.24.

[50] *Center for Biological Diversity v. Forest Serv.*, 349 F.3d 1157, 1169 (9th Cir. 2003).

[51] *Center for Biological Diversity v. United States Forest Service*, No. 02-16481 (9th Cir., Nov. 18, 2003). http://caselaw.findlaw.com/us-9th-circuit/1173711.html.

that conclusion appears suspect. …By failing to adequately consider and evaluate adverse scientific opinion, the Red Star Project FEIS fails to meet NEPA requirements for taking the requisite 'hard look' In Sierra Club v. Bosworth, 199 F. Supp. 2d 971 (N.D. Cal 2002), like the present case the … court concluded that the EIS at issue in that case violated NEPA 'by failing to disclose and analyze scientific opinion in support of and in opposition to the conclusion that the … project will reduce the intensity of future wildfires in the project area.' … NEPA specifically requires Defendants to objectively evaluate and disclose credible scientific evidence that contradicts its proposed course of action. 40 C.F.R. § 1502.9(b).[52]

The EA Should Consider the Relative Efficacy of Removing Canopy Fuels vs Surface and Ladder Fuels.

The Morgan Nesbit EA failed to take a hard look at issues that we raised in our scoping comments, including the relative ineffectiveness of commercial logging that mainly removes less hazardous canopy fuels versus non-commercial thinning and prescribed fire that mainly removes more hazardous surface and ladder fuels. This violates NEPA's mandate for high quality information and accurate analysis.

The Forest Service can meet its objectives to reduce fire hazard while mitigating effects of commercial logging on water, wildlife, and carbon, by doing lighter treatments such as non-commercial thinning and prescribed fire. Oregon Wild scoping comments raised concerns about the fact that canopy fuels are not very hazardous because they are help high above the forest floor where most fires burn. When canopy fires to carry across the landscape it is due to high winds, and thinning does little to mitigate fire spread in such circumstances. Logging also has complex effects on fire and fuels. Removing canopy fuels makes the forest hotter/drier/winder, moves more hazardous fine fuels from the canopy to the ground where they are more vulnerable to surface fires, stimulates the growth of surface and ladder fuels, and makes follow-up treatments more expensive. Commercial logging also requires roads and more heavy equipment that have significant effects on soil and watershed integrity. Roads also increase fire ignition risk. Focusing on non-commercial thinning and prescribed fire avoids many of the worst trade-offs of logging and still achieves objectives. The Tiger Mill EA failed to take a hard look at these issues, and failed to weigh the marginal benefits of canopy removal versus the significant costs in terms of complex fire effects, and effects to water, wildlife, carbon, soil, etc.

Before embarking on an aggressive strategy of crown fuel reduction, the agency must address the responsible opposing viewpoints regarding the manifold values of retaining more canopy to retain cooler temperatures and moisture. Responsible opposing experts say that reducing surface fuels and ladder fuels should be the first priority and reducing canopy fuels a lesser priority.

The NEPA analysis needs to account for the fact that canopy fire risk is greatly reduced by treating surface and ladder fuels because of the increased spatial gap in the vertical continuity of fuels as well as the reduced preheating of canopy fuels by burning fuels below the canopy.

[52] *Sierra Club v. Eubanks* Civ. S 03-1238 MCE PAN; (E.D. Cal. August 20, 2004)

An implicit assumption of many logging proponents is that less fuels means less fire. This is not supported by the evidence. Less fuel does NOT mean less fire. Some fuel can actually help reduce fire, such as deciduous hardwoods that act as heat sinks (under some conditions), and dense canopy fuels that keep the forest cool and moist and help suppress the growth of surface and ladder fuels, and those canopy fuels are connected to large tree boles with thick bark that do not readily burn.

Omi and Martinson (2012) prepared a review of the literature for managers and concluded —

> That no relationship ($r^2<0.06$) was found between canopy fuel variables and the effectiveness of either surface reduction treatments without thinning or thinning treatments without subsequent slash treatment supports the assertion that surface fuel reduction is of primary importance in influencing treatment effectiveness.[53]

Fitzgerald & Bennett (2013):

> Opening up the stand significantly will dry surface fuels due to increased light levels, surface winds and temperatures. This may increase surface fire intensity and rate of spread unless total surface fuel loading is reduced. In addition, thinning that allows significant light to reach the forest floor may result in the regrowth of small trees and shrubs, which over time become new ladder fuels.[54]

"Defoliation of upper canopies will likely increase understorey light availability on the forest floor, and subsequently promote the rapid growth of subcanopy species."[55] The proliferation of understories after logging has significant implications for fuel hazard and fire control.

Removing canopy fuels creates canopy gaps and thus "radiation reaching the forest floor and air movement beneath the residual live tree canopy are increased, and both contribute to fuel drying. More open canopies also contribute to greater understory vegetation growth. The consequences of these changes on fire behavior are not fully understood, but such conditions may favor ignition and spread of fire more readily than in forests having few canopy gaps …"[56]

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[53] Omi & Martinson 2012. Effectiveness of Fuel Treatments for Mitigating Wildfire Severity: A Manager-Focused Review and Synthesis. Joint Fire Science Program. Final Report. JFSP Project Number 08-2-1-09 https://web.archive.org/web/20121014013021/http://www.firescience.gov/projects/08-2-1-09/project/08-2-1-09_finalreport08-2-1-09.pdf.

[54] Stephen Fitzgerald and Max Bennett. 2013. A Land Manager's Guide for Creating Fire-Resistant Forests. EM 9087. OSU Extension. http://www.nwfirescience.org/sites/default/files/publications/A%20Land%20Managers%20Guide%20for%20Creating%20Fire-resistant%20Forests%20.pdf.

[55] Choi, D. H., LaRue, E. A., Atkins, J. W., Foster, J. R., Matthes, J. H., Fahey, R. T., Thapa, B., Fei, S., & Hardiman, B. S. (2023). Short-term effects of moderate severity disturbances on forest canopy structure. *Journal of Ecology*, *111*(9), 1866-1881. https://doi.org/10.1111/1365-2745.14145.

[56] Kaufmann M.R., G.H. Aplet, M. Babler, W.L. Baker, B. Bentz, M. Harrington, B.C. Hawkes, L. Stroh Huckaby, M.J. Jenkins, D.M. Kashian, R.E. Keane, D. Kulakowski, C. McHugh, J. Negron, J. Popp, W.H. Romme, T. Schoennagel, W. Shepperd, F.W. Smith, E. Kennedy Sutherland, D. Tinker, and T.T. Veblen. 2008. The status of our scientific understanding of lodgepole pine and mountain pine beetles – a focus on forest ecology and fire behavior. The Nature Conservancy, Arlington, VA. GFI technical report 2008-2. http://csfs.colostate.edu/pdfs/LPP_scientific-LS-www.pdf.

"Thinning is most effective when it removes understory trees, because larger overstory trees are more resistant to heat injury (Agee and Skinner 2005). In addition, shade and competition from larger trees slows the recruitment of younger trees in the understory."[57]

In areas with relatively high productivity that can support shrubs, canopy removal via thinning is very likely to stimulate the proliferation of shrubs and create the very conditions that favor more severe crown damage during fire. This study also challenges the very popular notion that dense forests are a fire hazard. A meta-analysis of the effects of partial cutting showed that understory growth was stimulated in all cases.[58]

Models show that maintaining canopy cover is a useful way to reduce fire hazard, while removing canopy increases fire hazard.

> Compared with the original conditions, a closed canopy would result in a 10 percent reduction in the area of high or extreme fireline intensity. In contrast, an open canopy has the opposite effect, increasing the area exposed to high or extreme fireline intensity by 36 percent. Though it may appear counterintuitive, when all else is equal open canopies lead to reduced fuel moisture and increased midflame windspeed, which increase potential fireline intensity.[59]

Modeling shows that canopy fuel reduction is accomplished at the expense of increasing surface fire intensity.

> Modifying canopy fuels as prescribed in this method may lead to increased surface fire intensity and spread rate under the same environmental conditions, even if surface fuels are the same before and after canopy treatment. Reducing CBD to preclude crown fire leads to increases in the wind adjustment factor (the proportion of 20-ft windspeed that reaches midflame height). Also, a more open canopy may lead to lower fine dead fuel moisture content. These factors increase surface fire intensity and spread rate. Therefore, canopy fuel treatments reduce the potential for crown fire at the expense of slightly increased surface fire spread rate and intensity.[60]

Evers et al. (2022) looked burn severity in the 2020 Labor Day fires in the Western Cascades and found:

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[57] Keeley, J.E.; Aplet, G.H.; Christensen, N.L.; Conard, S.C.; Johnson, E.A.; Omi, P.N.; Peterson, D.L.; Swetnam, T.W. 2009. Ecological foundations for fire management in North American forest and shrubland ecosystems. Gen. Tech. Rep. PNW-GTR-779. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 92 p. https://www.fs.usda.gov/pnw/pubs/pnw_gtr779.pdf.

[58] D. Zhou, S. Q. Zhao, S. Liu, and J. Oeding. 2013. A meta-analysis on the impacts of partial cutting on forest structure and carbon storage. Biogeosciences, 10, 3691–3703, 2013. https://www.biogeosciences.net/10/3691/2013/bg-10-3691-2013.pdf. ("Understory C was stimulated significantly by partial cutting in all of the studies. This stimulation can be mostly attributed to an increase in the availability of light, water, and nutrients to the understory because of tree removal (Aussenac, 2000; Kleintjes et al., 2004; Deal, 2007)").

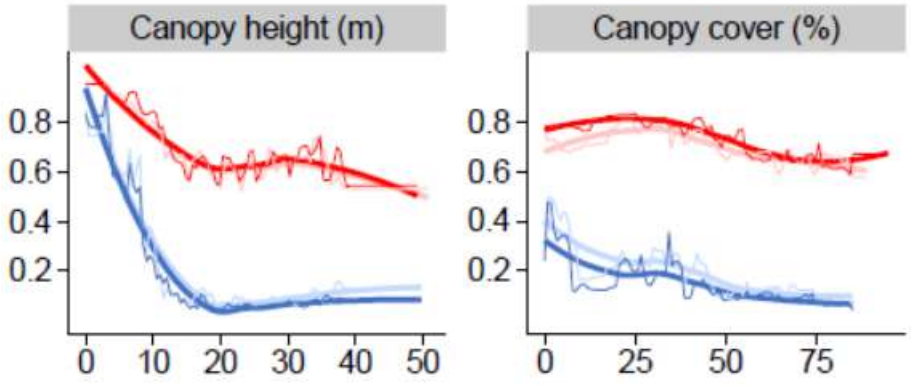
[59] Rutherford V. Platt, Thomas T. Veblen, and Rosemary L. Sherriff. 2006. Are Wildfire Mitigation and Restoration of Historic Forest Structure Compatible? A Spatial Modeling Assessment. Annals of the Association of American Geographers, 96(3), 2006, pp. 455–470. http://www.colorado.edu/geography/class_homepages/geog_4430_f10/Platt%20et%20al_Wildfire%20Mitigatnion_AnAAG_2006.PDF.

[60] Scott, Joe. 2003. Canopy Fuel Treatment Standards for the Wildland-Urban Interface. USDA Forest Service Proceedings RMRS-P-29. 2003. https://web.archive.org/web/20111025035919/http://www.fs.fed.us/rm/pubs/rmrs_p029/rmrs_p029_029_038.pdf.

> … both vegetation structure and topography significantly affect burn severity patterns even under extreme fuel aridity and winds. Early-seral forests primarily concentrated on private lands, burned more severely than their older and taller counterparts, over the entire megafire event regardless of topography. Meanwhile, mature stands burned severely only under extreme winds and especially on steeper slopes. … The most important factors explaining high burn severity across all five megafires combined (both burn periods) were canopy height, followed by weather period (i.e., winds), … Vegetation structure (especially canopy height) was the strongest predictor of high burn severity and was strongly related to two important thresholds. First, the likelihood of high burn severity increased markedly in stands shorter than 20 m and was particularly high below 10 m for P1 [severe fire weather] and especially P2 [moderate fire weather] (Figure 2B). The likelihood of short-stature vegetation (ca. 5 m) burning at high severity compared to 30 m in P1 was ca. 40% higher and 750% higher in P2. Second, open canopy vegetation, especially below 40% cover, was at substantially higher risk of burning at high severity during both periods, and particularly so for P2. … Canopy height and canopy cover had one of the most pronounced interactions both within and across periods, both of which had a notable and compounding effect on severity below specific thresholds (e.g., canopy heights < 10 m; canopy cover < 40%; Figure 3A). These compounding effects were pervasive and had an overriding effect on other variables. For instance, the effect of slope on severity in P1 was overwhelmed in stands lower than 10 m in canopy height (Figure 3C,G). … The probability of high-severity burn remained elevated for low-stature forests while mature stands were likely protected by thicker bark, shadier conditions [37], increased canopy–base height [79], and lower canopy bulk density [80,81]. Early successional vegetation (<40% canopy cover) burned more severely than closed-canopy forests. Streams and the moist, deep soils of the canyon bottom [20,82,83] lowered the likelihood of high severity fire during P2 … Inconsistent with hypothesis H1, forest structure (particularly canopy height) was the single most important predictor of high-burn severity during P1, …[61]

The figures below from Evers et al. (2022) show that tall canopies (i.e., mature forest) significantly reduces the probability of high burn severity (vertical axis) in both extreme (red line) and moderate (blue line) fire weather conditions, but especially in moderate fire weather conditions. In addition, higher canopy cover also reduced the probability of high burn severity, especially during moderate fire weather. This finding directly contradicts the rationale often used to justify fuel reduction logging.

[61] Evers C, Holz A, Busby S, Nielsen-Pincus M. Extreme Winds Alter Influence of Fuels and Topography on Megafire Burn Severity in Seasonal Temperate Rainforests under Record Fuel Aridity. Fire. 2022; 5(2):41. https://doi.org/10.3390/fire5020041, https://www.mdpi.com/2571-6255/5/2/41/pdf.



Bottom line: non-commercial thinning and prescribed fire are relatively non-controversial with fewer trade-offs, while commercial logging has marginal benefits, significant adverse trade-offs, and deserves much more careful scrutiny. Just because timber sales are the Forest Service's bread and butter, does not waive their responsibility to conduct careful NEPA analyses.

Thinning will push stands outside HRV

The understory reinitiation vegetation type is already above HRV, and removing canopy via moderate- and high-intensity thinning will free up site resources and stimulate growth of understory plants and create more of this type. The Forest Service should strive to avoid pushing the landscape further away from HRV in this way.

Thinning also risks homogenizing forest structure. The EA does not fully disclose these risks. The Forest always talks about using ICO (Individuals, Clumps, Openings), but in implementation, we tend to just see dry-pine type uniform spacing with very few leave patches and even less connectivity and dead downed material. We encourage the Forest Service to use actual ICO's with emphasis on the Clumps and not using dry forest RX's on moist and cool/cold forests.

Regen harvest and high-intensity thinning will violate Eastside Screens

The Eastside Screens state "To reduce fragmentation of LOS stands, or at least not increase it from current levels, stands that do not currently meet LOS that are located within, or surrounded by, blocks of LOS stands should not be considered for even-aged regeneration, or group selection at this time."

Regen harvest methods such as group selection and shelterwood will remove LOS components and set back development of LOS conditions. This violates Eastside Screens mandate to manage for LOS.

In addition, regen harvest methods will adversely modify microclimate, stimulate growth of surface and ladder fuels and increases fire hazard, which is contrary to the purpose and need. Bigelow & North 2012:

> Group-selection openings [0.7–0.8 ha, 12% canopy cover, Sierra mixed-conifer] … greatly increased wind speeds and higher surface temperatures mean that they are at risk for more severe fire behavior. This should be of particular concern when group selection openings are embedded within fuels-reduction thinned stands that form part of a network for rapid access by fire-fighting personnel.[62]

High-intensity thinning on over 10,000 acres will also remove too many trees that provide current and future LOS components.

See our scoping comments about the need for "basal area retention" to ensure future recruitment of large trees and dead wood habitat, and serve to moderate fire hazard by maintain a cool-moist microclimate, keep hazardous fuels in the canopy instead of on the ground, and help suppress the growth of surface and ladder fuels.

Scat Surveys

The NEPA analysis and project design should address the results of scat surveys indicating the presence of sensitive species, including various meso-predators. Logging, especially regen harvest and over 10,000 acres of high-intensity thinning could adversely affect habitat for these species.

In 2021, Oregon Wild, along with our partners at the Pacific Wolf Coalition, funded and organized a data collection effort in the footprint of the Morgan Nesbit Project. Over the course of several days, the Rogue Detection Teams deployed a scat detection dog and bounder to collect wolf and mustelid scats. In addition to the field work itself, the project was discussed in a public webinar (https://www.youtube.com/watch?si=VutO6f2zQFQ-6vcs&v=RZl5xN9lsR4&feature=youtu.be) and the team met with the Northern Blues Forest Collaborative on a field trip that included numerous Forest Service staff.

The data included scats that were confirmed and suspected to be from various carnivores and raptors including great gray owls, wolverine, fisher, marten, and more. Given its sensitivity, the raw data was submitted directly to agency staff on December 2, 2024. In 2021, mustelid scats (handled with appropriate protocols) were shared with Jamie Ratliff to be submitted for DNA analysis. While that data has not been shared with us, it should be in the possession of the Forest Service and should be considered in making final adjustments to this project.

In recent years, Oregon Wild has also submitted numerous reports from our citizen monitoring program in the project area including relevant wildlife sightings, grazing damage, and illegal

[62] Bigelow & North 2012. Microclimate effects of fuels-reduction and group-selection silviculture: Implications for fire behavior in Sierran mixed-conifer forests. Forest Ecology and Management 264 (2012) 51–59. https://northlab.faculty.ucdavis.edu/wp-content/uploads/sites/195/2016/02/Microclimate-Effects-Of-Fuels-reduction-And-Group-selection-Silviculture-Implications-For-FIre-Behavior-In-Sierran-Mixed-conifer-Forests-North-2011-1.pdf.

activities. We expect those reports will also be considered in the final project development and can provide additional information and/or answer any questions that may be helpful.

ESA Compliance: Avoid Take, Advance Recovery

This project area provides habitat for fish and wildlife listed under the Endangered Species Act, including chinook salmon, steelhead, and bull trout, and whitebark pine. We urge the agency to avoid logging and road building that could take listed species, slow recovery, or degrade critical habitat. See comments above regarding logging in RHCAs, logging steep slopes, logging unroaded areas, and adverse effects of roads.

We are concerned that the EA does not describe how the project advances recovery actions from the applicable recovery plans for ESA-listed species affected by this project.

We are concerned about significant incidental take of Threatened whitebark pine which is likely growing at low density in a significant portion of this project area due to the proximity of seed sources and the dispersal distances facilitated by birds that cache their seeds.[63] It is unlikely that fallers and loggers will be able to avoid killing large numbers of whitebark pine. The EA fails to take a hard look at how take will be avoided, minimized, and mitigated.

This project occurs in designated critical habitat for chinook salmon, steelhead, and bull trout. This raises several concerns:

1. The agency must physically protect and restore designated critical habitat to achieve "recovery" not just maintain the species in bare survival mode. This is the legal mandate of the ESA as reflected in three circuit court opinions Gifford Pinchot Task Force v. Norton 378 F.3d 1059 (9th Circ. August 6, 2004), Sierra Club v. U.S. Fish and Wildlife Service, No. 00-30117 (5th Cir. Mar. 15, 2001). N.M. Cattle Growers Ass'n v. United States Fish and Wildlife Serv., 248 F.3d 1277, 1283 & n.2 (10th Cir. 2001).
2. Meeting the recovery standard is not only an ESA issue, but also a NEPA issue. The agency is required by law to properly frame its NEPA analysis so that legal mandates are clearly apparent and the consequences of the proposed action are compared to the applicable legal standards. The NEPA document must therefore disclose primary constituent elements of critical habitat, the current condition of the affected CHU, and how this CHU may fit into recovery and conservation efforts for listed species. The NEPA analysis for this project fails to make these disclosures and inappropriately aims to avoid *jeopardy* rather than contribute to *recovery*. NEPA requires that the agency properly frame its legal duties so it can accurately disclose whether it is complying with the law. FSH 1909.15 Chapter 40, 43.21. 40 CFR 1508.27(b)(10). *NW Indian Cemetery Protective Association v. Peterson*, 795 F2d 688 (9th Circ. 1986). *SAS v. Mosely*, 798 F.Supp. 1473 (W.D. Wash. May 1992). *ONRC Action v. U.S. Forest Service*, CV. 03-613-KI (October 2003). *Klamath Siskiyou Wildlands Center v. Boody* (#03-3124-CO, May 18, 2004).

[63] Diana F. Tomback 2012. Whitebark pine: Ecology, Threats, and Why We Care. Whitebark Pine Ecosystem Foundation, Science and Management Workshop 14 September 2012, Kimberley, B.C. https://whitebarkfound.org/wp-content/uploads/2013/09/Diana-Tomback-Ecology-Threats-Why-We-Care.pdf; Keane, R. E., D. F. Tomback, C. A. Aubry, A. D. Bower, E. M. Campbell, C. L. Cripps, M. B. Jenkins, M. F. Mahalovich, M. Manning, S. T. McKinney, M. P. Murray, D. L. Perkins, D. P. Reinhart, C. Ryan, A. W. Schoettle, and C. M. Smith. 2012. A range-wide restoration strategy for whitebark pine forests. General Techical Report RMRS-GTR-279, USDA Forest Service Rocky Mountain Research Station, Fort Collins, Colorado. https://www.fs.usda.gov/rmrs/publications/range-wide-restoration-strategy-whitebark-pine-pinus-albicaulis.

3. The agency must comply with the ESA by formally consulting with the NMFS and FWS on the effect of this project on species recovery. Gifford Pinchot Task Force v. Norton 378 F.3d 1059 (9th Circ. August 6, 2004). If the agency has already consulted and the biop does not address in detail how this project will contribute to or detract from recovery, then consultation must be reinitiated.

In the absence of a recovery plan, the agency must retain all options for species recovery and avoid taking actions that will limit options for recovery.

The agency must follow the holding of the 9th Circuit.

> … the ESA was enacted not merely to forestall the extinction of species (i.e., promote a species survival), but to allow a species to recover to the point where it may be delisted. *See* 16 U.S.C. § 1532(3) (defining conservation as all methods that can be employed to "bring any endangered species or threatened species to the point at which the measures provided pursuant to this [Act] are no longer necessary"); *Sierra Club*, 245 F.3d at 438. … Clearly, then, the purpose of establishing "critical habitat" is for the government to carve out territory that is not only necessary for the species' survival but also essential for the species' recovery.

Gifford Pinchot Task Force v. Norton 378 F.3d 1059 (9th Circ. August 6, 2004).
http://web.archive.org/web/20041101124018/http://www.ca9.uscourts.gov/ca9/newopinions.nsf/57987D9564687978882 56EE800581847/$file/0335279.pdf?openelement

> A recent federal court decision may lead the federal government to designate more lands as "critical habitat" of endangered species and impose more restrictions on the use of those lands. The Fifth Circuit ruled in Sierra Club v. U.S. Fish and Wildlife Service, No. 00-30117 (5th Cir. Mar. 15, 2001), that the U.S. Fish and Wildlife Service and National Marine Fisheries Service had improperly interpreted the Endangered Species Act to provide for the designation and protection of critical habitat essential to the "survival" of listed species. According to the court, the Act calls on the Services to aim higher-and designate and protect critical habitat essential to the "recovery" of listed species.
> …
>
> The Endangered Species Act, noted the court, defines "conservation" as "the use of all methods and procedures which are necessary to bring any endangered… or threatened species to the point at which the measures provided by the [Act] are no longer necessary." This, said the court, "is a much broader concept than mere survival" that "speaks to the recovery of a threatened or endangered species." As the Services' standard for destruction or adverse modification protected critical habitat only from actions decreasing the likelihood of the *survival and recovery* of a listed species, the court found it inconsistent with Congress' intent as expressed in the Act.

http://web.archive.org/web/20020912045735/http://www.stoel.com/resources/articles/environment/news-mar01-2.shtm

The agency needs to avoid adverse modification of critical habitat, including actions that cause incremental loss of habitat. An October 2014 letter from conservation groups to the Secretary of Interior reminds the government of the fundamental fact that incremental actions can lead to cumulatively significant effects:

> Controlling and preventing the destruction of critical habitat is not easy because most habitat loss occurs gradually and incrementally over time. Very rarely does a single project threaten an entire species, as was the case with the snail darter and Tellico Dam in Tennessee Valley Authority v. Hill. [437 U.S. 153 (1978).] Instead many species become endangered by hundreds or thousands of small independent actions and decisions. Minor impacts to critical habitat may not at first appear significant, but over

time the cumulative impact of many, small changes can have a profound effect on endangered species habitats. It is these "death-by-a-thousand-cuts" scenarios that drive species decline in many cases in the United States, and it is these scenarios that the proposed rule fails to address properly.

The Services' proposed regulatory definition for "destruction or adverse modification" fails to address incremental and cumulative impacts of small harms in two important and related ways. First, the proposed rule states that only those negative changes that "appreciably diminish" the conservation value of critical habitat will be addressed during the consultation process under the ESA. Second, the proposed rule specifies that in determining whether an impact does "appreciably diminish" critical habitat, the Services will only evaluate impacts at the scale of the entire critical habitat designation. These two aspects of the proposal are not supported by the best available science and undermine the spirit and intent of the ESA.

As an initial matter, when Congress passed the ESA in 1973 and amended the law in 1978, it did not require the destruction or adverse modification of critical habitat to be "appreciable." Instead, it simply prohibited federal activities that destroyed or adversely modified critical habitat. In contrast, in Section 0(a)(1)(B) of the ESA, Congress permitted private activities that could incidentally take listed species so long as those activities would not "appreciably reduce the likelihood of the survival and recovery of the species in the wild." This crucial distinction recognizes that private entities should not be held to the same high standard of protection as federal agencies should in taking action that might harm listed species. By adding in the "appreciable" threshold, the Services are improperly raising the level of permissible harm to critical habitat in a manner contrary to the intent of Congress.

Second, the "appreciably" threshold proposed by the Services remains to a large extent vague and meaningless. The Services propose that "appreciably diminish" refer to situations where the Services "can recognize or grasp the quality, significance, magnitude, or worth of the diminishment" or where the Services can "appreciate the difference it will have to the recovery of the listed species." [79 Fed. Reg. 27060 at 27063 (May 12, 2014).] This begs the question of what it means to "recognize," "grasp," or "appreciate" a diminishment of critical habitat. None of these inquiries are science-based, and will render most Section 7 consultations ad hoc and arbitrary as to when an action trips these thresholds. The "appreciably" threshold should be replaced with a clear standard that considers all non-trivial impacts to critical habitat during the consultation process. Doing so would not necessarily stop more projects from being approved, but instead would ensure that all federal actions that harm critical habitat are appropriately mitigated and addressed.

Finally, the Services propose that they will consider whether actions "appreciably diminish" critical habitat based on the effect to the conservation value of the designated critical habitat as a whole, rather than to the action area alone. This default rule neuters any remaining value that the Section 7 prohibition on critical habitat represents. If, for example, an endangered species has 50,000 acres of designated critical habitat, it will almost never be the case that any action adversely modifying one, or ten, or 100 acres of critical habitat will "appreciably diminish" the conservation value of the entire designation such that it can be "grasped" by the Services. Over time however, these cumulative small harms will have serious, negative implications for the recovery of species. While the Services may claim that they will consider these cumulative impacts, the Government Accountability Office found as recently as 2009 that the Fish and Wildlife Service almost universally lacks the ability to track take and adverse modification of critical habitat authorized under Section 7 of the ESA. [Government Accountability Office. 2009. THE U.S. FISH AND WILDLIFE SERVICE HAS

> INCOMPLETE INFORMATION ABOUT EFFECTS ON LISTED SPECIES FROM SECTION 7 CONSULTATIONS, Report #: GAO-09-550.]
>
> As such, the proposal's approach for analyzing adverse modifications to critical habitat only as they relate to the entire designation lacks any scientific justification and will likely undermine the recovery of listed species. The draft proposal appears designed to avoid making tough calls about the impact of projects on critical habitat. We urge the Services to replace the "appreciably diminish" threshold with a clear standard that considers all non-trivial impacts to critical habitat during the consultation process.

Brett Hartl, CBD; Ya-Wei Li, DoW et al. October 9, 2014 letter to Interior Secretary Jewell.

New Information on Goshawk Habitat Selection

The Forest Service should modify this project to better reflect the best available science showing that logging is adverse to goshawk habitat needs. The fs should do more than protect nest sites and post-fledging areas. It would be much better to manage for a landscape that is suitable and permeable to goshawks.

The Eastside Screens provide,

> … the following standards are to be met as a minimum. Forest Plan standards and guidelines that EXCEED the levels described below should be used instead of, or in addition to, the following:
> (1) Protect every known active and historically used goshawk nest-site from disturbance. "Historical" refers to known nesting activity occurring at the site in the last 5 years. Seasonal restrictions on activities near nest sites will be required for activity types that may disturb or harass pair while bonding and nesting.
> (2) 30 acres of the most suitable nesting habitat surrounding all active and historical nest tree(s) will be deferred from harvest.
> (3) A 400-acre "Post Fledging Area" (PFA) will be established around every known active nest site. While harvest activities can occur within this area, retain the LOS stands and enhance younger stands towards LOS condition, as possible.

"Disturbance" is an inclusive term. Is does not mean to prohibit just commercial logging, but all cutting of vegetation.

A 2015 science review focused on the southern Blue Mountains of Oregon highlights several key points about goshawks:

- New goshawk science calls for protecting more habitat - e.g., recruitment habitat AND active nest cores; mid-AND-late seral forest;
- New science indicates that the Eastside Screens can be improved if FS would identify and protect more and larger reserve areas for goshawks AND other wildlife;
- Science affirms that goshawk require closed canopy forest, raising questions about increasing the pace and scale of density reduction;
- The Eastside Screens have slowed logging rates and successfully averted a conservation crisis for the goshawk. Increasing the pace and scale of logging could undermine this success story[64]

[64] Goodell, J. M. and Seager, ST. 2015. The Northern Goshawk on the Southern Blue Mountains and Malheur National Forest: A Technical Review of its Status, Ecology and Management. The Nature Conservancy, Portland, OR. 93 p. http://hdl.handle.net/1957/57413;

Blakey et al (2020) found that although "Effects of timber harvest, including thinning, on goshawks are debated, … avoidance of open areas and low canopy cover by goshawks in our study indicate that harvesting activities that result in these conditions may detrimentally impact Northern Goshawks."[65]

Rodriguez et al (2016) conducted a meta-analysis and found that

> Site occupancy by goshawks was reduced near timber harvest and small trees. … Evidence from across the breeding distribution of the northern goshawk suggests that timber harvest as represented in these studies (Table 2) is associated with lower nest-site occupancy. However, if goshawk pairs do nest at timber-harvest sites, their reproduction appears unaffected by this harvest. … Our results support conclusions of other reviews (e.g., Squires and Kennedy, 2006) that, regardless of forest type, goshawks prefer patches of more mature trees, relative to availability, for situating nests. … [R]educed goshawk occupancy of sites near timber harvest or sites with smaller trees need not result from changes in food availability. It is plausible that such patterns may result from goshawks selecting nests in areas that are shielded from predators or protected from inclement weather. When a nest tree is surrounded by small trees, or if surrounding trees are removed, the nest itself may become more visible to predators and less protected from inclement weather. If goshawks respond to greater nest exposure with nest abandonment, that could explain our occupancy results. There is no empirical support for this type of nest site selection in goshawks, but it is plausible given that in some other birds species individuals may adjust nest placement to enhance concealment and reduce predation risk (Lima, 2009). … Thus we have not shown that stand characteristics and timber harvest do not influence goshawk reproduction. Instead we have found only a lack of evidence that stand characteristics and timber harvest influence the success of nesting attempts that occur in the presence of timber harvest. In other words, the relationships we detected with site occupancy could well be effects on nest initiation, and thus potentially lifetime reproduction and ultimately fitness.[66]

Rickabaugh (201x) conducted extensive surveys of goshawks in eastern Oregon and found that density reduction treatments were not favorable.

> FOREST MANAGEMENT OF TERRITORIES
> In 1993, the USFS wisely began implementation of goshawk guidelines in their planning process, based on work by Reynolds et al (1992). On this forest the attempted directions for management (as specifically stated in the "East Side Forest Plan Amendment 2") is to protect every known active and historically used goshawk nest site from disturbance; and that 30 acres of the most suitable nesting habitat surrounding all active and historical nest trees will be deferred from harvest. A 400-acre PFA has been established around a majority of the known nests sites but not all.
> …

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http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/57413/Goshawk%20on%20Southern%20Blue%20Mountains_Goodell%20and%20Seager%202015.pdf.

[65] Blakey, R.V., Siegel, R.B., Webb, E.B., Dillingham, C.P., Johnson, M., Kesler, D.C. 2020 Multi-scale habitat selection by Northern Goshawks (Accipiter gentilis) in a fire-prone landscape. Biological Conservation Volume 241, 2020, 108348, ISSN 0006-3207, https://doi.org/10.1016/j.biocon.2019.108348. https://www.sciencedirect.com/science/article/pii/S0006320719305567.

[66] S.A. Rodriguez, P.L. Kennedy, T.H. Parker 2016. Timber harvest and tree size near nests explains variation in nest site occupancy but not productivity in northern goshawks (*Accipiter gentilis*). For. Ecol. Manag., 374 (2016), pp. 220-229. https://doi.org/10.1016/j.foreco.2016.04.052.

> Most of the management activities (timber harvest, thinning, etc.) on this study area at the nest stand level have proven to be deleterious to occupancy of those nest stands. Even though the directives in the "East Side Forest Plan Amendment 2" (C. Kranich, pers. com.) is to defer from harvest 30 acres of the most suitable nesting habitat surrounding all active and historical nest trees, this has not been implemented (for various reasons deemed by forest managers at the time) in all cases. In these cases (for examples see Burntcabin Creek, Dipping Vat, LP Dog, Steagall Springs), nesting goshawks moved to adjacent areas or were seemingly extirpated from that nest stand. Though the harvest prescriptions may change in the future, I have observed that the overall management activities in the goshawk nest stands and surrounding areas have had the effect of reducing the canopy layer and opening up the forest structure. Goshawks are more likely to be found in areas with a high percentage of mid-aged to late succession forest in closed canopy conditions. A reduction in large trees and canopy cover, either through short-term high volume logging or repeated entry into stands over time, reduced the suitability of those stands for occupancy by breeding goshawks (DeStefano et al. 2006). There is a need for long-term monitoring of the results of these management procedures; however, funding and personnel will probably continue to be deficient for this forest, particularly in the current budget climate. In the 32 core territories with the longest monitored record, only 13 have remained relatively unaltered by any timber activity or disturbance other than natural occurrences (e.g., wind throw, deadfall). Seventeen have been altered by cuts in or around the nest clusters, and two have been burned ...[67]

A 2005 review by Greenwald et al. of goshawk habitat selection confirms that goshawks select stands with complex forest structure (e.g. high canopy closure, large tree for forest type, canopy layering, abundant course woody debris). However, protecting just late successional forest and just the active nest sites may not be enough. The agency should be protecting more mid-and late seral forests and should be protecting both recruitment habitat and active nest cores, i.e., the agencies should be managing for a *landscape* that is suitable for goshawks and other late successional wildlife to thrive and move around in.

This review also does not find support for a few of the assumptions underlying Reynolds' 1992 management recommendations.

- Goshawks are habitat generalists only in the sense of using forests with a variety of tree species, but they are not habitat generalists in terms of selecting forest structure. They disproportionately select for late successional forest.
- Goshawks are not opportunistic foragers. Rather they appear to select for prey availability as determined by late successional forest structure.
- Goshawk are not limited by prey abundance. They select for prey availability, with absolute prey abundance being only a component of availability, late successional forest structure being an important determining factor.

Some relevant excerpts from this review include:

> Boal et al (2001) found that stands used by goshawks contained 1.6 to 2.4 km of down woody debris per hectare with an average diameter of 17-19 cm, depending on forest

[67] SKYLAR J. RICKABAUGH with THEODORE J. FREMD. NORTHERN GOSHAWKS IN THE MALHEUR NATIONAL FOREST EASTERN OREGON 1992 TO 2011. p 429-430
https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/12197/A_Final_Goshawk_doc_May_10.pdf

type, and Bloxton (2002) documented that goshawk kill sites has greater numbers of snags ≥12.5 cm dbh/ha (u=77) than random sites.
...
... the consistency of results in demonstrates goshawk selection for late successional forest structures (e.g. high canopy closure, large tree for forest type, canopy layering, abundant course woody debris) when using areas within their studies home ranges. ...
...
A majority of studies found selection for stands with >40% canopy closure and greater densities of trees over 40 cm dbh. ...
... goshawks may be broad habitat generalists in terms of tree species but are habitat specialists with respect to forest structure. ...
... prey abundance is not the most important factor is selecting foraging sites...
Several studies determined that goshawks select foraging habitat based not on prey abundance but rather prey availability as determined by habitat structure. ...
[R]ecommendations focusing on increasing prey abundance at the expense of forest structure within occupied home ranges are not likely to improve goshawk occupancy rates.
...
goshawks avoided open areas, particularly logged open areas, and none found selection for openings. ... current information does not conclusively support a contention that creating openings through logging will benefit the goshawk. Given the history of clearcutting in much of the western United States range of the goshawk, we very much doubt that forest clearing are a limiting factor for the species.
...
Occupancy rates were reduced by removing forest cover in the home range...
...
We have no way of knowing assessing whether 40% of the landscape in mature and old-growth forests is sufficient to sustain goshawks. ... we recommend protecting existing mature and old-growth forest characteristics and ensuring that such forests are allowed to develop in proportions similar to pre-settlement conditions. This can be accomplished by restricting cutting to small trees and prohibiting large reductions in canopy closure. A similar proposal was recently adopted by Region 5 of the United States Forest Service for the Sierra Nevada.[68]

This comprehensive review of telemetry studies does not find support for the hypothesis that thinning improves goshawk foraging habitat. Absent clear scientific support, the agency should clearly label the statement as an unsupported hypothesis.

Even though the speculations in Reynolds (1992) about the benefits of logging have been discredited by subsequent science we still see the agencies inappropriately relying on Wisdom (2000) which in turn relies on Reynolds (1992). (e.g. Jackson Vegetation Management Project FIES. Ochoco NF. 2012).

Beier et al (2008) looked at the efficacy goshawk management recommendations used by the FS in the SW and found

> The strongest pattern was that, contrary to our hypothesis, production of fledglings decreased as the breeding area's similarity to the goshawk guidelines increased. Why did

[68] Greenwald, Crocker-Bedford, Broberg, Suckling, and Tibbitts. 2005. A review of Northern goshawk habitat selection in the home range and implications for forest management in the western United States. Wildlife Society Bulletin 33(1):120-129. http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev3_021122.pdf.

> goshawk reproduction not increase with similarity to the goshawk guidelines? One possibility is that Reynolds et al. (1992) estimated inaccurately forest conditions that maximize prey abundance. … Another possibility is that Reynolds et al. (1992) erred in their fundamental assumption that goshawks are habitat generalists and prey specialists that thrive best in a landscape with abundant prey. … [W]e found a moderate negative correlation between goshawk productivity and the forest structure prescribed by the guidelines. This calls into question the purported benefit to goshawks.[69]

Timber sales that emphasize removal of shade tolerant trees will likely adversely affect goshawk habitat. Minta et al (1993) found that goshawk territories in NE Oregon tend to be located in stands dominated by Grand fir, while they prefer to nest in large Douglas fir trees.[70]

The agency sometimes argues that logging helps create flying space for goshawks. This generally not necessary or beneficial. Goshawks prefer relatively dense, complex forest and they have the ability to fly through complex forests, as shown in the following videos:
https://youtu.be/_bXHLznnQmY?t=37s;
https://youtu.be/7WurNq4q0K0?t=2m46s;
https://www.facebook.com/atmacaalemi.sparrowhawkworld/videos/121267271547623/

New information on Pileated Woodpeckers

Pileated woodpeckers play a unique role in the forest ecosystem

a. They excavate cavities in trees that are later used by numerous other species not just for nesting, but also for roosting and foraging. Benefited species include spotted owls and their prey.
b. Their excavations accelerate wood decomposition, nutrient cycling, and fungi dispersal.[71]
c. The pileated woodpecker's ability to excavate large cavities in relatively sound trees that are in the early stages of heart wood decay, means that the resulting cavity trees may provide uniquely long-lasting habitat.
d. The combined foraging activities of pileated woodpeckers and all the species they assist tend to mediate insect outbreaks.

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[69] Beier, P., E. C. Rogan, M. F. Ingraldi, and S. S. Rosenstock. 2008. Does forest structure affect reproduction of northern goshawks in ponderosa pine forests? Journal of Applied Ecology 45:342–350. http://oak.ucc.nau.edu/pb1/vitae/Beier_etal.2008.Goshawk.JAE.pdf and see Beier, P., E. C., and M. F. Ingraldi 2012. Commentary: There Is No Evidence That the Forest Service's Goshawk Recommendations Improve Goshawk Nest Productivity. Wildlife Society Bulletin; DOI: 10.1002/wsb.122. ("we tested whether goshawk (*accipiter genitilis*) productivity increased with increasing similarity of goshawk breeding areas to Forest Service recommendations for the northern goshawk in the southwestern United States. Surprisingly, we found that nest productivity declined as similarity to the recommendations increased from 21% to 57% (Beier et al. 2008)."

[70] Minta, Steven, Ralph Anderson and Tracy Fleming. 1993(fall). Trends in historic goshawk data, Wallowa (Whitman) National Forest, Oregon. Unpublished 2 page typescript summary. Report on file at National Council of the Paper Industry for Air and Stream Improvement. ("The dominant trees in the nest stand were grand fir (38.4%, n=159), Douglas Fir (22.6%), Ponderosa pine (14.5%), western larch (12%), and lodgepole pine (10.7%). Secondarily dominant trees included Douglas fir (46.6%, n=131), western larch (16.8%), Ponderosa pine (14.5%), and grand fir (10.7%). The USFS plant community designation was most frequently grand fir/twinflower (35.9%, n=117), grand fir/big huckleberry (27.4%), Douglas fir/common snowberry (13.7%), …").

[71] Kerry L. Farris, Martin J. Huss And Steve Zack. The Role Of Foraging Woodpeckers In The Decomposition Of Ponderosa Pine Snags. The Condor 106:50–59. The Cooper Ornithological Society 2004. http://www.wcs.org/media/file/FarrisandZack_2005.pdf.

Further new information suggests that pileated woodpeckers can tolerate reduced canopy cover caused by insect outbreaks as long as there remains abundant dead wood, but woodpeckers are less abundant in areas affected by logging that reduces the number of live and dead trees and coarse wood available for nesting, roosting, and foraging. After tracking pileated woodpeckers over time in an areas affected by bark beetles and bud worms, researchers found that "Even where mortality was high among grand fir and Douglas-fir, as long as extensive logging and fuel reduction treatments had not occurred and an abundance of large live or dead trees and logs remained, the pileateds were still there…"[72] Key findings include:

- Pileated reproductive success appears to be closely tied to the amount of unharvested, closed-canopy stands, and reproductive failure appears tied to the amount of harvested stands.
- High tree mortality is not detrimental to pileated woodpeckers if abundant large snags persist.

Management implications include: "Extensive tree harvesting rendered habitat unsuitable for nesting pileated woodpeckers [and] Retention of abundant large, dead trees and logs in mature and older stands with high tree mortality provided sustainable habitat for pileated woodpeckers."

The NEPA analysis failed to consider significant new information on pileated woodpeckers including:

a. Pileated woodpeckers need more and larger roosting trees than nesting trees. They may use only one nesting tree in a year, they may use 7 or more roosting trees.
b. West of the Cascades, pileated woodpeckers tend to prefer nesting in decadent trees rather than snags.
c. West of the Cascades, standing snags are important foraging sites because down wood may be too wet to harbor carpenter ants (the favored foods of the pileated woodpecker).
d. West of the Cascades, Pacific silver fir is often used for nesting (but not roosting).
e. West of the Cascades, western redcedar is often used for roosting (but not nesting).

Determining pileated woodpeckers population potential based on nesting sites alone will not provide adequate habitat for viable populations of this species. This new information is not recognized in current management requirements at the plan or project level. The EIS must address this new scientific information.[73]

Carbon Emissions and Global Climate Change

Carbon emissions (considered cumulatively) will exceed thresholds of concern.

The April 2024 Climate Change and Carbon Effects Analysis for the Morgan Nesbit Project (Climate Analysis) asks "Would project effects approach a threshold for your resource?" and Answer "NO." We are unclear how this conclusion was reached given that the earth is already experiencing extreme effects from global climate change and this logging project will only add to the cumulative overload of carbon in the atmosphere making climate change worse all over the world. We have already crossed critical climate thresholds; there is a lot of inertia in the climate system so the adverse effects of climate change will be with us for a long time; we are making pitiful progress controlling GHG emissions; each additional increment of GHG emissions make

[72] Nielsen-Pincus said. LOOKING OUT FOR THE PILEATED WOODPECKER. Science Findings Issue 109. Jan 2009. http://www.fs.fed.us/pnw/sciencef/scifi109.pdf.

[73] *Science Findings* Issue 57 (October 2003) Coming home to roost: the pileated woodpecker as ecosystem engineer, by Keith Aubry, and Catherine Raley http://www.fs.fed.us/pnw/sciencef/scifi57.pdf.

a bad situation worse. That's the missing context in the Morgan Nesbit Carbon and climate analysis.

The Climate Analysis must consider all carbon emissions.
The Climate Analysis says "This project-scale NEPA carbon effects analysis focuses on biogenic carbon… Fossil fuel emissions from machinery use associated with the implementation of prescribed burns were not calculated. … Fossil fuel emissions from equipment use associated with implementation of commercial and noncommercial treatments were not calculated. At this time, we cannot accurately calculate vehicle or equipment operations." The analysis should not ignore the greenhouse gas emissions from logging equipment and other fossil fuel powered vehicles and machinery used to plan and implement this project. Estimates can be made. Other NEPA analysis have done so. Failure to estimate emissions from fossil fuel use essentially assumes it's zero and its effects are ignored.

The analysis of emissions is also focused on units of CCF (hundreds of cubic feet of wood volume). This leaves out other important portions of the total carbon emissions from logging, including tree tops, branches, stumps, unmerchantable trees and other vegetation, snags and down wood that gets consumed by slash fires, the below-ground ecosystem that quickly dies and decomposes after its food supply (conifer root exudates) if cut off, etc. The analysis must reflect the fact that project-level carbon emissions originate not just from CCF (wood), but all carbon that is put on an accelerated path from the forest to the atmosphere.

The scale of the climate effects analysis must reflect the actual scale of affects and must not be arbitrarily limited to local effects.
The Climate Analysis "The spatial boundary for carbon effects is at the forest-level and the project-level." This is too small. Climate change is caused by cumulative global emissions and with our well-mixed atmosphere, those climate effects of logging will be felt all around the globe. "[T]he entire body of NEPA law directs federal agencies to analyze the effects of proposed actions to the extent they are reasonably foreseeable consequences of the proposed action, regardless of where those impacts might occur. Agencies must analyze indirect effects, which are caused by the action, are later in time or farther removed in distance, but are still reasonably foreseeable,…. CEQ has determined that agencies must include analysis of reasonably foreseeable transboundary effects of proposed actions in their analysis of proposed actions in the United States. … Such effects are best identified during the scoping stage, and should be analyzed to the best of the agency's ability using reasonably available information. Such analysis should be included in the EA or EIS prepared for the proposed action."[74]

The Minnesota PUC explains that

> GHGs are different from criteria pollutants in the spatial scale of their impacts. Because GHGs emitted in one location on earth mix with GHGs emitted from all other locations on the planet, each GHG molecule emitted contributes to climate change experienced everywhere. … To incorporate only [local] damages … would be to ignore the vast

[74] July 1, 1997 Memo from CEQ Chair Kathleen McGinty to the Heads of Agencies, RE: Transboundary Environmental Impacts. http://ceq.hss.doe.gov/nepa/regs/transguide.html.

> majority of external costs. If every political territory only considered external damages within its own boundaries… 'there would be virtually no correcting for externalities.' … The Administrative Law Judge concludes that the preponderance of the evidence in this docket demonstrates that CO2 emissions emitted in one location on the Earth mix with GHGs emitted from all other locations on the planet, with each GHG molecule contributing to climate change experienced everywhere.[75]

The analysis of climate change resilience and vulnerability must reflect the adaptive capacity of trees and ecosystems, and the risk that logging could kill trees that are most fit to survive. The Climate Analysis says "Actions to promote resiliency and reduce vulnerability, especially with regard to the indicators and measures listed, are a benefit to the ecosystem, … [indicator] Changes in soil moisture (i.e., drought resilience)".

The need for logging to make forests more resilient to global climate change is over-stated. Trees evolved with a wide range of climate variation, and their genetic diversity likely includes genes that can adapt to global climate change. Natural mortality processes are also part of the climate solution, by serving as a mechanism for self-correction. Trees are stressed more by vapor pressure deficit, rather than soil-water limitations, so logging that creates more open conditions and more warm air penetration into closed forest stands, may actually make forests less resilient, not more resilient.

The Climate Analysis assumes that thinning increases soil moisture and therefore increases drought resilience:

> … recommended stocking level for upland forests of northeastern Oregon and southeastern Washington forests is 25 percent of maximum density to enhance climate change resilience (North et al. 2022; Powell 2024). This percent was selected because it reflects the 'onset of inter-tree competition' benchmark (when roots and crowns begin to interact), and it functions as a proxy for resilient pre-Euromerican conditions (North et al. 2022; Powell 2024). This stocking level is recommended for management objectives that emphasize stand resistance to disturbance factors.

This is not well-supported. These stocking recommendations are based on an out-dated agricultural model of forestry that attempts to exclude competition and mortality from these complex ecosystems that need these natural ecological processes. A landscape of live trees is a tree-farm, not a forest ecosystem. All wildlife in these ecosystems evolved with abundance tree wood. Every tree that grew in the forest stayed in the forest after death. Logging is antithetical to this natural pattern.

Watts et al. (2024):

> Do natural disturbance agents such as insects, fire, and competitive mortality serve as natural self-correcting processes that help forests achieve desired characteristics? How can managers work with these natural processes instead of treating them as problems that need to be controlled?
>
> There is new evidence that trees are stressed more by warm-dry atmospheric conditions rather than lack of soil moisture, so thinning to reduce competition for below-ground may

[75] Laurasue Schlatter 2016. Minnesota PUC, Administrative Law Judge. Findings Of Fact, Conclusions, And Recommendations: Carbon Dioxide Values. In the Matter of the Further Investigation into Environmental and Socioeconomic Costs Under Minnesota Statutes Section 216B.2422, Subdivision 3. April 15, 2016. https://mn.gov/oah/assets/2500-31888-environmental-socioeconomic-costs-carbon-report_tcm19-222628.pdf.

not make stands more resilient. Atmospheric water demand, not soil moisture availability, appears to be the primary cause of tree water stress in the late summer. Temperature-driven increases in vapor pressure deficit from climate change are likely to reduce forest productivity regardless of soil moisture availability.

...

"How in the world can the trees be water stressed if they haven't used all the water available in the soil?" Wondzell recalls pondering. "We spent a lot of time at the whiteboard asking ourselves, 'Is this data actually correct?'" recalls Bladon.

...

In 2018, Jarecke read up on other studies that researched why trees might experience drought stress. What she learned was that the drought stress could be coming from aboveground. "New studies were emphasizing the impact of increasing vapor pressure deficit on tree water stress," she explains. "And there's a misconception in forest management on how we've been thinking about water stress being all about the belowground drought stress."

Jarecke describes vapor pressure deficit (VPD) as the "drying power of the atmosphere" or phrased another way, how much water vapor or humidity is needed to saturate the air at a given temperature. Hot air can hold more moisture than cold air, which means as temperatures increase without a corresponding increase in humidity, VPD increases. So, how does VPD affect trees? "You can think of a tree as a cluster of tiny straws," explains Wondzell. "As the soil dries out, the tree finds it harder and harder to pull soil water into the bottom of these straws. Conversely, aboveground it is the dryness of the air that does the pulling. And as the air gets drier, it pulls harder and harder on the water at the top of the straws."

...

Latewood carbon isotope composition was most strongly correlated to mean daytime VPD between May and September and total rainfall between May and August. The researchers noticed that increased VPD during June, when there was still plenty of soil moisture, decreased the latewood growth, which lent weight to the hypothesis that VPD limits growth even when soil moisture is plentiful.

... Karla's research strongly suggests that at her study site, these trees are highly sensitive to vapor pressure deficit," Wondzell says. "Of course, they're also sensitive to rainfall, but it's actually vapor pressure deficit that is by far and away the bigger driver."

...

If vapor pressure deficit is a primary cause of water stress and a primary limitation to tree growth during the long, dry summers typical of western Oregon, thinning could prove ineffective, or even counterproductive, for increasing drought resilience. Thinning a stand could allow penetration of hot, dry air deeper into the canopy, potentially increasing tree water stress.[76]

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[76] Watts, Andrea; Wondzell, Steve; Jarecke, Karla; Bladon, Kevin. 2024. Hot air or dry dirt: Investigating the greater drought risk to forests in the Pacific Northwest. Science Findings 268. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 6 p. https://www.fs.usda.gov/pnw/sciencef/scifi268.pdf. See also, Karla M. Jarecke, Linnia R. Hawkins, Kevin D. Bladon, Steven M. Wondzell 2023. Carbon uptake by Douglas-fir is more sensitive to increased temperature and vapor pressure deficit than reduced rainfall in the western Cascade Mountains, Oregon, USA. Agricultural and Forest Meteorology, Volume 329, 15 February 2023, 109267. https://www.sciencedirect.com/science/article/abs/pii/S0168192322004543. See also, Watts, Andrea; Wondzell, Steve; Jarecke, Karla; Bladon, Kevin. 2024. Hot air or dry dirt: Investigating the greater drought risk to forests in the Pacific Northwest. Science Findings 268. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 6 p. https://www.fs.usda.gov/pnw/sciencef/scifi268.pdf. (". Atmospheric water demand, not soil moisture availability, appears to be the primary cause of tree water stress in the late summer. ...

The Climate Analysis is also flawed because it assumes that thinning large trees to reduce "canopy bulk density" advances climate resilience. Running canopy fires are not caused by excessive fuels, but by high wind and low humidity. Logging may even increase forest damage by increasing wind speeds under the canopy. Canopy fuels are high above the ground and are not a high priority for fuel reduction. These fuels are also connected to medium and large trees that are tall and have thick bark which makes these fuels relatively fire resistant. Also, these canopy fuels help provide a cool, moist microclimate that not only helps moderate wildfire effects, but also helps wildlife tolerate climate extremes in both summer and winter.

The complex structure and multi-layered canopy of mature forests provides a buffer against thermal extremes which means that older forests can serve as climate refugia as the climate warms. OPB interviewed one of the authors of the study and reported:

> … the kind of forest makes a big difference on temperature.
>
> "The more structurally complex the forest, the more big trees, the more vertical layers – the cooler it was," he says.
>
> The research showed differences as much as 4.5 degrees on warm days. Old growth forests also held in heat during cold weather. Overall, these forests have a moderating effect on temperature extremes.
>
> One reason, researchers suspect, is that tree plantations, even mature ones, don't have nearly the understory material – small trees, shrubs, ground cover – as more complex stands. Nor do these single-age plantations have a lot of big trees – unlike old growth stands.
>
> "We think one of the mechanisms causing this is thermal inertia," Betts says. "That takes these trees longer to warm up and longer to cool down. And that could be providing some of the buffering capacity of these older forests."
>
> Betts says these stands of old growth could provide refuges for temperature-sensitive wildlife in the face of climate change.[77]

The buffering provided by relatively dense forests is relatively stable even in a dynamic climate regime, so "To maintain microrefugia in a rapidly changing climate, conservation of old-growth and other structurally complex forest habitat is critical"

> "Protected forests can effectively cool the land surface. The latitudinal gradient of the cooling effects of protected forests on LST [land surface temperature], i.e., decreasing

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Management Implications … • The sensitivity of Dougals-fir water stress to vapor pressure deficit has critical implications to managing forests of western Oregon for drought resiliency in a changing climate. Hotter summer temperatures expected from climate change are likely to drive higher vapor pressure deficit and exacerbate water stress in the future. • If vapor pressure deficit is a primary cause of water stress and a primary limitation to tree growth during the long, dry summers typical of western Oregon, thinning could prove ineffective, or even counterproductive, for increasing drought resilience. Thinning a stand could allow penetration of hot, dry air deeper into the canopy, potentially increasing tree water stress.").

[77] Jes Burns 2016. Old-Growth Forests Provide Temperature Refuges In Face Of Climate Change: Study. OPB/EarthFix | April 22, 2016 http://www.opb.org/news/article/forest-refuges-climate-change/ *citing* Sarah J. K. Frey, Adam S. Hadley, Sherri L. Johnson, Mark Schulze, Julia A. Jones, Matthew G. Betts. 2016. Spatial models reveal the microclimatic buffering capacity of old-growth forests. SCIENCE ADVANCES. 22 APR 2016 : E1501392. http://advances.sciencemag.org/content/advances/2/4/e1501392.full.pdf.

> cooling effects from the tropics to the poles, is similar to the spatial pattern of cooling effects of forest cover on land surface (21). This spatial pattern is also supported by ground observations of air temperatures measured within and outside forest canopies, indicating that the below-canopy microclimate is buffered by tree canopies. The buffering effect of forests on subcanopy microclimate tends to be greater than the magnitude inferred from LST that represents the temperature at the top of the canopy. Subcanopy air temperatures are even lower, most likely because of the shading and light interception of the canopy structure (20). However, the effect is much stronger than the mean effect of forests (protected and nonprotected) on LSTs compared to open land (grasslands and croplands). The cooling effects are high in tropical and temperate forests, … The buffering effect of PAs [protected areas] on increased temperatures therefore stabilizes the impacts of climate change at the global level. It is generally recognized that nature conservation contributes to global climate targets by preventing carbon emission from land-use change and by enhancing carbon removal from the atmosphere (12, 14). Here, we show that the effectiveness of PAs in stabilizing the local climate cannot be ignored. The stabilized climate in regions of high PA coverage is particularly important for providing climate change refugia and protecting species and communities from the negative impacts of climate change (45), whereas land-use change and disturbances result in greater warming that modifies habitats and threatens species. The buffering effects of PAs along a latitudinal gradient, i.e., stronger buffering at higher latitudes, are particularly important for species and communities at higher latitudes, where climate warming is more pronounced than that at lower latitudes. … The buffering effects of PAs on local microclimate are mainly achieved through the moderation of energy budgets by natural intact vegetation. Natural and seminatural vegetation, particularly forests, have much higher ET and surface roughness due to dense and tall canopies than croplands, where the land surface is cooled down by turbulent heat loss (32). … We find higher LAI [leaf area index] in PAs than NPAs [non-protected areas], which results in lower aerodynamic resistance and enhances turbulent heat transfer from the land surface to the atmosphere, thereby cooling the land surface (47) in temperate forests, tropical forests, grasslands, and savannas (fig. S8B). The cooling effect of land cover with higher LAI through aerodynamic resistance plays a major role in cooling the land surface compared to other biophysical effects (48).[78]

Another recent study by Tourani et al. (2023) showed that as the climate warms forests, especially natural forests, become an increasingly important refuge for mammals.[79]

There is evidence that relatively dense mature forests are relatively resistant and resilient to wildfire -

> Pre-fire nesting/roosting habitat had lower probability of burning at moderate or high severity compared to other forest types under high burning conditions. Our results indicate that northern spotted owl habitat can buffer the negative effects of climate change by enhancing biodiversity and resistance to high-severity fires, which are

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[78] Christopher Wolf, David M. Bell, Hankyu Kim, Michael Paul Nelson, Mark Schulze, Matthew G. Betts, Temporal consistency of undercanopy thermal refugia in old-growth forest. Agricultural and Forest Meteorology, Volume 307, 15 Sept 2021, 108520, ISSN 0168-1923, https://doi.org/10.1016/j.agrformet.2021.108520. See also Xiyan Xu, Anqi Huang, Elise Belle, Pieter De Frenne, And Gensuo Jia 2022. Protected areas provide thermal buffer against climate change. SCIENCE ADVANCES. 2 Nov 2022. Vol 8, Issue 44. DOI: 10.1126/sciadv.abo01. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9629704/pdf/sciadv.abo0119.pdf

[79] Tourani et al 2023. Maximum temperatures determine the habitat affiliations of North American mammals. PNAS December 4, 2023. 120 (50) e2304411120 https://doi.org/10.1073/pnas.23044111, https://www.pnas.org/doi/pdf/10.1073/pnas.2304411120.

> predicted to increase in frequency and extent with climate change. Within this region, protecting large blocks of old forests could be an integral component of management plans that successfully maintain variability of forests in this mixed-ownership and mixed-severity fire regime landscape and enhance conservation of many species.[80]

The Climate Analysis must harmonize trade-offs between climate change resilience and climate change mitigation.
The NEPA analysis should develop alternatives that harmonize the competing objectives of climate change mitigation and adaptation. The effects analysis should explicitly account for the trade-offs of logging, e.g., increased GHG emissions that exacerbate climate stresses.

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.[81]

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.

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.

This is important because, even if thinning provides climate benefits in future decades, short-term carbon emissions conflict with climate policy priorities. The next few decades are critical to achieving goals related to decarbonizing our economy. Delayed climate benefits should be strongly discounted because we should have decarbonized our economy by then, so future effects are not nearly as important as near-term effects. If thinning causes a short-term pulse of GHG emissions, that's a problem.

The agencies often claim that density reduction treatments are expected to increase the resiliency of treated stands to the projected effects of climate change. But this small increase in resiliency comes at a tremendous cost. The NEPA analysis needs to disclose and consider the fact that logging will result in greenhouse gas emissions that make climate change worse. Think

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[80] Lesmeister, D. B., S. G. Sovern, R. J. Davis, D. M. Bell, M. J. Gregory, and J. C. Vogeler. 2019. Mixed-severity wildfire and habitat of an old-forest obligate. Ecosphere 10(4):e02696. 10.1002/ecs2.2696. https://esajournals.onlinelibrary.wiley.com/doi/pdf/10.1002/ecs2.2696.

[81] 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

about that trade-off. Logging might make a small area more resilient to climate change while making climate conditions (and ocean acidification) worse for ecosystems all over the rest of the world. This significant trade-off needs to be carefully evaluated in the NEPA document.

Even well-intentioned logging also has impacts that make ecosystems less resilient to climate change. For instance, (i) roads and soil degradation make watershed less resilient to the expected effects of the amplified hydrologic cycle; (ii) reduction of complex forest structure and dense forest conditions makes certain species populations less resilient to climate change, including species associated with relatively dense forests and species associated with snags and dead wood. These species are already stressed by the cumulative effects of non-federal land management and fragmentation caused by past and ongoing management on federal lands; (iii) Also, "High overstory density can be resilient" when ladder fuel are absent and there is a gap between surface and canopy fuels.[82]

When all these trade-offs are considered, we feel that climate change mitigation should receive emphasis over climate adaptation on federal land management (especially when adaptation efforts come with significant trade-offs). When climate change mitigation and adaptation may be in conflict, the agency needs to focus on reducing GHG emissions (or maintaining carbon stores). These mitigation actions are more important because (i) mitigation is shown to be more challenging (institutionally) and it is perennially under-achieved, (ii) mitigation has global benefits, and (iii) mitigation ultimately reduces the need for adaptation. An emphasis on mitigation is in accord with international law, e.g. the European Convention on Human Rights:

> The court emphasises that the [State's duty of care] first and foremost should concern mitigation measures, as adaptation measures will only allow the State to protect its citizens from the consequences of climate change to a limited level. If the current greenhouse gas emissions continue in the same manner, global warming will take such a form that the costs of adaptation will become disproportionately high. Adaptation measures will therefore not be sufficient to protect citizens against the aforementioned consequences in the long term. The only effective remedy against hazardous climate change is to reduce the emission of greenhouse gases.[83]

See Oregon Wild scoping comments.

Regen harvest and Logging RHCAs will exacerbate adverse effects from climate change. The Climate Analysis does not reflect the fact that regen harvest, and logging Riparian Habitat Conservation Areas will reduce soil function, reduce stream shade, reduce wood recruitment, and increase the risk of rain-on-snow events, all of which conflict with the predicted increase in temperatures, increase in peak flows driven by global climate change, and the need for greater

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[82] Terrie Jain (2009) Logic Paths for Approaching Restoration: A Scientist's Perspective, from Workshop: Restoring Westside Dry Forests - Planning and Analysis for Restoring Westside Cascade Dry Forest Ecosystems: A focus on Systems Dominated by Douglas-fir, Ponderosa Pine, Incense Cedar, and so on. May 28, 2009. http://ecoshare.info/projects/central-cascade- adaptive-management-partnership/workshops/restoring-westside-dry-forests/.

[83] *Urgenda Foundation v. The State of the Netherlands*. Hague Court of Appeal. October 9, 2018. https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RBDHA:2015:7196

conservation of streams-side forests, and retention of more trees and more down wood to mitigate the amplified hydrologic cycle and climate uncertainty.

The Climate Analysis says "Vegetation treatments in areas with snowpack accumulation may increase snow retention and soil moisture and additionally extend water yield into the summer for a few years post-treatment (Halofsky and Peterson 2017)." But the analysis fails to disclose that such snow accumulation also increases flooding risk during rain-on-snow events.

The Climate Analysis says patch cutting and shelterwood are climate adaptive "Increased structural and age diversity is an adaptation strategy used to reduce the likelihood of uniform effects on the landscape (Halofsky et al. 2018; Peterson et al. 2011a). … shelterwood regeneration thinning may promote climate change resiliency and reduce vulnerability by promoting heterogeneity …" But the analysis does not disclose all the ways that natural processes (such as fire, insects, competitive mortality) do the same things with fewer trade-offs.

The Climate Analysis says that logging in RHCAs aids climate resilience "To increase climate change resiliency in fire excluded areas, fuel reduction treatments around high-value riparian areas are used as a strategy to prevent habitat loss and degradation." But the analysis completely fails to address: (i) the low probability that RHCA treatments will interact with wildfire during the brief period that fuels are reduced, (ii) trade-offs from commercial logging (e.g., soil degradation, loss of wood recruitment, degradation of microclimate refugia), (iii) the modest or negative effect of fuel treatments, and (iv) the fact that logging could make fire effects worse if wildfire happens before activity fuels have been treated, or after the surface and ladder fuels are stimulated by the canopy removal.

The Climate Analysis relies on management recommendations that have not been subject to NEPA review.
The Climate Analysis repeatedly relies on the Blue Mountains Climate Change Vulnerability and Adaptation in the Blue Mountains Region (Halofsky and Peterson 2017). This document (and others relied on by the Climate Analysis) have not gone through NEPA review, and this EA only considers one action alternative based on these pro-logging management recommendations. There may be unexplored alternatives, such as greater reliance on non-commercial thinning without roads and prescribed fire, that achieve similar or better outcomes with fewer trade-offs.

The Climate Analysis admits that the effects of road construction are decidedly counter to climate resilience, but the analysis concludes they are a necessary evil without considering alternatives.

The Climate Analysis fails to admit that logging related GHG emissions will undermine climate resilience goals.
The analysis of effects from temporary road construction admit that the effects of roads are counter to climate resilience goals, but the analysis never admits that the emission of GHG from logging and fossil fuel use will exacerbate global climate change and is therefore also counter to climate resilience goals, and the EA failed to consider alternatives (e.g., non-commercial thinning and prescribed fire) that might advance project goals with fewer emissions.

The Climate Analysis lacks a probabilistic framework.
The Climate Analysis says "Treatments reducing density will likely have a positive impact on stand vulnerability because of the reduced fuels available for high-severity fires." This statement is not factual. It is far more likely that logging will degrade habitat without providing any fuel benefits or climate benefits, because there is simply a very low probability that treatments will interact with wildfire during the brief period before fuels regrow.[84]

The Climate Analysis of carbon emissions and wood products is flawed.
The Climate Analysis says "we estimate the project will remove 307,665 to 319,876 tonnes CO_2eq from the forest ecosystem." But the analysis fails to disclose the forgone carbon sequestration if these forests were allowed to continue growing.

The analysis gives credit for carbon stored in wood products, which is misleading because:

(i) Creating wood products kills trees which requires accounting for the forgone opportunity to continue accumulating carbon in live trees;
(ii) It fails to account for the fact that carbon in wood products remains stored temporarily, and
(iii) Carbon in wood products it is transferred to the atmosphere at about the same rate as dead wood in the forest, so there is no climate benefit from wood products;
(iv) Wood products represent a net source of carbon to the atmosphere, not a source of storage;
(v) The alleged benefits of wood as a substitute for steel and concrete is highly speculative and misleading and over-estimated;[85]

The Climate Analysis offers a flawed analysis of forest type conversions.
The Climate Analysis says that vegetation type conversion are a possible negative outcome of the no action alternative. The analysis is flawed because it fails to recognize that:

- type conversion may be unavoidable even with logging;
- logging might amplify type-conversion by retaining poorly adapted trees;

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[84] Heiken, D. 2010. Log it to save it? The search for an ecological rationale for fuel reduction logging in Spotted Owl habitat. Oregon Wild. V 1.0. May 2010. https://www.dropbox.com/s/pi15rap4nvwxhtt/Heiken_Log_it_to_save_it_v.1.0.pdf?dl=0.

[85] Moomaw et al 2020. Scientists Letter to Congress Urging Protection of Forests to Mitigate the Climate Crisis, May 13, 2020. https://96a.96e.myftpupload.com/wp-content/uploads/2020/05/200TopClimateScientistCongressProtectForestsForClimateChange13May20.pdf; Mark E Harmon 2019. Have product substitution carbon benefits been overestimated? A sensitivity analysis of key assumptions. Environ. Res. Lett. *in press* https://doi.org/10.1088/1748-9326/ab1e95;)." 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. Environmental Research Letters, Volume 14, Number 9. https://iopscience.iop.org/article/10.1088/1748-9326/ab28bb/pdf; 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.

- type conversion is a form of climate adaptation that might be highly beneficial;
- logging might interfere with type conversion and perpetuate poorly adapted vegetation types;

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.

The Climate Analysis fails to accurately describe the effects of no action compared to the logging alternative.
The Climate Analysis burdens the no action alternative with a "worst case scenario" fire. This is not a fair comparison. The Forest Service should also explain how ineffective fuel treatments are if conditions are windy, and the very low likelihood that fire benefits will be realized given the low probability that wildfire will interact with fuel treatments before fuels regrow.

The Climate Analysis needs to disclose that not logging allows trees to grow and continue sequestering carbon, that natural processes allows forest to adapt to climate change, and that natural processes allows the fit trees most fit for the current climate to survive and reproduce.

The Climate Analysis is arbitrary and capricious because it minimizes carbon emissions by comparing them to other scales, while failing to recognize the cumulative effects of incrementally more GHG emissions caused by this project.

The NEPA analysis must avoid minimizing this project's contribution to carbon emissions and global warming by saying the effects of this project would be negligible on a global scale. 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 agency may argue 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."[86]

[86] 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.[87] "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."[88] 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 cookie-cutter 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

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[87] 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.

[88] 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.

> 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." NEPA 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.[89]

Former D.C. Circuit Judge Wald wrote in a 1990 dissenting opinion, which was recently quoted with unanimous approval by the Ninth Circuit in Center *for Biological Diversity v. NHTSA*:

> [W]e cannot afford to ignore even modest contributions to global warming. If global warming is the result of the cumulative contributions of myriad sources, any one modest in itself, is there not a danger of losing the forest by closing our eyes to the felling of the individual trees?[90]

Similarly, the U.S. Supreme Court's decision in *Massachusetts v. EPA* noted that one cannot avoid responsibility to reduce and mitigate the climate problem by attempting to minimize the scale of one's contribution to the problem. ("While it may be true that regulating motor-vehicle emissions will not by itself reverse global warming, it by no means follows that we lack jurisdiction to decide whether EPA has a duty to take steps to slow or reduce it.... In sum, ... [t]he risk of catastrophic harm, though remote, is nevertheless real. That risk would be reduced to some extent if petitioners received the relief they seek."[91]

The 9th Circuit's ruling in *ONRC v Brong* is instructive:

> The BLM's attempt to dilute the effects of its proposed activities by averaging the snag retention over such a wide area is inconsistent with the NFP and improper under our precedent. See Pac. Coast Fed'n of Fishermen's Ass'ns v. Nat'l Marine Fisheries Serv., 265 F.3d 1028, 1035-37 (9th Cir. 2001) (holding that an agency cannot try to "minimize" the environmental impact of an activity by simply adopting a scale of analysis so broad that it marginalizes the site-level impact of the activity on ecosystem health).
> …

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[89] *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.

[90] 538 F.3d at 1217.

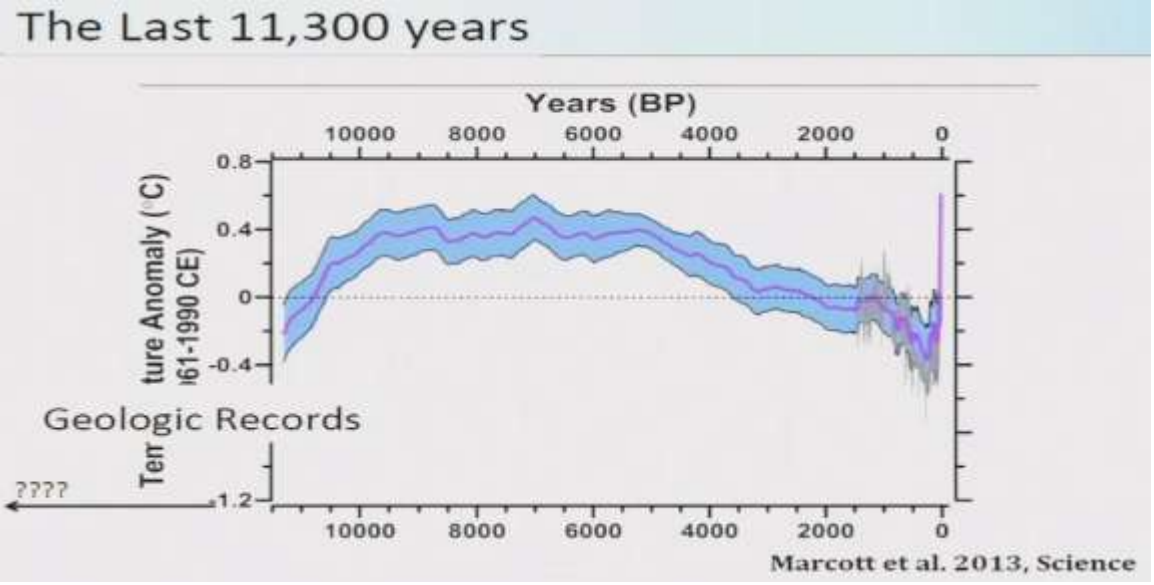
[91] 127 S.Ct. 1438, 1455 (2007) http://web.archive.org/web/20080610172128/http://www.supremecourtus.gov/opinions/06pdf/05-1120.pdf).

> In sum, we require an agency to "present a rational connection between the facts found and the conclusions made." Native Ecosystems, 418 F.3d at 960 (internal quotation marks omitted). The BLM's decision to preserve a baseline number of snags is insufficient in a fundamental way: it neglects to explain why the snag removal it does authorize, which undisputably harms late-successional habitat in the short term, will somehow maintain overall habitat suitability now or in the future, as expressly required by the NFP.[92]

Similarly, the agency may not minimize the effects of GHG emissions from logging by comparing this project's emissions to a baseline that makes them seem like these emissions are not significant, when in fact, all emissions are part of a cumulative problem with very significant effects.

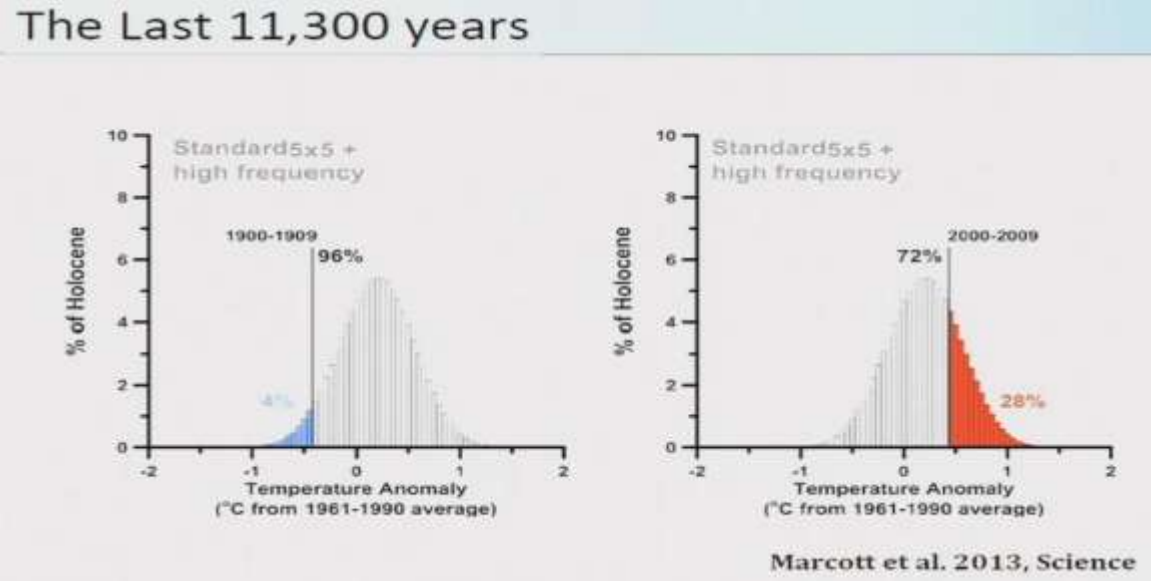
Trees Evolved with Climate Variability

The NEPA analysis needs to reflect the fact that trees are likely more adaptable than we give them credit for. While global temperatures have increased during the last 100 years, but they are not outside the range experienced by current forest tree species during the last 10,000 years. In fact, during the last 11,300 years, 28% of decades were warmer than the first decade of the 21st century (which was considered very warm by modern standards).[93]



[92] *ONRC Fund v. Brong*, 492 F.3d 1120, 1130 (9th Cir. 2007) https://www.sierraforestlegacy.org/Resources/Conservation/LawsPoliciesRegulation/RecentImportantCaseLaw/ONRCFundv.Brong.pdf.

[93] Shaun Marcott 2015. Pleistocene-to-modern Records of Climate Change, https://vimeo.com/138772308 *citing* SA Marcott, JD Shakun, PU Clark, AC Mix 2013. A reconstruction of regional and global temperature for the past 11,300 years. Science 339 (6124), 1198-1201 https://www2.bc.edu/jeremy-shakun/Marcott%20et%20al.,%202013,%20Science.pdf



This indicates a need for humility when designing projects to increase forest resilience. What trees are experiencing now is not necessarily far different from what they have experienced before. Trees carry the genes to adapt to a changing climate. We may not need to intervene, especially when it involves significant trade-offs such as degrading habitat and reducing carbon storage.

Milesi (2024):

> [W]e perform comparative population genomic analyses and demographic inferences for seven widely distributed and ecologically contrasting European forest tree species based on concerted sampling of 164 populations across their natural ranges. For all seven species, the effective population size, Ne, increased or remained stable over many glacial cycles and up to 15 million years in the most extreme cases. Surprisingly, the drastic environmental changes associated with the Pleistocene glacial cycles have had little impact on the level of genetic diversity of dominant forest tree species, despite major shifts in their geographic ranges. … [O]ur results indicate that forest trees have been able to retain their evolutionary potential over very long periods of time despite strong environmental changes.[94]

It is also important to recognize that the effects of climate change and drought on trees are highly complex, with many factors indicating reduced risk of mortality.

> Despite recent observational, experimental, and modeling studies suggesting increased vulnerability of trees to hotter drought and associated pests and pathogens, substantial debate remains among research, management and policy-making communities regarding future tree mortality risks. We summarize key mortality-relevant findings, differentiating between those implying lesser versus greater levels of vulnerability**. Evidence suggesting lesser vulnerability includes** forest benefits of elevated [CO2] and increased water-use efficiency; observed and modeled increases in

[94] Milesi, P et al. Resilience of genetic diversity in forest trees over the Quaternary. Nature Commun 15, 8538 (2024). https://www.nature.com/articles/s41467-024-52612-y.pdf; https://doi.org/10.1038/s41467-024-52612-y. See also, Shah, N., Wakabayashi, T., Kawamura, Y. et al. 2020. Extreme genetic signatures of local adaptation during *Lotus japonicus* colonization of Japan. Nature Communications 11, 253 (2020). https://doi.org/10.1038/s41467-019-14213-y https://www.nature.com/articles/s41467-019-14213-y.pdf.

> forest growth and canopy greening; widespread increases in woody-plant biomass, density, and extent; compensatory physiological, morphological, and genetic mechanisms; dampening ecological feedbacks; and potential mitigation by forest management. In contrast, recent studies document more rapid mortality under hotter drought due to negative tree physiological responses and accelerated biotic attacks. Additional evidence suggesting greater vulnerability includes rising background mortality rates; projected increases in drought frequency, intensity, and duration; limitations of vegetation models such as inadequately represented mortality processes; warming feedbacks from die-off; and wildfire synergies. Grouping these findings we identify ten contrasting perspectives that shape the vulnerability debate but have not been discussed collectively. We also present a set of global vulnerability drivers that are known with high confidence: (1) droughts eventually occur everywhere; (2) warming produces hotter droughts; (3) atmospheric moisture demand increases nonlinearly with temperature during drought; (4) mortality can occur faster in hotter drought, consistent with fundamental physiology; (5) shorter droughts occur more frequently than longer droughts and can become lethal under warming, increasing the frequency of lethal drought nonlinearly; and (6) mortality happens rapidly relative to growth intervals needed for forest recovery. These high-confidence drivers, in concert with research supporting greater vulnerability perspectives, support an overall viewpoint of greater forest vulnerability globally.[95]

The climate envelope tolerated by native trees may be larger than reflected in the environments that trees currently occupy.

> ... species' observed environmental tolerances, or realized niche, may be narrower than their potential niche if limited by dispersal, competition, or other biotic interactions. Laughlin and McGill investigated how much of their potential niches North American trees occupy by comparing temperature data from their native ranges with those from the arboreta where they have been planted around the world. Some species occupy almost all of their potential thermal niche, whereas others take up less than half.[96]

Retain and Restore Genetic Diversity of Trees

The NEPA analysis must recognize the significant unacknowledged risks involved when humans decide which trees live and which trees die. Natural mortality from drought, insects, and fire have shaped the genetic make-up of the forest for millennia, favoring more fit individuals and increasing the resilience of forest stands. Logging is a novel cause of mortality that does not favor the fittest individuals. The agency must carefully consider the consequences of logging that decouples mortality from fitness, survival and resilience. This is especially important in light of climate change. Conserving genetic and phenotypic diversity is important for climate adaptation.[97]

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[95] Allen, C. D., D. D. Breshears, and N. G. McDowell. 2015. On underestimation of global vulnerability to tree mortality and forest die-off from hotter drought in the Anthropocene. Ecosphere 6(8):129. http://dx.doi.org/10.1890/ES15-00203.1 https://esajournals.onlinelibrary.wiley.com/doi/epdf/10.1890/ES15-00203.1.

[96] Laughlin, D. C., & McGill, B. J. (2024). Trees have overlapping potential niches that extend beyond their realized niches. *Science*. https://doi.org/adm8671.

[97] Halofsky, J.E.; Peterson, D.L., eds. 2016. Climate change vulnerability and adaptation in the Blue Mountains. Gen. Tech. Rep. PNW-GTR-xxx. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. (Table 6.8e) http://adaptationpartners.org/bmap/docs/BMAP_final.pdf. Also, Matthew Reilly, 2018. Chapter 2: Climate, Disturbance, and Vulnerability to Vegetation Change in the Northwest Forest Plan Area.

A strategy to conserve genetic diversity would do two things: First, protect all old trees that have survived previous climate extremes. These legacy trees have already shown their fitness for survival. Protecting such trees might involve careful actions to reduce competition and ladder fuels in the immediate vicinity of those legacy trees. Second, let natural processes determine which of the younger trees are most fit to survive. Genetic fitness is not obvious even to the trained forester. Logging might inadvertently let the least fit survive and kill the trees with the most fit genes.

Old trees that are alive today are survivors. In the least 50 years, they have survived one of the wettest 20 year periods in more than 1,000 years, and one of the driest periods, now referred to as a megadrought. These survivors may be hard to replace and they deserve to be retained. "The 2000–2018 drought was preceded by the wettest 19-year period (1980–1998) in at least 1200 years. … [T]he 2000–2018 drought was on a megadrought-like trajectory throughout its development …"[98]

A careful study of trees' growth response to high temperatures tested two competing hypotheses, that trees exposed to high temperatures when young, were more adapted to high temperatues when older, versus, high temperatures experienced by trees when young resulted in cumulative damage when exposed to high temperatures when older.

> There is some adaptation among Douglas Firs to temperatures above 26°C (Figures S17–S19), among Ponderosa Pines to temperatures above 14°C (Figures S20 and S21), and weaker adaptation in Cfa to temperatures above 26°C (Figures S15 and S16), and among White Oaks to temperatures above 14°C (Figures S22 and S23). On average, a one standard deviation increase in the average incidence of high temperatures, corresponds to lower damage from those temperatures by 803% (45% after excluding outliers), 106%, 11% and 14% in each of those respective samples.
> …
> I find that many ecoregions are characterized by a non-linear response to temperature, where increases in temperature are neutral or slightly beneficial to growth up to a point, beyond which increases in temperature are harmful to growth.[99]

The agency must recognize that natural mortality provides an important ecological function – that is, it promotes evolutionary adaptation which is critical right now in the face of climate change.

> [R]esearchers were surprised to find that the mortality of established trees considerably promotes the adaptation of forests to the changing environment. … Evolution is promoted by the mortality of established trees. The researchers assumed that demographic characteristics of the trees would have a notable impact on their adaptability. Tree species differ for example so that birch matures at a considerably younger age than pine, and birch seeds spread more effectively than pine seeds.

Northwest Forest Plan Science Synthesis – Science Forum | Tuesday, June 26, 2018 | Portland, Oregon. https://docs.wixstatic.com/ugd/8f8000_08456f0927cb4aa88b18f341b3c7c435.pdf.

[98] A. Park Williams, et al. 2020. Large contribution from anthropogenic warming to an emerging North American megadrought. Science 368, 314–318 (2020). https://science.sciencemag.org/content/368/6488/314.

[99] Joséphine Gantois 2022. New tree-level temperature response curves document sensitivity of tree growth to high temperatures across a US-wide climatic gradient. Global Change Biology, Vol 28, Issue 20. https://doi.org/10.1111/gcb.16313.

> However, the results showed that these differences had only minor impacts. Instead, the mortality of established trees played a large role in the evolutionary adaptation.[100]

Importantly, for natural selection to occur, mortality must be caused by natural events like drought, insects, and fire, rather than through human choices about which trees will live and which will die. There is already evidence that this is happening.[101]

Biologist Derek Lee points out that

> … logging schemes are the latest in a series of Forest Service attempts to chainsaw their way out of a perceived problem. However, forests in the western United States have evolved to naturally self-thin uncompetitive trees through forest fires, insects, or disease. Forest fires and other disturbances are natural elements of healthy, dynamic forest ecosystems, and have been for millennia. These processes cull the weak and make room for the continued growth and reproduction of stronger, climate-adapted trees. Remaining live trees are genetically adapted to survive the new climate conditions and their offspring are also more climate-adapted, resistant, and resilient than the trees that perished. Without genetic testing of every tree in the forest, indiscriminate thinning will remove many of the trees that are intrinsically the best-adapted to naturally survive drought, fire, and insects.[102]

Another study shows that slower growing Ponderosa pine trees may be better adapted to survive drought. This might mean that logging prescriptions that favor removal of smaller trees might be making Ponderosa pine forests less resilient.

> Slow-growing ponderosa pines may have a better chance of surviving longer than fast-growing ones, especially as climate change increases the frequency and intensity of drought, according to new research from the University of Montana. … [A] key difference between fast and slow growers resides in a microscopic valve-like structure between the cells that transport water in the wood, called the pit membrane. The unique shape of this valve in slow-growing trees provides greater safety against drought, but it slows down water transport, limiting growth rate.[103]

The bottom line is that nature does a good job of picking trees that are fit for survival in a stressful world. Foresters cannot predict which trees will survive drought and insects, so they will kill some trees that are relatively more fit and retain trees that are relatively less fit. This

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[100] Northern forests do not benefit from lengthening growing season. UNIVERSITY OF HELSINKI. PUBLIC RELEASE: 12-JAN-2010. http://www.eurekalert.org/pub_releases/2010-01/uoh-nfd011210.php.

[101] Trugman et al (2020) found "evidence for coordinated shifts toward communities with more drought-tolerant traits driven by tree mortality…" Anna T. Trugman, Leander D. L. Anderegg, John D. Shaw, William R. L. Anderegg 2020. Trait velocities reveal that mortality has driven widespread coordinated shifts in forest hydraulic trait composition. Proceedings of the National Academy of Sciences. Mar 2020, 201917521; DOI: 10.1073/pnas.1917521117. https://www.pnas.org/content/early/2020/03/24/1917521117.

[102] Derek Lee. January 14, 2017. Blog post: Proposed Forest Thinning Will Sabotage Natural Forest Climate Adaptation and Resistance to Drought, Fire, and Insect Outbreaks. http://dereklee.scienceblog.com/34/proposed-forest-thinning-will-sabotage-natural-forest-climate-adaptation-and-resistance-to-drought-fire-and-insect-outbreaks/.

[103] University of Montana. June 18, 2019. Cell structure linked to longevity of slow-growing Ponderosa Pines. https://www.sciencedaily.com/releases/2019/06/190618174358.htm *citing* Beth Roskilly, Eric Keeling, Sharon Hood, Arnaud Giuggiola, Anna Sala. Conflicting functional effects of xylem pit structure relate to the growth-longevity trade-off in a conifer species. Proceedings of the National Academy of Sciences, 2019; 201900734 DOI: 10.1073/pnas.1900734116.

indicates that natural mortality will lead to greater forest resilience, while logging will lead to reduced forest resilience.

> **e360**: So by trying to fix the problem, we sometimes only make it worse.
> **Six**: As humans, we have this feeling that if something goes awry, we need to fix it, and that somehow we can. I don't think that we necessarily always know what needs to be done, or that when we do apply management that we are always actually doing the right thing. Sometimes we just need to realize that nature can sort itself out perhaps better than we can.
> ...
> [M]odels assume that the forest is genetically homogenous, that everything is the same. And they are not. I suspect that there is a lot more genetic variability out there that will allow for more adaptation and greater persistence than we currently anticipate.
>
> **e360**: You are suggesting that evolution will kick in and help to a degree?
> **Six**: If we let it. If we don't go out and replant with stock that may not be genetically correct, if we don't thin or cut down trees that may have been selected by beetles or drought to survive. We have to get smart about how we are treating our forest if we're going to help nature's process of adaptation to proceed.[104]

A press release from the University of Montana says:

> A University of Montana researcher has discovered that mountain pine beetles may avoid certain trees within a population they normally would kill due to genetics in the trees.
>
> UM Professor Diana Six made the discovery after studying mature whitebark and lodgepole trees that were the age and size that mountain pine beetle prefer, but had somehow escaped attack during the recent outbreak.
>
> After DNA screening, survivor trees all contained a similar genetic makeup that was distinctly different from the general population that were mostly susceptible to the beetle.
>
> "Our findings suggest that survivorship is genetically based and, thus, heritable," Six said, "which is what gives us hope."
> ...
> "Our results suggest that surviving trees possess a wealth of information that can be used to inform our understanding of the genetic and phenotypic bases for resistance and to develop management approaches that support forest adaptation," Six said.[105]

The study cited above, Six et al. (2018), said:

> We found that surviving mature trees in a high elevation forest of whitebark and lodgepole pine were genetically distinct from "general population" trees that were assumed to represent the genetic structure of the population pre-outbreak and without selection by the beetle. In line with our hypothesis, a low percentage (<10%) of

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[104] Richard Shiffman interview with Diana Six. 04 JAN 2016: INTERVIEW- How Science Can Help to Halt The Western Bark Beetle Plague http://e360.yale.edu/content/feature.msp?id=2944

[105] PUBLIC RELEASE: 16-AUG-2018. UM Researcher discovers genetic differences in trees untouched by mountain pine beetles. THE UNIVERSITY OF MONTANA https://www.eurekalert.org/pub_releases/2018-08/tuom-urd081618.php

> "survivor" genotypes were identified within the general population. ... We found surprisingly high levels of differentiation between survivor and general population trees in both species of pine. ... With climate change supporting the invasion of aggressive bark beetles into naïve forests, and predictions of more frequent and severe outbreaks, it is increasingly important to understand the capacity of trees to adapt and persist (Millar et al., 2007; Ramsfield et al., 2016). ... While the massive mortality of pines in western North America in recent years is cause for concern, we should also look at these hard-hit forests as opportunities to learn. In almost all cases, affected forests are not completely dead–they retain many living large diameter trees. If these trees are genetically different than those selected and killed by the beetles as our study suggests, these trees may aid in *in situ* adaptation and persistence. They may also be key to developing management and trajectories that allow for forest adaptation. For example, retaining surviving trees as a primary seed source, rather than removing them during salvage operations could support *in situ* adaptation. In contrast, the effects of natural selection in these stands could be instantly negated by clearcutting or replanting with general seed stock. Supporting forest adaptation is critical in this time of rapid change (Millar et al., 2007). Given the great expanses of forest that are being affected by climate change and the fact that most will need to adapt *in situ*, it is imperative we begin to move past structural approaches to consider the genetic capacity of forest trees to adapt. The high degree of standing genetic variation found in most forest trees indicates many will have considerable ability to adapt. We need to be cognizant of adaptation that is occurring so that our management approaches act to support rather than hinder natural selection for traits needed under future conditions.[106]

George Wuerthner often reminds public land managers that

> ... there is significant genetic variation in individual trees, and thinning the forest can reduce the genetic diversity of the remaining stand, in effect, reducing its "resilience" and the ability of the forest ecosystem to adapt to changing conditions.
> [Studies] show that ponderosa pine seedlings have tremendous variation in their adaptation to drought and mature trees ability to fend off bark beetles. Under natural conditions, the beetles and drought would [selectively] eliminate the trees without these adaptations. But the average forester with his or her paint gun marking trees has no idea of the genetic makeup of the trees they are logging. Yet I do not even hear any sense of caution from the collaborative about this matter. They are of the belief that logging creates resilience. In fact, it impoverishes the forest ecosystem.[107]

In a Sept 2023 guest column in the Bend Bulletin, George Wuerthner said:

> We are told that chain saw medicine treatments aim to reduce large, high-severity wildfires and enable trees to survive insects, drought and disease.

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[106] Six, Diana L.; Vergobbi, Clare; Cutter Mitchell. 2018. Are Survivors Different? Genetic-Based Selection of Trees by Mountain Pine Beetle During a Climate Change-Driven Outbreak in a High-Elevation Pine Forest. Frontiers in Plant Science 9(993). https://doi.org/10.3389/fpls.2018.00993; https://www.frontiersin.org/articles/10.3389/fpls.2018.00993/full.

[107] Wuerthner, George. 3-28-2017 Email to Deschutes Collaborative via Vernita Ediger, *citing* Kolb, T.E., Grady, K.C., McEttrick, M.P., and A. Herrero 2017. Local-Scale Drought Adaptation of Ponderosa Pine Seedlings at Habitat Ecotones. For. Sci. 62(6), pp.641-651. http://dx.doi.org/10.5849/forsci.16-049 ("The large amount of phenotypic variation within populations suggests the potential for future evolution of stress tolerance...") and Pinnell, Sean, 2016. MS Thesis: "Resin Duct Defenses In Ponderosa Pine During A Mountain Pine Beetle Outbreak: Genetic Effects, Mortality, And Relationships With Growth" (2016). Paper 10709. http://scholarworks.umt.edu/cgi/viewcontent.cgi?article=11753&context=etd. ("Analyses at both the phenotypic and genetic levels indicated that drought significantly predisposed some trees and families to mortality ...").

> The problem is that the above are the evolutionary factors that have maintained "healthy" forest communities for millennia. In a sense, these evolutionary agents select which trees are best adapted to current conditions (not some past historical situation that no longer exists).
> To quote the poet, Roberson Jeffers, "What but the wolf's tooth whittled so fine. The fleet limbs of the antelope?" It is the same for our forests — wildfire, drought, insects and disease are whittling the woodlands to withstand present and future challenges just as wolves select the least fit elk or deer for their prey, improving the species' overall genetic health.[108]

Studies show that forests have a natural ability to weed out trees that are less likely to survive and retain trees that are more likely to survive, so that forests become progressively more resilient to stress over time. Logging can interfere with this process by choosing the *wrong* trees for removal and retention.

> Some forests take one-two punches surprisingly well. Researchers have shown that certain California forests exposed to two successive droughts weathered the second one much better than forests only hit by the later dry period. Given that the frequency and severity of droughts is increasing with climate change, the findings suggest that forested regions might fare better than predicted in the future… Norlen and Goulden speculate that the first drought eliminated trees weakened by pests like bark beetles, or perhaps that the dry conditions prompted trees to protect themselves by growing deeper roots. Those changes would have helped protect the remaining trees from future droughts, Goulden says. 'You effectively have a stronger population.'[109]

Note also, Pinnell (2016) found that fast growing trees are not necessarily more fit to survive drought and insects. ("I found no evidence of a resin duct defense-growth tradeoff. … [F]aster growing families did not suffer lower mortality.") Foresters often identify stands for thinning based on their growth rate as measured by annual growth rings/inch, and they identify trees for retention based on observed vigor and form. This study indicates that these factors may not be associated with resistance to mortality. Again, foresters think they are improving forest resilience, but they may be removing trees that are more fit, and retaining trees that are less fit, leaving more ill-fitting genes in the stand to reproduce and leaving the stand less resilient over the long term.

Black (2005):

> Generally speaking, outbreaks of beetles can facilitate the development of a forest that is structurally, genetically and compositionally more diverse (Axelson et al., 2009) and therefore perhaps less prone to subsequent beetle attack (Amman, 1977). Thus, despite

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[108] https://www.bendbulletin.com/opinion/guest-column-chainsaws-are-not-medicine-for-our-forests/article_645dafa2-50c9-11ee-beaa-1bc53c575f52.html

[109] Katherine Kornei 2023. Surviving a drought may help forests weather future dry spells - After a drought, California's forests withstood a second one surprisingly well. ScienceNews. JUNE 9, 2023 https://www.sciencenews.org/article/drought-forests-trees-weather-future *citing* C.A. Norlen and M.L. Goulden. Recent Tree Mortality Dampens Semi-Arid Forest Die-Off During Subsequent Drought. AGU Advances. Published online May 17, 2023. doi: 10.1029/2022AV000810, https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2022AV000810; and X. Jiang et al. Projected Future Changes in Vegetation in Western North America in the Twenty-First Century. Journal of Climate. 2013. doi: 10.1175/JCLI-D-12-00430.1, https://journals.ametsoc.org/view/journals/clim/26/11/jcli-d-12-00430.1.xml.

> causing mortality of many individual trees, outbreaks can also play a critical role in ecosystem processes (Berryman, 1982).[110]
>
> Epidemics of forest insects and pathogens have always occurred, and the selective killing of susceptible trees tends to increase overall stand fitness (Haack and Byler 1993). Spruce budworm, for example, may help maintain ecosystem health by selectively killing weaker, genetically inferior trees and thus increasing resistance to future outbreaks (Alfaro et al. 1982).
> ...
> Mountain pine beetle epidemics are part of a natural boom-and-bust cycle (Amman 1977). Large populations of beetles selectively kill large numbers of the most susceptible trees. Killing these trees facilitates the development of a forest that is structurally, genetically, and compositionally more diverse and therefore less prone to beetle attack in the long run (Amman 1977).[111]

Climate change is driving natural selection, but we will interfere in that process by choosing the winners and losers instead of letting natural mortality do it.

> From 2012 to 2016, drought and bark beetles killed more than 129 million trees in California, most of them conifers in the Sierra Nevada. On the drier, south-facing slopes on this basin's north side, sugar pines were hit especially hard as mountain pine beetles attacked the water-starved trees, tunneling through their bark until many of them died.
>
> "You had literally side-by-side sugar pines, one alive, one dead," said UC Davis forest biologist Patricia Maloney.
>
> But it's not the dead trees that interested Maloney. It's the survivors.
>
> She wanted to know how they managed to stay healthy and green despite experiencing the same parched conditions that killed their neighbors. She thinks it has to do with innate characteristics that gave them a selective advantage over their peers.
>
> Maloney is now leading an effort to plant thousands of seedlings descended from drought-surviving sugar pines from around Lake Tahoe, hoping they carry genes that make them more resilient to drought, waning snowpack and other effects of global warming.
>
> ... [S]he sees hope in the genetic variation in local populations that allows some trees to survive while others succumb to drought and other environmental threats.
>
> "I think what we're witnessing is contemporary natural selection. Species have been evolving for millions of years, we've just hastened the pace with climatic change and

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[110] Black, S. H., D. Kulakowski, B.R. Noon, and D. DellaSala. 2010. Insects and Roadless Forests: A Scientific Review of Causes, Consequences and Management Alternatives. National Center for Conservation Science & Policy, Ashland OR. http://www.geosinstitute.org/images/stories/pdfs/Publications/RoadlessAreas/FireandBugReport.pdf.

http://www.xerces.org/wp-content/uploads/2010/03/insects-and-roadless-forests1.pdf

[111] Black, S.H. 2005. Logging to Control Insects: The Science and Myths Behind Managing Forest Insect "Pests." A Synthesis of Independently Reviewed Research. The Xerces Society for Invertebrate Conservation, Portland, OR. http://www.xerces.org/wp-content/uploads/2008/10/logging_to_control_insects1.pdf *citing* Amman, G.D. 1977. The role of the mountain pine beetle in lodge pole pine ecosystems: Impact of succession.

In *The Role of Arthropods in Forest Ecosystems: Proceedings in the Life Sciences,* W.J. Mattson, ed. Pp. 3–18. New York: Springer–Verlag. https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1110&context=barkbeetles

drought," Maloney explained. "Let nature and evolution in some way run its course, but we can assist in its regeneration. There is promise in these survivors. So let's work with what we have."

... Sally Aitken, a professor of forest genetics at the University of British Columbia [said] "The raw material of natural selection is genetic diversity. Increase diversity and you increase the chances of survival. It's a way of hedging your bets."
...
After the drought ended, in 2017, [Maloney] and her team selected 100 of these surviving sugar pines to be mothers to a new generation. They studied, cored and examined the rings of a portion of those trees and learned they all had at least one thing in common: They used water more efficiently than their deceased neighbors.

That ability can be passed along to the next generation, Maloney said. But they probably have other advantageous traits that she wants to study, such as when they time their spring growth, how massive their roots are and what chemicals they send out from their resin that might attract or repel beetles.
...
The 1859 discovery of the Comstock Lode in Virginia City, Nev., sparked a silver rush and a logging boom, with trees felled and ferried by raft, water flume and rail to supply lumber to the mines. Loggers cut down so many sugar pines, Maloney's research has found, that in some locations their genetic diversity suffers to this day.[112]

New information on Snags

The NEPA analysis needs to account for significant new information about snag habitat and the effects of logging. Dynamic ecosystems historically included large-scale mortality events both pulsed and continuous. Mortality and biomass accumulation are natural and desirable ecological processes that forest management has been working for decades to capture, suppress, and avoid. Large snags are severely under-represented in our forests and logging will capture, reduce and delay recruitment of future large snags. Korol et al (2002) estimated that even if we 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.[113]

Wisdom et al (2008) found that snag abundance in the Pacific northwest forests is inversely related to past harvest and proximity to roads.

> "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

[112] TONY BARBOZA 2019. In the Sierra, scientists bet on 'survivor' trees to withstand drought and climate change. LA Times 11-18-2019. https://www.latimes.com/california/story/2019-11-18/sierra-trees-climate-change-adaptation-lake-tahoe.

[113] 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.

harvest. Stands not adjacent to roads had almost 3 times the density of snags as stands adjacent to roads.")[114]

The 2008 FIA Report for Oregon found:

> "In general, wildlife species that use dead wood for nesting, roosting, or foraging prefer larger diameter logs and snags (>20 inches). Although we tallied dead wood in this size class throughout Oregon, the estimated density may not be sufficient for some wildlife species. For example, inventory results show a mean of almost 3 snags per acre in this size class in western Oregon and 1 per acre in eastern Oregon. This may indicate that large-diameter snags are currently uncommon in Oregon habitat and that management may be necessary to produce a greater density of large snags."[115]

The Forest Service does not know how many snags are necessary to support viable populations of cavity associated species. The Forest Service has provided no credible link between DecAID tolerance levels, potential population levels, and/or viable populations. The Forest Service has also failed to reliably quantify existing and projected habitat for snag associated species.

An unavoidable impact of all commercial logging is to "capture mortality" which reduces valuable snag habitat in the short-term (via hazard tree felling) and in the long-term (via delayed recruitment and reduced overall recruitment). Hazard tree assessments should be conducted before units are cut to minimize cutting that undermines ecological goals. If hazard tree removal would in fact undermine those ecological goals, those units should be dropped or prescriptions otherwise changed.

The federal forest agencies now recognize that current methods and assumptions concerning snag habitat standards are outdated, and the old snag standards do not ensure enough snags to meet the intent of the standard, yet the agencies have not adjusted their management plans to account for this new information nor have they developed new standards that are consistent with the latest scientific information.

Rose et al (2001) explained several problems with the agency's approach to snag management:

> **Lessons Learned During the Last Fifteen Years**
>
> …
>
> Several major lessons have been learned in the period 1979-1999 that have tested critical assumptions of these earlier management advisory models:

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[114] 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

[115] Donnegan, Joseph; Campbell, Sally; Azuma, Dave, tech. eds. 2008. Oregon's forest resources, 2001–2005: five-year Forest Inventory and Analysis report. Gen. Tech. Rep. PNW-GTR-765. Portland, OR: U.S. Forest Service, Pacific Northwest Research Station. 186 p. http://www.fs.fed.us/pnw/publications/gtr765/pnw-gtr765b.pdf

- Calculations of numbers of snags required by woodpeckers based on assessing their 'biological potential' (that is, summing numbers of snags used per pair, accounting for unused snags, and extrapolating snag numbers based on population density) is a flawed technique. Empirical studies are suggesting that snag numbers in areas used and selected by some wildlife species are far higher than those calculated by this technique.[226]
- Setting a goal of 40% of habitat capability for primary excavators, mainly woodpeckers,[369] is likely to be insufficient for maintaining viable populations.
- Numbers and sizes (dbh) of snags used and selected by secondary cavity-nesters often exceed those of primary cavity excavators.
- Clumping of snags and down wood may be a natural pattern, and clumps may be selected by some species, so that providing only even distributions may be insufficient to meet all species needs.
- Other forms of decaying wood, including hollow trees, natural tree cavities, peeling bark, and dead parts of live trees, as well as fungi and mistletoe associated with wood decay, all provide resources for wildlife, and should be considered along with snags and down wood in management guidelines.
- The ecological roles played by wildlife associated with decaying wood extend well beyond those structures per se, and can be significant factors influencing community diversity and ecosystem processes.[116]

As explained on the DecAID website:

> **Why is DecAID needed?**
> National Forest LRMP standards and guidelines for management of snags and down wood in the Pacific Northwest were based on wildlife species models and tools that were developed in the 1970s and 1980s (Thomas et al. 1979, Neitro et al. 1985, Marcot 1992, Raphael 1983). New information about the ecology, dynamics, and management of decayed wood has been published since then, and the state of the knowledge continues to change. Rose et al. (2001) report that results of monitoring indicate that the biological potential models are a flawed technique (page 602). There has been an evolution from thinking of large woody material as habitat structures, to thinking of decaying wood as an integral part of complex ecosystems and ecological processes.

[116] 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

> This paradigm shift has made the management of dead wood a much more complex task. We can no longer expect to go to our LRMPs or the biological potential model to get one number for the amount or size of snags and down wood that we can apply to all projects and to all acres. We are directed to use the best available science to manage ecosystems, and the best available science simply will not support business as usual for managing dead wood.[117]

The Forest Service has not addressed the identified deficiencies in its snag standards. The agency cannot provide any assurance that its plans and projects will assure viable populations of native wildlife that depend on dead trees. The recently amended Eastside Screens changed the requirements for snag habitat in a way that offers no assurances of population viability. The new snag standards basically requires *some* snags for *some* wildlife, while failing to ensure there are *enough* snags for wildlife that are *most sensitive* to logging and the resulting absence of abundant snags.

Disclose, Weigh, and Mitigate Trade-offs

Land management inevitably involves trade-offs among competing uses of the public lands. NEPA requires consideration of these trade-offs.[118] Trade-offs should be disclosed, and alternatives should be developed to resolve trade-offs in different ways. In the Morgan Nesbit Project, some of the significant trade-offs that need to be carefully considered include:

- Soil disturbance and habitat degradation from logging steep slopes;
- Soil degradation, erosion, water pollution, loss of wood recruitment, loss of shade and wildlife cover from logging in sensitive areas such as RHCAs and undeveloped areas,
- Removing too much basal area via commercial logging will adversely affect wildlife cover and snag recruitment that are beneficial for species like marten, goshawk, and pileated woodpecker,
- The different effects of commercial logging as a restoration tool (with heavy equipment, roads, and removal of valuable habitat trees) compared to non-commercial thinning and prescribed fire,
- regen harvest that sets back successional development processes and fails to retain and recruit LOS components,
- removal of canopy trees in shaded fuels breaks will adversely modify microclimate, reduce fuel moisture, stimulate growth of hazardous surface and ladder fuels, and exacerbate roads as a barrier to wildlife crossings,

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[117] Region 6 - USDA Forest Service. A Guide to the Interpretation and Use of the DecAID Advisor. June, 2006. http://www.fs.fed.us/r6/nr/wildlife/decaid-guide/

[118] *California v. Block*, 690 F.2d 753, 771 (9th Cir. 1982) (NEPA was designed to "ensure that an agency is cognizant of all the environmental trade-offs that are implicit in a decision").

- road construction required by commercial logging will cause long-term adverse effects on soil, vegetation, water, etc. – any temporary roads must be made genuinely impassable following use to minimize these adverse effects
- commercial logging will emit significant greenhouse gases that exacerbate global climate change and reduce forest resiliency.

The agency must avoid portraying the effects of the proposed action in uniformly positive terms, while describing the effects of no action in uniformly negative terms.

When the agency uses commercial logging to meet restoration goals, the NEPA analysis needs to clearly disclose to what extent optimal restoration outcomes are being sacrificed in order to "make units pencil out," ensure "operational feasibility," and/or produce timber volume. For instance, OSU Scientist and Oregon Board of Forestry member Brenda McComb says "For species that select early successional stages of forest, such as deer, rabbits, hares, and quail, production of timber and production of these species is highly compatible. And tradeoffs are few. But for species that select habitat elements found more frequently in stands [sic] and landscapes that represent conditions beyond typical rotation ages for timber production, there are tradeoffs between providing habitat through management and income from products …."[119]

It is often the case that optimal restoration calls for retention of more trees, especially commercial-sized trees, that serve a variety of ecosystem services. Retaining optimal levels of medium and large trees –

- Provides habitat for wildlife that depend on (i) relatively dense forests and/or (ii) abundant snags and dead wood;
- Stores carbon that helps moderate global climate change;
- Enhances recreational/scenic values;
- Suppresses the growth of weeds and hazardous ladder fuels and reduces future maintenance costs associated with removing non-commercial in-growth; and
- Provides cool/moist microclimate buffering that benefits wildlife, recreation, and moderates fire hazard;

Removing trees to meet timber objectives sacrifices all these values. The agency needs to carefully disclose the extent to which these public values are sacrificed in order to achieve timber volume objectives. Clearly disclosing such trade-offs helps the public provide informed comment, and helps achieve the informed decision-making requirements of NEPA. It also furthers the requirements of NEPA related to:

- "… To determine the scope of environmental impact statements, agencies shall consider … 3 types of alternatives, …. They include: … (b) Alternatives, which include: (1) No action alternative. (2) Other reasonable courses of actions. (3) Mitigation measures (not in the proposed action)."[120]
- "Federal agencies shall to the fullest extent possible: … (e) Use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment. (f)

[119] 7-20-2020 email from Brenda McComb to ForestWildlifeHabitatSeminars email list.

[120] 40 CFR §1508.25.

Use all practicable means, consistent with the requirements of the Act and other essential considerations of national policy, to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions upon the quality of the human environment."[121]

- "Study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources."[122]
- "The discussion [of environmental consequences] will include the environmental impacts of the alternatives including the proposed action, any adverse environmental effects which cannot be avoided should the proposal be implemented, the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented"[123]

NEPA requires disclosure of the trade-offs among competing uses.

Project-level planning and implementation pursues management activities in accordance with forest plans to enhance flows of particular ecosystem services—to improve a specific fish or wildlife population, for example, or reduce the likelihood that natural disturbance (e.g., wildfire) might adversely affect flows of ecosystem services. However, many ecosystem services and the associated landscape conditions from which they derive are interrelated in either conflicting or synergistic ways such that changes in one service necessarily involve changes in another service. In some cases, increased flows of one service may only be possible by accepting decreased flows of another service. Evaluating and communicating expected management outcomes necessarily must account for these interrelationships and the tradeoffs—the exchange of one level of service for another—made necessary when implementing a project that will affect multiple ecosystem service flows.

Conceptually, tradeoffs among ecosystem services are best illustrated by using the economic concept of "production possibility frontiers" (e.g., Bowes and Krutilla 1989: 49, Stevens and Montgomery 2002). Production possibility frontiers show the combinations and levels of ecosystem services that can be produced on a landscape given that landscape's capacity to produce those services (e.g., its size and biophysical features) and management inputs (e.g., labor) and capital improvements (e.g., roads, trails, culverts).

…

Understanding the production possibilities for a given landscape enables managers to identify and weigh the possible output combinations that might be expected on a given landscape, and may make it more feasible to avoid unnecessary tradeoffs.

…

Another important step in evaluating forest management tradeoffs is characterizing how valued ecosystem services are likely to change in response to management activities under consideration. … Ideally, analysis of the likely outcomes of landscape management would be based on credible scientific information linking expected changes in ecosystem services to specific changes in landscape conditions and processes resulting from proposed plans and projects. The quantity and quality of scientific information available for evaluating management effects in this way can differ depending on how well

[121] 40 CFR §1500.2.

[122] 40 CFR §§1501.2(c), 1507.2(d), 42 USC § 4332(2)(E).

[123] 40 CFR §1502.16, 42 USC § 4332(2)(C). https://www.energy.gov/sites/prod/files/NEPA-40CFR1500_1508.pdf

particular ecosystem processes are understood and how well they can be described by ecologists and biophysical scientists as changes in ecosystem services.
... [M]any economists refer to a need for ecological production functions (e.g., Polasky 2008) that link the production of a given ecosystem service in space and time to landscape conditions and processes necessary to its production. ...
Whether dealing with empirical data and models or qualitative data and narratives, evaluating and communicating expected management outcomes calls for managers to (1) identify key landscape conditions that affect the quantity and quality of valued ecosystem services; (2) characterize key relations between those landscape conditions and the levels of ecosystem services produced; and (3) describe the degree of uncertainty in the data and models used to predict management outcomes. This process includes describing the spatial and temporal aspects of expected outcomes.[124]

Pollock et al. (2004):

> [W]hile specific structural attributes of forest ecosystems have been correlated with certain species, it is uncertain how such species will respond to treatments designed to recreate these features. There is always the possibility that in our attempt to create a structural attribute we think is important, we eliminate another attribute that is equally important, but unrecognized. One example is that attempts to restore spotted owl habitat by heavily thinning to accelerate the development of large diameter nesting trees could actually delay spotted owl recovery by reducing production of the large down wood utilized by the species it preys upon (Forsman et al., 1984; Carey, 1995; North et al., 1999). Similarly, heavily thinning stands to accelerate the development of marbled murrelet nesting trees also create open stands with a dense understory that is ideal habitat for a number of corvid species that prey on marbled murrelet nest eggs (USFWS, 2010). Riparian thinning efforts to create long-term supplies of very large diameter instream wood that can initiate complex wood jam formation (e.g., key pieces) are also likely to reduce the supply of large diameter wood that will create pools (Beechie and Sibley, 1997; Beechie et al., 2000; Fox and Bolton, 2007). Thus, we suggest that any efforts to actively restore riparian forests for the benefit of certain species should be treated as scientific experiments and proceed cautiously, skeptically, and with robust pre- and post-treatment data collection efforts. Hypothesized effects of thinning on riparian forest structure and the use of that structure by targeted species should be tested against empirical data.[125]

The agency should look for tools to help illuminate and transparently resolve trade-offs. "An integrated planning process focuses on multiple-objective planning rather than single-objective planning from the beginning of the project. It favors a transparent and interactive process that offers opportunities for understanding ecosystem complexity, stakeholder positions, and clear articulation of decision trade-offs and benefits."[126] Chapter 7 of this document highlights the

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[124] Kline, Jeffrey D.; Mazzotta, Marisa J. 2012. Evaluating trade-offs among ecosystem services in the management of public lands. Gen. Tech. Rep. PNW-GTR-865. Portland, R: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 48 p. http://www.fs.fed.us/pnw/pubs/pnw_gtr865.pdf.

[125] Pollock, Michael M. and Timothy J. Beechie, 2014. Does Riparian Forest Restoration Thinning Enhance Biodiversity? The Ecological Importance of Large Wood. Journal of the American Water Resources Association (JAWRA) 50(3): 543-559. DOI: 10.1111/jawr.12206. http://oregon-stream-protection-coalition.com/wp-content/uploads/2014/07/Pollock-and-Beechie.-2014.-Riparian-thinning-and-biodiversity.pdf.

[126] Jain, Theresa B.; Battaglia, Mike A.; Han, Han-Sup; Graham, Russell T.; Keyes, Christopher R.; Fried, Jeremy S.; Sandquist, Jonathan E. 2012. A comprehensive guide to fuel management practices for dry mixed conifer forests in

importance of clearly articulated project objectives, quantitative metrics defining success across multiple objectives, "a format to display the benefits and trade-offs among the metrics…," and a clearly articulated rationale linking treatment prescriptions to desired objectives.

Sometimes the agency must weigh competing values that are hard to compare, such as local economic values versus the broader impacts of global climate change, or impacts to habitat values that are already rare. This will require careful analysis with clear and compelling rationale rooted in law, policy, economics ethics, etc., not hand-waving. Importantly, the FS Handbook FSH 1909.15 Chapter 43.21 requires that Decision Notices describe "How … considerations were weighed and balanced in arriving at the decision."

Spies et al. (2006): "[F]uel-reduction activities may have undesirable environmental effects (e.g., the need for periodic treatments, introduction of weeds, soil disturbance, or maintenance of some roads)."[127]

Another potentially useful framework for weighing trade-offs among ecosystem services (such as timber production and biodiversity) is presented by Cavender-Bares et al. (2015):

> Similar to Bator's 1957 article, 'The simple analytics of welfare maximization,' which sought to provide a coherent unified treatment of welfare economics that was widely accessible, we sought to provide a coherent unified and clear treatment of ecosystem service trade-offs in the context of sustainability. We did so in a series of steps that (1) defined the biophysical constraints of the system in the form of an efficiency frontier, (2) combined the values of stakeholders and the efficiency frontier, (3) examined temporal lags and intergenerational inequalities, and (4) incorporated thresholds and nonlinear system dynamics. … Our sustainability framework emphasizes the ecological processes underlying the production of ecosystem services that contribute to human well-being. This emphasis complements the work of economists on "inclusive wealth " (Hamilton and Clemens 1999, Dasgupta and Mäler 2000, Heal 2000, Arrow et al. 2004, 2012). Inclusive wealth is a measure of the value of all capital assets, i.e., manufactured, human, social, and natural capital, with value reflecting the contribution of the asset to providing benefits both now and in the future. To be sustainable, inclusive wealth should be nondeclining, so that future generations have bundles of assets that are of equal or greater value than the value of current assets. The advantage of the inclusive wealth approach is that it offers a clear and simple criterion for sustainability with a comprehensive and global scope (Cavender-Bares et al. 2013). … The process of developing a study in the context of the sustainability framework as we have outlined it is a valuable exercise (cf. Ewing and Runck 2015, Grossman 2015, Mastrangelo and Laterra 2015; P. Balvanera, F. Mora, A. Castillo, and J. Trilleras, unpublished manuscript, M.). It untangles the known from the perceived, makes transparent disparate viewpoints and underlying assumptions of stakeholders, and clarifies the information base that stakeholders rely on for informing themselves about the system. Moreover, it identifies the data gaps so that stakeholders can make more informed decisions about the most appropriate intervention for an area, given social and biophysical constraints (Grossman 2015; P. Balvanera, F. Mora, A. Castillo, and J. Trilleras, unpublished manuscript). The process itself, however, may be more valuable than any immediate outcome of the

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the northwestern United States. USDA Forest Service Gen. Tech. Rep. RMRS-GTR-292. 2012 https://www.fs.usda.gov/rm/pubs/rmrs_gtr292.pdf.

[127] Spies, Thomas A.; Hemstrom, Miles A.; Youngblood, Andrew; Hummel, Susan. 2006. Conserving old-growth forest diversity in disturbance-prone landscapes. Conservation Biology. 20(2): 351-362. http://www.fs.fed.us/pnw/pubs/journals/pnw_2006_spies001.pdf.

> analysis. As such, the framework has the potential to contribute to a participatory approach (E. G. King, J. Cavender-Bares, T. Mwampamba, P. Balvanera, and S. Polasky, unpublished manuscript) that builds trust, common ground, and the working environment needed to address ecological problems in a way that can secure long-term commitment to resolving them, which is a necessary building block for sustainability. Ultimately, an integrated social-ecological analysis of the trade-offs among ecosystem services and their dynamics through time is necessary to assess how close or far we are from attaining sustainability.[128]

Yang et al (2015) created a framework linking ecosystem services to human welling being. They "used *net benefits* rather than *gross benefits* to allow the indices to capture both [ecosystem services] and disservices, account for costs associated with provision of [ecosystem services], consider trade-offs and synergies between different [ecosystem services], and facilitate cross-context comparisons (Yang et al. 2013b)."[129] In this framework, the benefits of ecosystem services provided by wood products would be adjusted to reflect the costs of water pollution, loss of biodiversity, and carbon emissions , and other values associated with logging.

Consider All Reasonable Alternatives.

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. Scoping comments included numerous suggestions for alternative approaches that would better meet project objectives, resolve trade-offs, or mitigate adverse environmental effects. Alternatives include: avoid logging steep slopes, avoid commercial logging in sensitive areas such as RHCAs and undeveloped areas, retain more basal area to mitigate adverse effects on wildlife cover and snag recruitment that are beneficial for species like marten and goshawk, reduce reliance on commercial logging as a restoration tool and rely more on non-commercial thinning and prescribed fire, avoid regen harvest, retain canopy trees in shaded fuels breaks, minimize road construction, reduce greenhouse gases emissions by retaining more trees, etc.

Oregon Wild offered a reasonable alternative in our scoping comments. We urge the agency to consider it in the final EA or DEIS. "The agency can minimize and mitigate the adverse impacts and avoid unnecessary conflict if the preferred alternative focuses on areas where there is broad public agreement. Specifically:

- consider and implement of a broad suite of non-commercial restoration activities, instead of emphasizing log extraction with all its trade-offs;
- complete a robust analysis, data collection, field work, and monitoring that is in line with the complexity, diversity, and importance of this landscape;
- retain all large trees (>21" dbh) regardless of age and all old large trees regardless of size;
- avoid commercial logging in unroaded areas >1,000 acres, RHCAs, and steep slopes;

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[128] Cavender-Bares, J., S. Polasky, E. King, and P. Balvanera. 2015. A sustainability framework for assessing trade-offs in ecosystem services. Ecology and Society 20(1): 17. http://dx.doi.org/10.5751/ES-06917-200117; http://www.ecologyandsociety.org/vol20/iss1/art17/.

[129] Yang, W., T. Dietz, D. B. Kramer, Z. Ouyang, and J. Liu. 2015. An integrated approach to understanding the linkages between ecosystem services and human well-being. Ecosystem Health and Sustainability 1(5):19. http://dx.doi.org/10.1890/EHS15-0001.1; http://onlinelibrary.wiley.com/doi/10.1890/EHS15-0001.1/epdf.

- avoid regen logging (shelterwood and patch cuts);
- avoid road construction, including temporary roads, except very short spur roads;
- strategically close roads to restore the natural range of variability of large blocks of habitat;
- avoid log hauling during wet weather;
- limit fuel breaks to non-commercial thinning of small fuels within 150 feet from roads; retain canopy trees to moderate the microclimate, retain fuel moisture, reduce slash production, suppress growth of future surface and ladder fuels, and reduce maintenance costs;
- retain and recruit abundant snags and dead wood for the diverse wildlife and ecological functions that benefit from abundant dead wood; and
- retain enough basal area of medium and large trees to perpetuate natural processes, including the mortality processes associated with insects and disease, competition, etc."

The Climate Analysis repeatedly relies on the Blue Mountains Climate Change Vulnerability and Adaptation in the Blue Mountains Region (Halofsky and Peterson 2017), hereafter CCVA. This document has not gone through NEPA review, and this EA only considers one action alternative based on these recommendations. There may be unexplored alternatives, such as greater reliance on non-commercial thinning without roads and prescribed fire, that achieve similar or better outcomes with fewer trade-offs. The Climate Analysis admits that the effects of road construction are decidedly counter to climate resilience, but the analysis concludes they are a necessary evil without considering alternatives.

The CEQ regulations specifically require that Environmental Assessments shall follow the alternatives language in NEPA. "Environmental Assessment": ... (b) Shall include brief discussions of the need for the proposal, of alternatives as required by sec. 102(2)(E), of the environmental impacts of the proposed action and alternatives ..."[130]

The "alternatives provision" of NEPA applies whether an agency is preparing an EIS or an EA and requires the agency to give full and meaningful consideration to all reasonable alternatives.[131]

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."[132] NEPA also requires the agency to "study, develop, and describe appropriate alternatives to the

[130] 40 CFR § 1508.9

[131] 42 U.S.C. § 4332(2)(E); *Native Ecosystems Council v. U.S. Forest Service,* 428 F.3d 1233, 1245 (9th Cir. 2005); *see Bob Marshall Alliance v. Hodel*, 852 F.2d 1223, 1229 (9th Cir. 1988) (The alternatives requirement is triggered where unresolved conflicts as to the proper use of resources exist, whether or not an EIS is required). *Te-Moak Tribe v. Interior, 608 F.3d 592, 601-602 (9th Cir. 2010)* ("Agencies are required to consider alternatives in both EISs and EAs and must give full and meaningful consideration to all reasonable alternatives.")

[132] 40 C.F.R. § 1500.2(e).

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]."[133]

It is not enough to consider just one action alternative as in the Morgan Nesbit EA. Environmental analysis documents must "[r]igorously explore and objectively evaluate all reasonable alternatives" to the project.[134] 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."[135] 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."[136] 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."[137] 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."[138]

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.[139] The Ninth Circuit stated in *California v. Block* that "[a]s with the standard employed to evaluate the detail that NEPA requires in discussing a decision's environmental consequences, the touchstone for our inquiry is whether an EIS's selection and discussion of alternatives fosters informed decision-making and informed public participation."[140]

The purpose of the multiple alternative analysis requirement is to insist that no major federal project be undertaken without intense consideration of other more ecologically sound courses of action, including shelving the entire project, or of accomplishing the same result by entirely different means.[141]

Other courts have stated that in order to comply with NEPA, "the discussion of alternatives 'must go beyond mere assertions' and provide sufficient data and reasoning to enable a reader to

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[133] 40 C.F.R. § 1501.2 (c).

[134] 40 C.F.R. § 1502.14(a).

[135] 40 C.F.R. § 1502.14.

[136] *Id.* § 1502.14.

[137] *Id.* § 1500.8(a)(4).

[138] *Id.*

[139] 42 U.S.C. §§ 4331, 4332(2)(E); 40 C.F.R. § 1508.9(b). *See also Robertson v. Methow Valley Citizen's Council*, 490 U.S. 332, 349 (1989).

[140] *California v. Block*, 690 F.2d 753, 767 (9th Cir. 1982).

[141] *Environmental Defense Fund v. Corps of Engineers*, 492 F.2d 1123, 1135 (5th Cir. 1974); *Methow Valley Citizens Council v. Regional Forester*, 833 F.2d 810 (9th Cir. 1987), *rev'd on other grounds*, 490 U.S. 332 (1989) (agency must consider alternative sites for a project). The Ninth Circuit has concluded that "the existence of a viable but unexamined alternative renders an environmental impact statement inadequate." *Alaska Wilderness Recreation & Tourism v. Morrison*, 67 F.3d 723, 729 (9th Cir.1995).

evaluate the analysis and conclusions and to comment on the EIS."[142] A detailed and careful analysis of the relative merits and demerits of the proposed action and possible alternatives is of such importance in the NEPA scheme that it has been described as the "linchpin" of the environmental analysis. For this reason, the discussion of alternatives must be undertaken in good faith; it is not to be employed to justify a decision already reached. *Id*.

"An alternative may not be disregarded merely because it does not offer a complete solution to the problem."[143] As one court explained, "[o]bviously, any genuine alternative to a proposed action will not fully accomplish all of the goals of the original proposal. One of the reasons that Congress has required agencies to set out and evaluate alternative actions is to give perspective on the environmental costs, and the social necessity, of going ahead with the original proposal."[144]

The agency often says that removing medium and large trees is often necessary to ensure a viable timber sale even though the same medium and large trees need to be retained for late successional forest habitat characteristics, dead wood recruitment, to suppress the growth of ladder fuels, and to maintain a cool-moist microclimate that helps mitigate fire hazard. These conflicts were brought to light in PNW Science Findings #85 "requiring landscape treatments to earn a profit negatively impacted both habitat and fire objectives".[145] When economic objectives conflict with ecological objectives and fire hazard objectives, the agency is obligated to consider NEPA alternatives such as reallocating funds within the agency's existing budget or asking Congress for additional appropriations to allow the agency to better balance competing objectives.[146]

"The existence of a viable but unexamined alternative renders an EA inadequate."[147] When the agency clearly has independent knowledge of specific issues or concerns, "there is no need for a commenter to point them out specifically in order to preserve its ability to challenge a proposed action."[148]

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[142] *Citizens Against Toxic Sprays v. Bergland*, 428 F. Supp. 908, 933 (D. Or. 1977).

[143] *Id.*

[144] *Town of Matthews v. United States Dept of Transp.*, 527 F. Supp. 1055, 1058 (W.D.N.C. 1981).

[145] Thompson, Jonathan; Stevens Hummel, Susan. 2006. Seeing the bigger picture: landscape silviculture may offer compatible solutions to conflicting objectives. Science Findings 85. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 5 p https://www.fs.usda.gov/pnw/sciencef/scifi85.pdf.

[146] Center of Biological Diversity v. Rey, (9th Circ, May 14, 2008) http://web.archive.org/web/20081018102407/http://www.ca9.uscourts.gov/ca9/newopinions.nsf/BBADBE769F43A66D88257449005521AE/$file/0716892.pdf.

[147] *Western Watersheds v. Abbey*, 719 F.3d. at 1050. *North Idaho Cmty. Action Network*, 545 F.3d at 1153 (both EA and EIS must consider all reasonable alternatives, but EIS must provide more detail and analysis of those alternatives).

[148] Id. at 765; *'Ilio'ulaokalani Coal. v. Rumsfeld*, 464 F.3d 1083, 1093 (9th Cir. 2006); see *Friends of the Clearwater v. Dombeck*, 222 F.3d 552, 559 (9th Cir. 2000) ("Compliance with NEPA is a primary duty of every federal agency; fulfillment of this vital responsibility should not depend on the vigilance and limited resources of environmental plaintiffs").

Each substantive issue discussed in these comments should be (i) incorporated into the purpose and need for the project, (ii) used to develop NEPA alternatives that balance tradeoffs in different ways, (iii) carefully analyzed and documented as part of the effects analysis, and (iv) considered for mitigation.

Please post to the project website, links to all relevant ESA and EFH consultation documents, RMPs, watershed analyses, and other supporting documents relied on in the NEPA analysis.

Please post to the project website before the public comment period, georeferenced maps of the proposed activity units that can be used to navigate in the field using apps such as Avenza.

If the agency discovers new information or changed circumstance or modifies the project or the analysis after the decision, Oregon Wild requests to be notified and provided an opportunity to comment.

Note: If any of these web links in this document are dead, they may be resurrected using the Wayback Machine at Archive.org. http://wayback.archive.org/web/

Sincerely,

Doug Heiken (he/him)
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/s/ Amy Stuart
Central Oregon Bitterbrush Broadband / Great Old Broads for Wilderness

/s/ Mathieu Federspiel
Juniper Group / Oregon Chapter Sierra Club

/s/ Chris Krupp
WildEarth Guardians

/s/
David Mildrexler
Eastern Oregon Legacy Lands