BLUE MOUNTAINS BIODIVERSITY PROJECT'S NOTICE OF OBJECTION, STATEMENT OF ISSUES AND LAWS, AND REQUESTED REMEDIES

NOTICE OF OBJECTION

May 2nd, 2024

Forest Supervisor, Reviewing Officer
Shane Jeffries
Ochoco National Forest
3160 NE 3rd Street
Prineville, OR 97754

RE: Blue Mountains Biodiversity Project's objection to the Ochoco National Forest Mill Creek Dry Forest Restoration Project Draft Decision Notice and Environmental Assessment

Dear Objection Reviewing Officer,

Blue Mountains Biodiversity Project (BMBP) hereby formally submits the following objections to the Ochoco National Forest Project Mill Creek Dry Forest Restoration Project Environmental Assessment and Draft Decision Notice. BMBP has secured the right to submit objections and thereby participate in the pre-decisional administrative review process for this project. BMBP has submitted timely written scoping comments regarding this project and extensive comments on the Draft Environmental Assessment, including field survey sheets and photographs from our surveying the affected area for weeks.

Decision Document
Mill Creek Dry Forest Restoration Project Final Environmental Assessment and Draft Decision Notice

Date Decision published
March 19th, 2024

Responsible Official
Slater R. Turner, District Ranger, Lookout Mountain Ranger District, Ochoco National Forest

Description of the Project
The Ochoco National Forest Service has selected Alternative 4 Modified, including the following proposed management actions. Therefore, this objection focuses on Alternative 4 Modified, as specified in the Draft Decision Notice.
Alternative 4 Modified includes:
*Ground-based commercial thinning of trees less than 21" DBH on 7,397 acres, followed by non-commercial thinning and fuels treatment.
*Helicopter thinning of trees less than 21" DBH on 352 acres.
*Biomass thinning on 1,182 acres, followed by fuels treatment.
*Non-commercial thinning only on 4,432 acres, followed by fuel treatment.
*Prescribed underburning or hand-piling and underburning only on 4,268 acres.
*Riparian restoration and floodplain enhancement on 23 miles of stream channel.
*Closure or decommissioning of about 6 miles of road; opening of 1 mile of road; and reinforcement of road closures at about 26 locations.
The modifications to Alternative 4 from what is described in the final EA are as follows:

*Tree cutting and harvesting would be limited to trees under 21" DBH for all species.
*The skyline and helicopter commercial thinning units identified in the EA for Alternative 4 are reduced to 352 acres of helicopter thinning with this draft Decision. Small portions of the skyline units were incorporated into ground-based units where feasible.

*Thinning within RHCAs is reduced: noncommercial thinning reduced to 774 acres and commercial thinning and biomass thinning to 58 acres.
*Four areas totaling about 25 acres will be fenced along Mill and East Fork Mill Creeks to exclude livestock.

The Draft Decision Notice also includes further detailed descriptions of the selected Alternative 4 Modified, which can also be found in various sections of the Mill Creek Project Environmental Assessment.

Location

The Mill Creek Dry Forest Restoration Project is northeast of Prineville, Oregon. From the EA: The vicinity map shows that the project is located on the Lookout Mountain Ranger District of the Ochoco National Forest in central Oregon. This 36,430 acre project area encompasses the entire Mill Creek watershed and a small portion of Ochoco Creek watershed and McKay Creek watershed in Crook County, Oregon. The area is used for livestock grazing allotments and also offers recreational opportunities such as hiking and equestrian trails, dispersed and developed camping, and the Steins Pillar Recreation Area. The Mill Creek Wilderness covers about 36% of the project area. Private inholdings totaling 130 acres are not included in the project area acre figure.

Appellant's Interests

Blue Mountains Biodiversity Project has a specific interest in this decision, which has been expressed through participation throughout the NEPA process. BMBP supporters visit much of the affected area for hiking; camping; fishing; relaxing; bird-watching; wildlife observation; wild flower viewing; nature photography; hunting; and more. The value of the activities engaged in by BMBP volunteers, supporters, and staff would be damaged by the implementation of this project.

BMBP is a non-profit organization that works to protect Eastern Oregon National Forests. Staff, volunteers, and supporters of BMBP live in various communities surrounding the Ochoco National Forest and use and enjoy the Forest extensively for camping; hiking; drinking water; hunting; fishing; general aesthetic enjoyment; gatherings; viewing flora and fauna; gathering forest products; and other purposes, such as solar eclipse viewing.

Request for meeting

BMBP requests a meeting with the Forest Service to discuss matters in this objection and seek resolution of concerns through negotiation before the Ochoco Forest Service makes a final decision on the Mill Creek Dry Forest Restoration Project (aka Mill Creek Project).

Specific issues addressed in this objection

- NEPA (National Environmental Policy Act) violations, including: proposing actions inconsistent with achieving the stated purpose and need for the project; failure to provide an adequate range of alternatives; failure to adequately analyze direct, indirect, and cumulative impacts of the project; failure to disclose scientific controversy; and inaccurate use of the science.

- Violations of the National Forest Management Act (NFMA) and the Ochoco Forest Plan, including failure to provide for population viability for multiple Management Indicator species and other wildlife species and violations of the Ochoco Forest Plan.
- Potential violations of the Ochoco National Forest Plan include violations of management area guidance and Forest Plan standards, including INFISH/PACFISH requirements and Northern goshawk protections under the Eastside Screens; violations of Management Areas guidance for Wildlife Connectivity Corridors; Developed recreation; and visual corridors; and Forest Plan standards for elk and deer hiding cover; scenic values; snag and down wood density/abundance; and impacts to soils.
- Endangered Species Act violations include contributing to a trend toward federal uplisting for the following species: Threatened-listed Gray wolf; potential Threatened-listed Canada lynx and wolverine; Sensitive Columbia Spotted frog; Sensitive Redband trout; and various Sensitive-listed plants known to be or suspected to be within the project area.
- Clean Water Act violations include failure to demonstrate that the proposed actions will not further impair or retard water quality recovery for streams still on the 303(d) list for water quality impairment (e.g. for stream temperature and/or lack of flow) or with TMDLs and water quality management plans.

- We also express concerns regarding “temporary” road construction and closed road re-opening, and potential impacts to climate stability.

BMBP objects to the Mill Creek Project for the following reasons:

I. The Mill Creek project violates the National Environmental Policy Act

The Mill Creek project violates the National Environmental Policy Act in the following ways: inconsistency with the stated “purpose and need” of the project; failure to provide an adequate range of alternatives; failure to adequately analyze direct, indirect, and cumulative impacts of the project; failure to take the requisite “hard look” at project impacts required by NEPA; failure to disclose scientific controversy; and inaccurate use of the science.

Inconsistency with the stated purpose and need of the project

The Mill Creek project is not consistent with all the purpose and need goals as expressed in the Environmental Assessment. The Mill Creek project EA includes the following statements that constitute the purpose and need for the Mill Creek project on EA pages 2 and 3:

“Purpose and Need for Action
Increase Resilience to Insects, Disease, Fire, and Drought
Forested stands in the project area are at high risk to experience impacts from multiple types of disturbances, including from insects, disease, fire and drought. The current species composition, stand structures, and density of forested stands are different than they once were historically on this landscape.” (See details of these conditions on EA p. 2.)
“Enhance and Restore Stream Channels and Riparian Areas
Within the Mill Creek watershed, the decline in salmonid production has been due to the degradation of instream habitats, including water quality and quantity/attenuation of high flows, from road construction, past timber harvest, grazing management, and stream cleanout activities. More information can be found in the Hydrology section as well as the full Aquatics Report (Appendix F in particular).
There is a need to improve habitat conditions necessary to support healthy populations of Redband trout (*Oncorhynchus mykiss gairdneri*) and improve the watershed’s resiliency to changing climatic conditions. The purpose of the proposed action is to improve the attainment of Riparian Management Objectives over the long term, including large woody debris, and subsequently pools and spawning gravels, reconnect the floodplain to attenuate high flows and recharge the local water table, and increase riparian hardwood vegetation along tributaries of Mill Creek.
Supply Timber and Wood Products
An objective of the project is to contribute wood products and restoration work to the local and regional economy. The Forest Plan calls for providing the production of quality wood products in a manner consistent with other resource objectives, environmental constraints, and economic efficiency.
Align Road Maintenance Levels with Travel Management Plan
An interdisciplinary travel analysis process identified objective maintenance levels for the roads in the project area. Minor proposed changes to the roads in the project are for the purpose of managing the transportation system to support access to private inholdings, eliminate unnecessary spur roads, and reduce fragmentation.” (EA p. 3)

The need for action should be based on current habitat conditions within the project area, which we field-surveyed and documented in our survey sheets, incorporating our field survey sheets and photographs of conditions on the ground as part of our comments.

Examples of our comments on the inconsistency of proposed management actions with the stated purpose and need for the Mill Creek project:

Re: Purpose and Need for Action:

This is far too fast for a timber sale rotation, with the FEIS for the Mill Project Timber Sales having prepared a FEIS and Record of Decision in 1999, with the logging taking place there after—up to 10 years or more later. So this new Mill Creek timber sale would have a decision less than 25 years since the last comprehensive timber sale decision in the same area! Repeated timber sales on short rotations with heavy equipment use will just further degrade soil productivity, wildlife habitat, and water quality, and make future regeneration very difficult, with additional ecological processes poorly functioning. (BMBP p. 1, par. 1)

See Comment 10, summarizing our 2 comments above on EA Appendix C Consideration of Public Comments, p. 351. See also the Forest Service response to our comments (#10) regarding the very recent Mill Creek Timber sale, with 1,417 acres of commercial thinning overlapping the current Mill Creek timber sale proposed, as a source of cumulative long-term impacts. The Forest Service response to our comments summarized in Comment 27 (EA p. 356), they note that: "Stand re-entry is recommended at approximately 20 years in the LRMP." This is a completely unsustainably short timber sale rotation if this refers to returning to the logged area 20 years later to commercially log again. 20 years after the mature tree logging generally looks like the Forest Service "desired condition" they were trying to attain for the purpose and need for the last timber sale, with not enough time for significant increase in mature trees and in mature tree larger sizes. This is why we equate such fast timber sale rotations, combined with heavy commercial logging to very low basal areas on a landscape scale, as forest liquidation, severely degrading forest conditions rather than increasing forest resiliency, which is contrary to the stated purpose and need for the Mill Creek Project.

The Mill Creek area is already in an existing condition of already having been extensively thinned and still being mostly wide open from recent past logging. The existing condition is probably congruent with the "desired future condition" determined by the Forest Service at the time, with variable density and more open stands. However, there are also many obvious impacts from the recent logging, such as unregenerated skid trails, no significant re-growth except for small (< 9" dbh) and pole-sized trees, and missing mature and large, old trees evident in lots of stumps. It's far too soon to be logging again (while we are not assuming that it should ever be logged again), as the forest is still recovering from the relatively recent logging with not enough time elapsed between timber sales for trees to grow much larger or for young trees to grow into mature trees. Where greater density exists, it is in retention patches of young, small trees (probably for hiding cover) with more vigorous growth in naturally denser moist mixed conifer. See our field survey sheets and sample photos that document existing conditions in commercial sale units. (BMBP comments, p. 1, par. 3)

Addressing the Purpose and Need bullet points:

The absence of Ponderosa pine stands of large trees were greatly diminished by logging, which should not be repeated. Planning to log Ponderosa pine up to 21" dbh, as planned, would perpetuate the loss of large Ponderosa pine stands by preventing mature pines from growing into large and old Ponderosa pine. This would be contrary to the purpose and need re: correcting "departures" from "more sustainable historic conditions".

Since: "Many stands, which were once dominated by large trees, have been replaced by stands in which pole and/or small sized trees are most common", the sensible management action to reduce any excess tree density would be to thin only small and pole-sized trees to remedy the loss of large trees, since there aren't that many mature and large trees left from past logging. The mature and large size classes are not dense. (BMBP comments on p. 1, par.s 4 & 5)

See the Forest Service response to our comment summary #27 of our comments in the paragraph above. The Forest Service acknowledges that: "Current conditions in the project area show in-growth in the seedling, sapling, and pole and small sawtimber sizes common in many areas. Many of the stands do need the smaller understories tree thinned out, but also have overly dense conditions in trees greater than 10" DBH." (FS response, pp. 355-356, underlining emphasis ours.) Note that we are recommending that the upper limit of commercial thinning should be 14" dbh, not 10" dbh in young plantations, which allows for observed density reduction. Our comment characterizing stands as "wide open" refers to the big gaps in mature and large trees throughout most of the sale area—i.e. 15" dbh and larger—due to past logging.

Re: "Climate change may exacerbate the stress to late seral and less-drought tolerant species", this is a good reason to not log mature and large trees critically needed for carbon sequestration and storage to reduce or slow extreme climate change effects. (BMBP comments, p. 2)

Re: The Purpose and Need statement for *Enhance and Restore Stream Channels and Riparian Areas*:

Re: Key Issue #2: Vegetation Management in Riparian Habitat Conservation Areas and Potential Impacts to Streams, FEA p. 8:

We are strongly opposed to commercial logging and roading in RHCAs. We shared the concerns of other commenters: "Commenters question the need for these activities and expressed concern about potential impacts to shade and stream temperature, sedimentation, turbidity, bank stability, and future large wood recruitment. Commenters also questioned the distinction between upper and lower RHCA vegetation." (Final EA p. 8). We knew the differences between upper and lower RHCAs while commenting on the importance of the entire RHCA drainage being unlogged and not having biomass removed, in order to retain moisture through tree shading and down wood retention, which affect micro-climate cooling and moisture levels. Protected transitional and upland adjacent RHCA zones are still important for preserving shading, cooling, and moisture retention in the drainage, as well as for maintaining slope stability to reduce excess sedimentation in streams and recruitment of large wood for pools over time.

Re: FEA p. 3:

While we're all in favor of ecologically sound riparian restoration, more logging, road re-opening, "temporary" road construction, and heavy equipment use in RHCAs and on steep slopes above drainages will only exacerbate existing problems that caused currently degraded riparian conditions.

We are strongly opposed to commercial logging, closed road re-opening, heavy biomass removal, and heavy equipment use within RHCAs.

Logging and roading in RHCAs as planned would defeat the purpose of the proposed action as stated in par. 2 on EA p. 3. (BMBP comments, p. 2)

Another timber sale in the Mill Creek area this soon and with such intensity as planned in alternatives 3 and 4 would <u>not</u> provide "the production of quality wood products in a manner consistent with other resource objectives [and] environmental constraints", as logging on such a short rotation in already open, thinned forest and logging large trees and logging on steep slopes would not protect wildlife habitat for species associated with greater forest density, large tree structure, or blocks of security habitat. Logging in RHCAs and on steep slopes would threaten Sensitive Redband trout and Columbia Spotted frog viability, as well as Sensitive plants, impair water quality, and deplete water retention. These impacts represent failure to meet resource objectives and to defer to environmental constraints as required by the Forest Plan. (See FEA p. 3, 3rd par.) Logging on steep slopes in the absence of abundant mature and large trees due to past logging would not be economically efficient. (BMBP comments, p. 2, 2nd to last par.)

Our additional comments on inconsistency between the stated purpose and need and proposed management actions can be found in our comments on the EA, p. 1, par. 2; p. 2, par. 3.

<u>Resolution</u>

BMBP has commented on its objection to the Ochoco National Forest's (ONF) Mill Creek EA in comments (see quotes and citations above.) More of our comments on this objection include:

We request that, to be consistent with the purpose and need for the project, conditions on the ground, and restoration goals, that the Forest Service:
*Reduce the scale and intensity of planned logging overall by dropping logging of mature trees (e.g. 15" dbh to 21" dbh) that would otherwise be next in line to become future large trees and restore large trees to the landscape.
*Reduce the logging impacts to forest resiliency and structure and to maintain heterogeneous conditions and greater biodiversity. Decrease the number of commercial logging sale units by dropping commercial logging in all moist mixed conifer, any cold dry Lodgepole pine forest, and in old growth and Late and Old Structure forest. See our survey sheets for guidance as to the best wildlife habitat in sale units, according to our characterization of conditions and our recommendations to drop or modify sale units.
* We are largely not opposed to the Forest Service reducing <u>smaller</u> tree density in even-aged Ponderosa pine plantations (see our survey sheets) but we want the Forest Service to stay out of all mixed conifer LOS except for some noncommercial-size thinning up to 6-9" dbh and prescribed burning for dry forest types.
* Increase basal area retention in remaining sale units and leave more patches of diverse tree species and density within sale units for greater variability across the landscape

*Drop sale units that are most used by wildlife, including species dependent on large trees and large or abundant snags such as MIS primary cavity excavators and for wildlife needing greater levels of security cover, such as Northern goshawk, Rocky Mt. elk, and Mule deer.
*Confine any commercial logging to young, dry Ponderosa pine-dominant dry forest plantations.
*Drop the remaining planned commercial logging within RHCAs. Don't ignite fires within the RHCAs but allow fires to back into the RHCAs. Limit non-commercial thinning to areas where there is clear competition from conifers where riparian hardwoods exist or historically existed. Don't fell any conifers stabilizing stream banks or felling conifers that would remove too much shading of the streams to meet stream shading standards.
*Drop all remaining proposed steep slope logging, by all methods: cable yarding, tethered, or helicopter logging. None of the steep slope logging is likely to be economical and all of it threatens slope stability, soil integrity and productivity, and often excess sedimentation of streams, contrary to Riparian Management Objectives and likely to degrade water quality and fish habitat below or downstream.

Specific BMBP comments suggesting remedies to the proposed alternative being inconsistent:
with the stated Purpose and Need for the Mill Creek project include:
In this case, density management can be accomplished just by non-commercial thinning up to 9" dbh and through prescribed burning in truly dry, Ponderosa pine dominant forest types.
Just implementing non-commercial thinning of small trees up to 9" dbh and prescribed burning in the dry forest types would take care of fire risk reduction. (BMBP comments, p. 2)

Another timber sale in the Mill Creek area this soon and with such intensity as planned in alternatives 3 and 4 would not provide "the production of quality wood products in a manner consistent with other resource objectives [and] environmental constraints", as logging on such a short rotation in already open, thinned forest and logging large trees and logging on steep slopes would not protect wildlife habitat for species associated with greater forest density, large tree structure, or blocks of security habitat. Logging in RHCAs and on steep slopes would threaten Sensitive Redband trout and Columbia Spotted frog viability, as well as Sensitive plants, impair water quality, and deplete water retention. These impacts represent failure to meet resource objectives and to defer to environmental constraints as required by the Forest Plan. (See EA p. 3, 3rd par.) Logging on steep slopes in the absence of abundant mature and large trees due to past logging would not be economically efficient.

Failure to provide an adequate range of alternatives

The Mill Creek Draft Environmental Assessment had an inadequate range of alternatives. However, we greatly appreciate the scaling down of the Mill Creek proposed timber sale from alternatives 3 and 4 to alternative 2 levels, and the cancelling of plans to log large trees, as well as specifically scaling down commercial logging in RHCAs and scaling down commercial logging on steep slopes. This was in response to multiple forest protection organizations' shared concerns. Yet we were clear in our comments on the Draft EA that we were opposed to any commercial logging in the RHCAs and on steep slopes, both of which pose much greater ecological degradation to riparian area functions and processes, which are supposed to be protected under the Purpose and Need for the Mill Creek Project.

Foreseeable risks to the stream system includes increased risk of erosion and landslides, potential excess sedimentation of streams that would harm fish species, and increased ground disturbance on sensitive hydric soils in RHCAs. Commercial logging on the steep slopes would result in more detrimental soil impacts and increased introduction and dispersal of invasive plants that could affect Sensitive plant populations in riparian areas in particular. Yet the new version of alternative 4 that is now proposed rather stubbornly retains some of the commercial logging in RHCAs even though the effects would be highly detrimental to meeting Riparian Management Objectives, which is part of the stated purpose and need.

Likewise, still incorporating steep slope logging doesn't make sense, as it would not be economical and would increase detrimental soil impacts on already very marginal soils with little plant cover on the steep slopes, which portends likely significant erosion and sedimentation of stream drainages that could harm Redband trout downstream. Redband trout are already verging on local extirpation of the population due to the loss of water flow in Mill Creek over multiple months every year. Logging in the RHCAs and on the steep slopes above the stream system drainages could potentially lead to uplisting of Sensitive Redband trout to Threatened status, since uplisting is based on cumulative losses of populations. The Redband trout is already designated as Sensitive, which means that it is already in decline as a species.

We also strongly opposed any commercial logging in Old Forest Preserves. It is not clear that the proposed alternative under the Draft Decision would eliminate commercial logging in Old Forest Preserves or logging and roading in undeveloped lands.

Our concerns regarding an inadequate range of alternatives included the key issues discussed above and clear statements in our comments that we wanted an alternative without logging on steep slopes and within RHCAs. See our comments on this below:

"After eliminating large tree logging, logging on steep slopes, and increased timber volume from high intensity logging that is much higher than the scoped alternative 2, then we could negotiate on the basis of alternative 2. We strongly oppose any commercial logging in RHCAs, as in alt. 2. We strongly oppose any commercial logging in Old Forest Preserves. We strongly oppose logging and roading in undeveloped lands. If logging in RHCAs, Old Forest Preserves, and Undeveloped lands were dropped, then we could negotiate over scaling down the foot print of alternative 2 by dropping commercial logging in the already minimal amounts of moist mixed conifer forest, including all the old growth moist mixed conifer sale units. We would also ask for already open stands to be dropped from commercial logging and for the sale units with the best wildlife habitat that we found while surveying to be dropped. We would also request that all "temporary" road construction be abandoned and that closed roads that are not maintained for seasonal use not be re-opened. Overall, there also needs to be more dense forest areas left for density-associated wildlife, such as Northern goshawk, Pileated woodpecker, Rocky Mountain elk, American marten, Mule deer, and Cooper's hawk. Some of these remedies could overlap with each other." (BMBP comments, p. 6, par. 2)

So we are still concerned that there is an inadequate range of alternatives, since the planned logging in Old Forest Reserves and undeveloped lands has not been dropped from the proposed alternative, and not all of the logging in the RHCAs and on steep slopes was dropped in the proposed alternative 4 Modified, even though such logging is contrary to the purpose and need statement for the Mill Creek Project. We also said in our comments that we wanted an alternative that would not open so many miles of closed roads and construct so many miles of "temporary" roads, as well as listing Management Areas that shouldn't be managed. See our EA comments below that specify more critical management degradation would be avoided in the proposed alternative. While scaling back the timber sale logging, this should also reduce the amount of closed road mileage that would not be re-opened and there should be fewer "temporary" roads constructed. However, the reduction in road mileage of opened closed roads and of construction of "temporary" roads was not clear in the Draft Decision.

There was also no indication as to whether Old Growth Management Areas, the Steins Pillar Recreation Area, and undeveloped lands would still be logged or roaded under alternative 4 Modified. These are very important concerns for us. Commercial logging in the Old Growth Management Areas and the Steins Pillar Recreation Area may violate Forest Plan standards. Undeveloped lands need to be protected from logging and roading since there are very few areas left as natural forest for wildlife and reference conditions for science to inform adaptive management, as well as for primitive recreation and indigenous people's cultural uses.

Our comments below support this objection and indicate our goals for objection negotiations:

"Alternatives and Project Design not Considered in Detail:

The suggested alternatives or project design criteria that were not considered in detail that should have been considered in detail included restrictions on logging large Grand fir, not conducting logging and biomass reduction within Riparian Habitat Conservation Areas, including more road closures and decommissioning, and avoiding management actions within certain Management Areas. We are strongly opposed to commercial logging, closed road re-opening, and "temporary" road construction within RHCAs. We are strongly opposed to logging large Grand firs and other large trees =/> 21" dbh. We are deeply concerned that most or all of the 54 miles of roads closed previously would now be re-opened and used again, with the consequent extensive negative impacts. Funding should be sought for decommissioning all existing closed roads that are not maintained for seasonal use. We are strongly opposed to any commercial logging and re-opening of closed roads or building "temporary" roads in Old Growth Management Areas, the Steins Pillar Recreation Area, RHCAs, and undeveloped lands. Our further comments on these Management Areas, logging large trees, and road construction and re-opening can be found in other sections of our comments." (BMBP comments, p. 7, par. 3)

Our other comments on an inadequate range of alternatives in the EA can be found on BMBP comment pages: p.6, par.s 3 & 4 and p. 7, par. 2.

Resolution

BMBP has commented on its objection to the ONF's inadequate range of alternatives in the Mill Creek Environmental Assessment and requested a broader range of alternatives in our comments. See our comments quoted and cited above.

To remedy this problem, the Forest Service would either have to reissue a new Environmental Impact Statement offering a full range of alternatives as required by NEPA for public review and comment, or better meet our concerns expressed in related comments as follows:
*Reduce the overall scale of commercial size logging (of mature trees)—already improved in the proposed alternative. The following remedies to resolve our objection would scale down the timber sale more.
*Drop all commercial logging and/or road construction or re-opening within RHCAs—already scaled down by the proposed alternative 4 Modified. However, any logging and road work in RHCAs is contrary to the riparian part of the purpose and need for this project and also contradicts the best available science.
*Drop all steep slope logging, which is also contrary to the purpose and need for this project.
*Drop all commercial logging and/or road re-opening or construction in undeveloped lands.
*Drop all commercial logging and any road re-opening or construction in Old Growth Management Areas.
*Drop all commercial logging and any road re-opening or construction in the Steins Pillar Recreation Area.
*Modify proposed logging intensity to maintain more forest structure for wildlife and soil nutrient cycling. Any commercial logging should be confined to dense, young plantations, limited to a 14" dbh limit and higher basal area retention for dry forest types and no commercial logging in the minimal amount of moist Grand fir-dominant mixed conifer.
*Retain mature trees 15 " dbh and greater, regardless of species, to retain needed future large structure, which is at a great deficit in the project area compared to historic conditions.
*Change more sale units to only non-commercial-size thinning instead of commercial logging, or to no thinning, throughout the sale unit, especially those sale units with suitable habitat density and canopy closure for Pileated woodpecker; American marten; elk and deer thermal and hiding cover; primary cavity excavators; and Northern goshawk.
*Drop logging of suitable or active Pileated woodpecker and American marten habitat, which are indicated on our survey sheets by high old growth mixed conifer counts per acre; large live, snag, and log tree structure; fresh and recent Pileated foraging sign; and for marten, abundant down wood, large snags, and/or the presence of large enough root wad burrows for marten.
*Drop any sale units or parts of sale units that have never been logged.
*Drop commercial-size logging and all heavy equipment use within the RHCA buffers except for conifer removal in aspen stands up to 15" dbh.
*Drop all "temporary" road construction and greatly reduce the re-opening of currently closed roads. Especially don't reconstruct or re-open roads already grown over or roads that were closed for ecological protection reasons, including roads within riparian buffers or that are hydrologically connected to streams.
*See recommendations on our survey sheets, as well as wildlife species sign mentioned, old growth counts, and forest type, for specific sale units or parts of sale units we want modified or dropped.

Failure to adequately analyze direct, indirect, and cumulative effects

The Mill Creek Environmental Assessment demonstrates failure to adequately analyze environmental effects of the project in various sections of the Environmental Assessment, including omissions and distortions such as the following addressed in our comments:

Wolverine are now uplisted to Threatened status under the Endangered Species Act, heightening the necessity of analyzing in-depth to determine potential effects of the Mill Creek Project management actions to the viability of wolverines and potential negative effects within the project area due to the Mill Creek project management adjacent to the Mill Creek Wilderness Area:
"Wolverine use very extensive home ranges for a pair of about 150 square miles, so wolverine could use most forest areas as scavenging habitat and dispersal habitat. The Ochoco National Forest on the east side of highway 26 could have

suitable wolverine denning habitat at higher elevations. The Mill Creek Wilderness Area could be used as security habitat within the analysis area. Effects to wolverine should have been considered in the EA." (BMBP comments, p. 14, par. 2) (See FEA p. 105, Table 28, dismissing analysis for effects to wolverine as "Considered, but not carried forward.")

"Effects to Lewis' woodpecker should have been considered in the EA analysis, as they select for old burns such as the Mill Creek fire. A Lewis' woodpecker pair nested where I live in dry Ponderosa pine and juniper forest at 3,400 to 3,700 feet elevation, using an old burn from 1996 for nesting (with successful fledglings) for about four to five years and still forage there with their young, so it is possible that Lewis' woodpeckers use the old burned areas from the Mill Creek fire in the project area. Lewis' woodpeckers also use riparian areas. Any potential impacts from logging and roading in RHCAs will <u>not</u> be mitigated if commercial logging or tree felling is allowed there as planned." (BMBP comments, p. 14, par. 3) (See FEA pp. 105-106, Table 28, dismissing the need for in-depth analysis as "Considered, but not carried forward.")

Examples of comments regarding inadequate cumulative effects analysis:

"This is a very biased and incomplete cumulative effects analysis (on EA p. 46), in that it fails to consider the long-term effects of extensive earlier logging that did overlap the current Mill Creek sale that was called the Mill Project, referenced in the first section of the EA. Yet this extensive heavy logging in the same area not very long ago (with the decision signed in 1999) being subsumed into "the existing condition" so as to avoid acknowledging the long-term negative impacts of timber sales over decades, including extensive soil compaction; extreme reduction of large and mature trees; unregenerated skid trails; difficult future tree regeneration; extensive loss of wildlife habitat for more diverse species; loss of any rare plant species; loss of moisture retention; highly degraded and dysfunctional riparian ecosystems from both riparian area logging and intensive livestock grazing; loss of scenic integrity; and loss of potential Wilderness Areas, etc." (BMBP comments, p. 12, par. 5). See also BMBP, Comment #187 in Consideration of Public Comments, FEA p. 414, which summarizes the above comment plus our comment that "Without detailed analysis of past management impacts, the same mistakes are repeated."

Now the cumulative effects analysis for effects to Late and Old Structure forest that is referenced in the comments above as on EA p. 46 is still deficient in the same way on FEA pp. 49-50. For instance, for the "Spears Vegetation Management" timber sale: "Treatments already occurred to the extent planned and incorporated into the existing condition of this project; therefore, there is no cumulative effect to the amount, type, or distribution of LOS stands in the project area from the Spears EIS." (FEA p. 50). Regarding the overlapping "McKay Vegetation" timber sale, the Forest Service is not considering that cumulative effects do not have to overlap, as the critical issue is the cumulative loss of LOS on a landscape scale. There is no quantified analysis of how much acreage of LOS has been lost from previous timber sales, in the same project area as Mill Creek, across the Ranger District, and throughout the Ochoco National Forest. And there is not consideration in the FEA analysis of the combined effects of lost LOS structure from the current Mill project with the past timber sales' contribution to diminishing Late and Old Structure forest habitat for associated wildlife species.

"Cumulative Effects analysis for Primary Cavity Excavators:
The cumulative effects analysis for Primary Cavity Excavators fails to quantify the amount of existing snag levels and future snag recruitment from the action alternatives. Instead, the analysis minimizes the potential combined loss of existing snags and the loss of future snag recruitment due to logging of mature and large trees by calling it "the potential for a slight negative trend" in future snag recruitment. The analysis does not disclose what level of snag recruitment loss would be considered "slight" and how much future snag recruitment loss there could be and with what effects to the viability of Primary = Cavity Excavators." (BMBP comments, p. 16, par. 4, also summarized in Consideration of Public Comments, FEA p. 377, Comment #98, 1st comment)

"The EA conclusion that loss of Pileated habitat "would be insignificant at the scale of the Forest" fails to recognize all the Pileated habitat loss to other timber sales across the National Forest cumulatively. Switching to the Forest scale for species viability analysis is inaccurate use of the science, in that it fails to account for loss and degradation of wildlife habitat from many other timber sales and other management impacts across the entire Forest to the same species. This switching to Forest scale to promise viability of species also reflects inadequate cumulative effects analysis." (BMBP EA Comments, p. 17, par. 6)

"The synergistic effects of climate change, high temperatures, and increased fine sediments warrant actions such as protecting shade, ecosystem integrity, and terrestrial and aquatic connectivity. Wildfire is far less of a threat to these parameters than widespread logging in RHCAs." (Consideration of Public Comments, FEA p. 395, Comment #130)

More of our comments on inadequate cumulative effects analysis can be found in BMBP comments on pages: re: elk and deer, p. 18, par. 3; and in Consideration of Public Comments, Comment summaries: #84, FEA p. 374;

<u>Resolution:</u>

BMBP has commented on its objection to the ONF's failure to adequately analyze direct, indirect, and cumulative effects of the Mill Creek project on a range of receptors, including potential project effects to: potential Canada lynx and wolverine; existing and future large and old tree structure; Pileated woodpecker and other Primary Cavity Excavating woodpeckers; deer and elk displacement; specific long-term cumulative effects from past management to the project area and effects of commercial logging in RHCAs to meeting Riparian Management Objectives.
See our comment quotations and citations in the paragraph above and references to inadequate analysis in comments quoted in other sections of this objection.

To resolve this objection, a Supplemental Environmental Impact Statement needs to be prepared that adequately analyzes direct and indirect effects of the Mill Creek project, and cumulative effects of the project in combination with past, ongoing, and reasonably foreseeable future actions to NEPA standards, with a public comment period to enable informed public comment and agency review.

Inaccurate use of the science

There are instances in the Mill Creek FEA of analysis not reflecting the full range of best available science or using science inaccurately. Examples of inaccurate use of the science from our comments:

It's inaccurate use of the science to project tree species composition 50 years into the future without being able to predict and incorporate natural disturbance effects and extreme climate change effects. (BMBP comment, p.11, 4th par.) See also this comment as Comment #31, in Consideration of Public Comments, FEA p. 357. The Forest Service response to our critique of their model as inaccurate (and misleading to the public) includes the following admission: "It is acknowledged that other disturbances and their effects are expected to be present in the project area during a 50 year time but are too stochastic to accurately predict in time or space for meaningful depiction. The EA notes that projects are based on endemic changes to the stands over time." (FEA pp. 358-359)

"We find the following method for determining susceptibility of the project area to insects and disease to be inaccurate use of the science:

'The susceptibility hazard (risk) of the project area to insects and disease has been evaluated by comparing the abundance of seral/structural stages that are either at high stand densities and/or have a large proportion of grand fir and Douglas-fir associated with them and comparing them to the historic range of variability.' (FEA p. 35, last par.)

This is not a scientifically valid way to identify areas at high "risk" of insects and disease when actual evidence of insect outbreaks and disease are not being used to determine the insect and disease ratings. High stand densities and/or having "a large proportion of Grand fir and Douglas fir" and "comparing them to the historic range of variability" (p. 33, last par.) does not mean necessarily that the stands are at high risk of insects and disease. Denser stands may be moister and naturally more productive, and stands with Grand fir and Douglas fir are usually moister and more resilient than drier stands. I have never seen this method used to establish high risk of stands to insects and disease. Usually, instead, pathologists are brought in to sample in the field the abundance levels of defoliating insects or the spread of a particular tree disease, which is far more credible, based on both expertise and evidence from the field." (BMBP comments, p. 11)

See also BMBP Comment summary 59 in Consideration of Public Comments, FEA p. 367, which incorporates the comments above and adds our further associated comments:

"High proportion of Grand fir and Douglas fir compared to HRV does not mean necessarily that the stands are at high risk of insects and disease. Denser stands may be naturally more productive." (BMBP Comment summary 59, FEA p. 367)

"The presence of defoliating insects is not a crisis requiring logging, as bark beetles and mistletoe are natural disturbances and may be at only endemic levels." (BMBP Comment 58, in Consideration of Public Comments, FEA p. 367). Notably, in the Forest Service response to this comment, the agency admits that: "Defoliating insects are <u>not</u> currently highly active in the project area (e.g. spruce budworm, sawflys, balsam wooly adelgid)." (underlining emphasis ours, FEA p. 367 under Comment #59)

<u>Resolution</u>

BMBP has commented on its objection to the ONF's inaccurate use of the science in the Mill Creek project analysis. See our comment citations and quotations in the paragraphs above.

In order for the Mill Creek project to comply with NEPA, the Forest Service needs to incorporate the requisite best available science and use the science accurately, with professional integrity in analysis in a new SEIS available for public comment for Mill Creek and more accurately inform public comments, agency review, and decision-making.

Failure to Disclose Scientific Controversy

The Mill Creek project violates NEPA by failing to disclose significant scientific controversy over the efficacy and ecological soundness of managing to reduce the severity of wildfire (essentially acting to further suppress wildfire) as a natural disturbance and implementing heavy commercial logging under the guise of "restoration." This failure to disclose significant scientific controversy leads to consequent suppression of scientific evidence and perspectives supporting other management, or non-management, as opposed to the Forest Service's proposed action alternatives, in the Mill Creek EA. See our numerous comments related to scientific controversy in various sections of this objection, including our proposed alternative management changes.

For instance: "There is also a plethora of evidence to suggest that logging in the backcountry is an ineffective strategy for attempting to control fire behavior that fails to keep communities safe." (BMBP Comment 62, in Consideration of Public Comments, FEA p. 368)

Examples of our comments regarding Mill Creek Project EA failure to disclose scientific controversy include the following:

"The EA also admits that "HRV is not a perfect metric for forest resilience through future climatic changes…." (EA p. 21) Forest Service researchers working with the Pacific Northwest Research Station published an article in the Station's newsletter advocating that the historical range of variability concept is not appropriate to use for guidance under rapidly changing extreme climate changes. Relying heavily on the HRV concept ignores the agency's own scientists.

By basing the desired future condition on HRV, the Forest Service is failing to disclose and consider the scientific critique of the Forest Service use of HRV. The current climate change regime will likely thin out the forest itself by stressing and killing tree species on marginal sites for the species and potentially eliminating much forest cover through more intense wild fires, prolonged droughts, and record-breaking high temperatures, as well as due to severe storms, seasonal temperature changes, and erratic precipitation patterns. These new conditions should be met with far more forest protection from logging, not more logging removal of forest cover on a landscape scale." (BMBP comments, p. 10, par. 3) (There was no response to this set of comments re: HRV and climate change in the FEA Consideration of Public Comments.)

Central Oregon LandWatch supported our concerns over the use of the Historic Range of Variability (HRV) based on inadequate baseline data, lack of a mixed-severity fire model, the competing methodology of Baker et al. (2023) critiquing outdated assumptions, omission of critical scientific data, and HRV not being supported by the majority of current research. (See Comments #37, Consideration of Public Comments, FEA p. 360, which only included our comment that "HRV estimates are highly suspect…."

<u>Resolution</u>:

Blue Mountains Biodiversity Project has commented on the Forest Service's failure to disclose scientific controversy in the Mill Creek EA. See our comments quoted and cited in the paragraph above.

To resolve this objection, the Forest Service must thoroughly disclose existing scientific controversy over agency assumptions and management plans in an SEIS available for public review and comment. The Forest Service needs to use the full spectrum of best available science reflected in the controversy to guide management plans and to provide for a broader selection of action alternatives and changes in management direction.

II. The Mill Creek project violates the National Forest Management Act

The Mill Creek project violates the National Forest Management Act in the following ways: failure to ensure the viability of Management Indicator and other species; potential violation of management guidelines for Old Growth Management Areas, the Steins Pillar Recreation Area, Riparian Habitat Conservation Areas, and Wildlife Connectivity Corridors. The Forest Service is in potential violation of Forest Plan standards and guidelines for riparian area (RHCA) protection; snag and down wood abundance and size, and protection of soils from widespread detrimental impacts through proposed actions. The Forest Plan requires adherence to INFISH requirements, including moving toward attainment of Riparian Management Objectives, and protection guidance for the Northern goshawk under the Eastside Screens requirements.

Failure to ensure the viability of Management Indicator Species (MIS)

Our comments noted many areas of analysis in which the Mill Creek FEA failed to demonstrate that the viability of Management Indicator (MIS) and Sensitive species would be ensured with project implementation. Species of concern for protection of viability included the following Management Indicator species: Pileated woodpecker, American marten, Primary Cavity Excavator woodpeckers; Redband trout; and Rocky Mountain elk; as well as Northern goshawk, which has protection guidance under the Eastside Screens.

We are also concerned about failure to ensure viability of Sensitive and Threatened-listed species on the Forest, including Threatened-listed Gray wolf; Threatened-listed Canada lynx; Threatened-listed Wolverine; Sensitive-listed Pacific fisher; Sensitive Columbia Spotted frog, and Sensitive-listed Redband trout.

The Forest Service has legal responsibilities to protect the viability of Management Indicator species, but not to move forest structure toward a theoretical Historic Range of Variability (HRV) as an over-riding goal. It's not appropriate or legally justifiable to keep reducing Management Indicator species' suitable habitat (e.g. American marten) in timber sale 'project' after timber sale 'project', even after that species is considered vulnerable by the U.S. Fish and Wildlife Service--which applies now to American marten, who would have suitable habitat acreage reduced under the Mill Creek project. The EA did not include adequate cumulative effects analysis as to all the reductions of suitable habitat for Management Indicator species across the Forest. (See our objection and comments above regarding inadequate cumulative effects analysis.) It is not justifiable to plan for continued impacts and cumulative potential loss of species viability for a Management Indicator species based on "long-term" theoretical re-growth of suitable habitat eventually, as the species' viability may be lost before the habitat can grow back—especially given likely planned similar timber sales across the Ranger District and the National Forest in the future. For instance, for Pileated woodpecker and American marten, the long-term theoretical re-growth of suitable habitat could take 100+ years for suitable large and old habitat structure to re-develop.

Examples of how our comments express these concerns regarding the failure to ensure the viability of Management Indicator Species and other species associated with similar habitat requirements:

Regarding MIS Primary Cavity Excavating woodpecker species viability:

"We are concerned that in the Eastside Mixed Conifer habitat type that: 'The analysis area is below reference conditions for the 2-4, 4-6, 6-10, and 10-18 snags/acre categories, meaning there are fewer acres of high densities of large snags than would have been present historically.'" (EA p. 112, 2nd to last par.)

"Logging in general reduces higher densities of snags needed by Primary Cavity Excavating (PCE) woodpeckers, due to hazard snag removal and great reduction of available future snags through heavy mature tree logging." (BMBP comments, p. 15)

“The cumulative effects analysis for primary cavity excavating woodpeckers is inadequate due to reiteration of project design criteria that have consistently failed to avoid consequent declines in snag abundance for wildlife in timber sale after timber sale. This could also result from the Mill Creek sale….” (BMBP comments, p. 16. See also additional comments regarding PCE woodpecker species viability under “Inadequate Cumulative Effects Analysis” above in this objection.)

Re: MIS Pileated woodpecker viability:

“Pileated woodpecker habitat is no longer increasing across the Blue Mountains Forests since Wisdom et al.’s finding in 2000, due to increasing logging of moist mixed conifer old growth habitat.

The EA recognizes that ‘densities of large-diameter snags (>20” DBH) have declined from historical to current levels due to the transition of stands to early seral forests that lack the historical structure, which included large snags and large emergent trees that survived crown fires (Wisdom et al. 2000; Korol et al. 2002).” (EA p. 115, 1st par. under “Existing Condition”). The EA also acknowledges that the drier Ponderosa pine “habitat type does not produce large-diameter snags (>20” DBH) in densities used by Pileated woodpeckers.’

The EA discloses that in the Mill Creek timber sale area: “Densities of large-diameter snags (>20 inches DBH) in the snag density classes that provide Pileated woodpeckers are below reference conditions in the Eastside Mixed Conifer Wildlife Habitat Type.” This pertains to their best foraging habitat.

DECAID analysis on EA p. 116 shows low tolerance levels for Pileated woodpecker viability, with most habitat being only at the 30% tolerance level for Pileated use and only 1% of the large snag habitat at the 80% tolerance level and only 3% of the area with small snags at the 80% tolerance level.” (BMBP comments, p. 15)

Due to the planned heavy logging of mature trees to very low basal area retention, greatly reducing future large snag abundance, along with typical timber sale hazard tree and hazard snag felling, would likely contribute cumulatively to further loss of Pileated woodpecker viability in the Mill Creek project area.

Additional prescribed burning would likely reduce the availability of soft snags and logs for foraging. These losses of suitable habitat are cumulatively increasing the existing great loss to logging of moist mixed conifer old growth (EMC) in the same area. (BMBP comments, p. 17)

“The EA conclusion that loss of Pileated habitat “would be insignificant at the scale of the Forest” [See FEA p. 125, last full par.] fails to recognize all the Pileated habitat loss to other timber sales across the National Forest cumulatively. Switching to the Forest scale for species viability analysis is inaccurate use of the science, in that it fails to account for loss and degradation of wildlife habitat from many other timber sales and other management impacts across the entire Forest to the same species. This switching to Forest scale to promise viability of species also reflects inadequate cumulative effects analysis.” (BMBP comments, p. 17 under “Conclusion”)

Viability for MIS American marten could also be reduced in the Mill Creek project area, as marten are now known to inhabit lower elevation forest and to den in Pileated nest holes in old growth Ponderosa pine snags. Marten also require higher canopy closure, little forest fragmentation, and abundant down logs for winter foraging. There may be marten in the Steins Pillar Recreation Area and within the adjacent Mill Creek Wilderness Area, as well as in suitable habitat in undeveloped lands still slated for commercial logging. No commercial logging in remaining moist mixed conifer LOS would better support the viability of both Management Indicator Species, Pileated woodpecker and American marten.

Rocky Mountain Elk and Mule deer:

“Another reason not to commercially log and construct or re-construct roads in RHCAs is their importance as the most likely elk calving and deer fawning sites. Logging would remove suitable hiding cover and closed road re-opening or “temporary” road-building and skid trails would increase human disturbance. This would likely result in no further use of otherwise suitable fawning and calving sites in the RHCAs.” (BMBP comments, p. 17, 2nd to last par.)

“Logging would remove suitable hiding cover and closed road re-opening or “temporary” road building and skid trails would increase human disturbance.” (BMBP comment #93, FEA p. 376 in Consideration of Public Comments). This comment refers to hiding cover needed for elk and deer and the sensitivity of elk to human disturbance, which causes them to abandon otherwise suitable habitat within 300 feet on each side of roads with any motor vehicle traffic. The Mill Creek project area is a popular area for elk and deer hunting among local residents (e.g. from the Prineville area and rural land owners. Loss of significant hiding cover availability and increased human disturbance would also be detrimental to dispersing Gray wolves for hunting their prey, and also would cause displacement of elk and deer onto private lands, attracting wolves to areas where livestock conflicts could increase.

See our additional comments supporting our objection re: the need to maintain the viability of MIS species under NFMA:
Re: Pileated woodpecker: on BMBP comment pages 16 and 17
Re: negative effects to LOS habitat for LOS-dependent species: on pages
Re: Primary Cavity Excavating woodpeckers: on BMBP comment pages 14 and 16
Re: Mule deer and Rocky Mountain elk: BMBP comment on p. 18, par. 3
Re: Northern goshawk: BMBP comments on p. 18
Re: Redband trout and Columbia Spotted frog see INFISH comments below under Forest Plan violations and Endangered Species Act violations
<u>Resolution</u>

BMBP has commented on its objection to the ONF’s failure to provide for viability of Management Indicator and other associated wildlife species requiring similar habitat in the Mill Creek project. See our comment citations and sample quotes in the above paragraphs.

Resolution of this issue would include:
Re: Pileated woodpecker and marten viability: Drop commercial logging and prescribed burning in all sale units that incorporate suitable or active habitat for Pileated woodpeckers and American marten, which would be cooler, moister mixed conifer old growth or LOS habitat with 40-60% canopy closure or more, and for marten, abundant down and elevated logs for winter foraging, as well as large snags for both species. See our survey sheets for guidance re: fresh Pileated foraging and/or Pileated nest or roost holes in snags and abundant down and elevated logs and large snags for marten. There is also Pileated woodpecker nesting in old growth Ponderosa pine habitat, generally in proximity to old growth Grand fir foraging habitat in riparian corridors.
Re: Primary Cavity Excavating woodpecker viability: Protect large snags and groups of snags and significantly reduce snag loss by reducing mature tree logging, especially in the 15-21” dbh range and by dropping “temporary” road construction and closed road reconstruction to reduce loss of snags through hazard tree felling.

Re: MIS American marten, Pileated woodpecker, and Rocky Mountain elk, with similar benefits to other wildlife species with associated habitat needs:
* No commercial-size logging in active or suitable marten habitat and suitable and active Pileated woodpecker habitat, with no overstory canopy reduction in these areas;
* No log and snag reduction in suitable and active American marten and Pileated woodpecker habitat, and no prescribed burning in suitable or active marten and Pileated habitat.
* Drop all commercial-size logging in wildlife connectivity corridors;
* Drop all commercial logging, noncommercial thinning, and prescribed burning within any undeveloped lands to preserve more natural forest habitat for far ranging and declining or rare wildlife species, including American marten, Canada lynx, potential wolverine, and Gray wolf.
*Drop planned “temporary” roads as these often remain on the landscape and increase access for illegal firewood (often large snag) cutting and fur trappers and for disturbance to nesting goshawks, and reduce re-opening of closed roads for the same reasons.
*Drop all commercial logging in known goshawk PFAs, as well as in any other goshawk activity centers (nests and PFAs) discovered. Specifically, drop all overstory and midstory logging in goshawk PFAs under proposed alternative 4 Modified, and drop most or all non-commercial thinning in the PFAs, with no more than a quarter of each PFA non-commercially thinned—only well away from the 30 acre nest buffer. Prescribed burning could be used instead of non-commercial thinning in dry forest type PFAs. There should be no closed road re-opening or “temporary” road construction in PFAs, as human disturbance can cause goshawks to abandon their nests. Scale back commercial logging in general for the Mill Creek project timber sale to retain more mature tree density for dense forest-adapted wildlife

species, including Northern goshawk, Cooper's hawk, Rocky Mountain elk, Pileated woodpecker, and American marten. This has already been done to some extent through adoption of alternative 4 Modified under the Draft Decision. However it is not clear in the FEA how much reproductive goshawk habitat would become unsuitable due to logging or road construction or road-re-opening under alternative 4 Modified. We request this information, including for PFAs, but also for reproductive habitat for goshawk in general.

Re: deer and elk:
* Retain more overall tree density and deer and elk cover—especially by dropping sale units in cool moist and cold dry habitat and in microhabitat patches where greater density would naturally occur, such as at higher elevations, within RHCAs, on North to Northeast aspect slopes or in hollows, and in wildlife connectivity corridors.
* Scaling down the size of the timber sale and retaining higher basal areas where there is logging, as well as not removing so much biomass, including small trees for hiding cover, would benefit MIS Rocky Mountain elk, who strongly select for denser forest and Mule deer, who are already in sharp decline. There should be no commercial logging or road re-opening or construction in riparian areas, which are critical habitat for deer fawning, elk calving, MIS Redband trout, and Sensitive Columbia Spotted frog, as well as Sensitive riparian plants.
* Road density should be reduced to at least the Forest Plan standards and objectives for elk.
Re: Redband trout and Columbia Spotted frog: See recommended remedies below, under Forest Plan violations—INFISH and under Endangered Species Act violations.

Other Forest Plan violations

Additional Forest Plan violations in the Mill Creek project include potential violations of Forest Plan standards by further setting back attainment of INFISH/PACFISH Riparian Management Objectives; not following management guidance for wildlife connectivity corridors, Old Growth Management Areas, and the Steins Pillar Recreation Area. Violation of Forest Plan standards also include not adequately protecting Northern goshawk under the Eastside Screens and potential exceedances of the Forest Plan limit to detrimental impacts to soils.

Violation of the Forest Plan Eastside Screens

INFISH Violations:

***Note that most of BMBP's Aquatics-focused objection will be covered in Section V, below.**

Our comments on potential Forest Plan violations regarding failure to demonstrate adherence to INFISH logging buffers and Riparian Management Objectives clearly state our concerns. See BMBP comments quoted and cited below:

"We are concerned that logging and re-opening of closed roads and/or constructing "temporary" roads within RHCAs would violate INFISH established RHCA buffers intended to prevent logging impacts and prevent achievement of related Riparian Management Objectives (RMOs), as well as violating Forest Plan standards and guidelines for activities occurring in RHCAs." (BMBP comment on p. 3, par. 6)

We are strongly opposed to commercial logging and roading in RHCAs. We shared the concerns of other commenters: "Commenters question the need for these activities and expressed concern about potential impacts to shade and stream temperature, sedimentation, turbidity, bank stability, and future large wood recruitment. Commenters also questioned the distinction between upper and lower RHCA vegetation." (Final EA p. 8). We knew the differences between upper and lower RHCAs while commenting on the importance of the entire RHCA drainage being unlogged and not having biomass removed, in order to retain moisture through tree shading and down wood retention, which affect micro-climate cooling and moisture levels. Protected transitional and upland adjacent RHCA zones are still important for preserving shading, cooling, and moisture retention in the drainage, as well as for maintaining slope stability to reduce excess sedimentation in streams and recruitment of large wood for pools over time.

The science supporting the ecological degradation from logging in RHCAs is well established. This is an outrageous timber grab within vulnerable protected riparian areas over 1,210 acres of RHCAs within RHCA categories 1, 2, 3, and 4—apparently indiscriminately. Yet all that's really needed (if any management is needed in RHCAs at all) would be to thin conifer seedlings and saplings up to 9" dbh at the most, only where really needed to greatly reduce or remove any impediments to riparian hardwood establishment and felling any small trees into stream channels or in the flood plain for roughness. Standing live trees and snags are needed for future log recruitment into stream channels over time. Heavy equipment use in the RHCAs and removal of trees greater than 9" dbh is contrary to achieving riparian restoration goals and riparian management objectives. Drop all commercial logging in the RHCAs.

We did field survey along segments of Mill Creek that were proposed for commercial logging and found that there was already substantial riparian hardwood cover, with the biggest problems not being conifers shading out hardwoods (although some of that—young Ponderosa pine planted or growing into recreation sites next to Mill Creek--had already been felled into the stream channel.) Instead, the biggest problems were cattle in the riparian areas and loss of water in the channel as the summer progressed (during the hot dry summer of 2021) to the point of no flowing water in Mill Creek. There's private land with cattle along Mill Creek, so the cattle could be drinking a lot of the Mill Creek water, as well as any diversions of the creek reducing water flow and cattle limiting the riparian hardwood growth." (BMBP comments, p.4, pars 4, 5, & 6)

Our other comments supporting this objection can be found in Section V, below.

<u>Resolution</u>

BMBP has commented on the Mill Creek project's potential violations of INFISH Riparian Management Objectives and RHCA no logging buffers. See our comments cited, referenced, and quoted above.

To resolve this objection, the Forest Service needs to:
*Drop all commercial logging and heavy equipment use within RHCA buffers except for conifer thinning up to 15" dbh for aspen stand recovery which retains conifers providing streambank stability and primary shading.
*Limit non-commercial conifer thinning in RHCAs to where riparian hardwoods exist and show signs of competition from conifers and to stream reaches that historically had hardwoods. Non-commercial thinning should be limited to 9" dbh, with only hand felling. No trees should be removed from the RHCAs. Instead, they can contribute to woody debris placement in stream channels to form pools or to increase roughness of the flood plain.
*Drop all re-opening of closed roads and construction of 'temporary' roads within, or adjacent to, RHCAs.
*Drop any planned heavy logging equipment stream drainage crossings.

Failing to adhere to Eastside Screens Protections for Northern goshawks

Our comments on the EA regarding goshawk clearly explain our rationale for this objection:

"Re: Northern goshawk and Cooper's hawk:
Based on Table 43 "Last Year of Documented Activity" for known Northern goshawk nest sites, Northern goshawk nests seem to have been abandoned in the time span of 2003 to 2017, which could have overlapped with logging of timber sales in the Mill Creek area or increased human disturbance. The earlier nests of 1997 and the early 2000's could have been disrupted by the logging of the 1999 Mill Project timber sales." (BMBP comments, p. 18, with Table 43 on FEA p. 137)

Based on Tables 45, 46, and 47 for each action alternative (but not for alternative 4 Modified) on FEA pp. 139-141 commercial overstory logging, midstory logging, and non-commercial thinning would greatly diminish suitable acres of reproductive habitat for goshawk, who require denser forest and canopy closure of at least 40% for foraging and 60% for nesting. From the current estimate of 23, 612 acres of existing reproductive goshawk habitat there was expected reduction in goshawk reproductive habitat to as low as 14,561 acres under alternative 3 in the draft EA. However, the Final EA is apparently not updated to show calculations for how much goshawk reproductive habitat would be removed from suitability under proposed alternative 4 Modified. This is a revised version, based on the FEA, of one of our comments on p. 18.

"Cumulative effects to goshawk include effects to suitable habitat outside the Post Fledging Areas that could be degraded significantly." (BMBP comment, p. 18)

<u>Resolution</u>

* Drop all commercial logging in known goshawk PFAs, as well as in any other goshawk activity centers (nests and PFAs) discovered. Specifically, drop all overstory and midstory logging in goshawk PFAs under proposed alternative 4 Modified, and drop most or all non-commercial thinning in the PFAs, with no more than a quarter of each PFA non-commercially thinned—only well away from the 30 acre nest buffer. Prescribed burning could be used instead of non-commercial thinning in dry forest type PFAs—outside of the goshawk reproductive season, including fledging.
*There should be no closed road re-opening or "temporary" road construction in PFAs, as human disturbance can cause goshawks to abandon their nests.
* Scale back commercial logging in general for the Mill Creek project timber sale to retain more mature tree density for dense forest-adapted wildlife species, including Northern goshawk, Cooper's hawk, Rocky Mountain elk, Pileated woodpecker, and American marten. This has already been done to some extent through adoption of alternative 4 Modified under the Draft Decision. However it is not clear in the FEA how much reproductive goshawk habitat would become unsuitable due to logging or road construction or road-re-opening under alternative 4 Modified. We request this information, including for PFAs, but also for reproductive habitat for goshawk in general.
* Don't implement prescribed burning in goshawk PFAs or nest stands during the Spring reproductive season.

Forest Plan Management Area Guidance Violations

Re: Potential Violation of Wildlife Connectivity Corridor Management Goals

We are strongly opposed to commercial logging and excessive "non-commercial" size thinning in wildlife connectivity corridors. We want the Forest Service to drop all commercial logging and limit non-commercial thinning in connectivity corridors, as it defeats the purpose of leaving denser areas to allow for movement of old growth-associated wildlife species, as well as native ungulates using these areas as security cover, and to provide greater habitat security in these areas compared to intensively managed stands outside these corridors.

Our comments regarding violation of wildlife connectivity corridor management goals can be found below. We also expressed concern regarding provision of sufficient deer and elk security cover, such as is often provided by wildlife connectivity corridors. For example:

"Logging wildlife corridors must retain 66% to 100% of "full stocking", not 50 to 75% of "full stocking" by defining the "upper limit of the management zone" as the upper threshold for canopy retention. This is a clear violation of the Forest Plan regarding retention requirements for wildlife corridors. Logging down to only 50% of full stocking and a corresponding canopy closure from 50 to 70% of site potential violates the Forest Plan and would not meet the "desired condition" quoted above, which is embedded in the Forest Plan." (BMBP comments, p. 17, last par.s) After reading the Forest Service response to this comment, summarized as Comment #102, on FEA p. 378 in Consideration of Public Comments, we are still concerned that the Forest Service is still mis-interpreting the Forest Plan requirement to ensure that "canopy closures are within the top one-third of site potential." (FEA text on p. 143, par. 2, underlining emphasis ours). Yet the Forest Service staff seem to have re-interpreted "site potential" as the top third of "full stocking", which is a silvicultural concept, not the ecological concept of site potential.

The corrected final EA text interprets the wildlife connectivity corridor requirement as follows: "To meet the density criteria, it would be necessary to retain enough trees to maintain between 66 percent and 100 percent of full stocking. Full stocking is the density level at which inter-tree competition is occurring and resulting in mortality. Stand densities above full stocking are not sustainable due to competition related mortality and resultant susceptibility to attack by insects and disease (Powell 1999)." (FEA p. 143, par. 2). This conception of "the top one-third of site potential" is problematic, as site potential varies based on moisture regimes, soil types, and consequent forest types. However the use of these outdated "stocking" levels are biased toward dry forest types with Ponderosa pine dominance and doesn't account for the higher natural productivity and density of moist mixed conifer and cold, high elevation forest types.

Further, the Powell 1999 management zones and stocking concepts are purely silvicultural concepts that have been greatly over-used with each timber sale, resulting in the (apparently desired) continuous logging based on the premise that the forest stand—regardless of forest type and natural productivity—will otherwise succumb to insects and disease. This conflation of artificial "stocking" levels and "management zones" with ecological site potential would allow for more intensive logging to lower basal area retention than would otherwise be retained based on the upper third of site potential requirement. The Forest Service needs to stop liquidating the Forests through rationales like Powell 1999's "stocking" and "management zones".

So 50% to 100% of theoretical "full stocking" based on very dry Ponderosa pine forest does not equate to the upper third of site potential, as site potential varies, and because 50% to 66% of "full stocking" (even if the two terms are equivalent) still does not represent retention of the upper third of site potential.

While the Forest Service response promised that: "The project will not reduce stocking levels below 66% of site potential", (FEA p. 378, last par.), the corrected EA text on p. 143 does not seem to honor that promise: "The upper limit of the management zone is equivalent to 75 percent of full stocking, while the lower limit of the management zone [is] equivalent to 50 percent of full stocking. Retaining trees at these densities would result in a corresponding canopy closure ranging from 50 to 75 percent of site potential." (FEA p. 142, par. 4). This is problematic because the requirement is for the upper third of site potential, not as low as only half of site potential.

Then the FEA corrected text on p. 143 continues by trying to make up for not allowing for enough mature trees to remain in the connectivity corridors to meet the upper third of site potential by: "Retaining additional understory trees during noncommercial thinning would add to the amount of canopy closure retained….Commercial thinning proposed in connective corridors within the Mill Creek Project would generally thin to or near the midpoint of the management zone (i.e. 66%) and leave additional understory. This would retain canopy closure in the top third of site potential and meet the direction contained within the Wildlife Standard." Sorry, but we have to disagree that this extra retention of understory trees would somehow make up for the missing overstory trees—which is illegitimate, as canopy closure does not include non-commercial size understory trees by any definition.

As we wrote in our comments:

"Understory trees are not usually interpreted as part of canopy closure, which is comprised of mature (midstory) and large (overstory) canopy. See EA, p. 138, par. 2. This retention of additional understory planned does <u>not</u> "retain canopy closure in the top third of site potential and meet the direction contained in the Wildlife standard" as claimed." (BMBP comments, p. 17, last par.s)

In 33 years of field surveying, I have never experienced the Forest Service trying to rationalize commercial logging in wildlife connectivity corridors in this way to bypass the requirement to have the upper one-third of site potential retained as mature trees contributing to canopy closure. We reject the Forest Service argument on FEA p. 143. Additional non-commercial size small trees do need to be retained, but they do not comprise canopy closure required to meet the upper third of site potential.

"Maintaining greater stand density and higher canopy closure in wildlife corridors is needed more than ever to provide for extreme climate change effects causing need for wildlife species to migrate to higher elevations or north to escape overwhelming heat and drought at lower elevations and southern regions. Drop all commercial logging in the identified wildlife corridors, especially since most of the surrounding area would have very low canopy closure and density under the action alternatives." (BMBP comments on top half of p. 18)

See also our additional comments supporting this objection on BMBP comment pages: 17-18.

<u>Resolution:</u>

BMBP has commented on the potential Forest Plan violation of not following management area intent regarding Wildlife Connectivity Corridors. See our comments cited and quoted above.

*Drop all planned commercial logging and limit non-commercial thinning to only the densest areas (that appear due to wildfire suppression) in mapped or identified wildlife Connectivity Corridors.

Old Growth Management Areas, Steins Pillar Recreation Area, and Undeveloped Lands:

We are strongly opposed to commercial logging and road construction or re-opening in Old Growth Management Areas, Undeveloped Lands, Riparian Habitat Conservation areas, and other never logged or riparian-associated Management

Areas, such as Stein's Pillar Recreation Area, which has only had limited (and unfortunate) past logging at the edges near roads.

We are opposed to logging and roading of these Management Areas, including Undeveloped Lands, because there is very little un-logged and un-roaded National Forest left outside of Wilderness Areas and Inventoried Roadless Areas. Never logged areas have far more intact and functional natural ecological processes and functions and provide more suitable habitat for wildlife species because they evolved with and are adapted to natural disturbances, but not to the impacts of commercial logging and roads.

The Blue Mountains Forest Plans are terribly outdated to promote managing every unmanaged area (Undeveloped lands and previously protected Management Areas) regardless of the consequences.

These consequences from rampant commercial logging and roading for about a century include long-term detrimental soil impacts that may last for 40-70 years or more; many native wildlife species in decline and now ranked as Vulnerable, Sensitive, or Threatened; rapid loss of Threatened fish species through population extirpations, including Bull trout, Mid-Columbia Steelhead, and Salmon runs; a huge deficit in large and old tree structure compared to historical conditions; vast conversion of the natural National Forests into homogenous, even-aged, single tree species plantations that are more susceptible to wild fire, insects, and disease; and loss of critical forest carbon sequestration and storage which is maximized in large and old trees. The list of catastrophic outcomes from commercial logging and roads could go on almost endlessly.

It is the height of hypocrisy for the Forest Service to try to convince the public that timber sales are "restoration projects" or "increase forest resiliency to natural disturbances."

Many of these management areas, such as Old Growth and Stein's Pillar Recreation Area were designated to prevent their being logged and roaded. Old growth forest and natural forest recreation areas are very important for the public and the original Forest Plan intent of multiple uses, not just logging.

Undeveloped lands need to be kept in a natural state, with no logging or roads within the undeveloped areas, so that we can learn from local reference condition forest areas through scientific study and learn how to restore natural ecosystem processes and functions for lands already degraded by logging and roads.

Many wildlife species in decline are far ranging species that need more wild and remote back country habitat than they may currently have—such as Grizzly bears who are now returning to Idaho and the North Cascades Wilderness in Washington; Pacific fisher, who used to be throughout eastern Oregon forests, with a positive Pacific Fisher sighting by two of us on the Ochoco National Forest; Canada lynx, that still persist in small numbers in eastern Oregon, as we know from three sightings, including one on the Ochoco National Forest; rare wolverine, that was just up-listed to Threatened, that roam over 150 square miles for a pair and used to be more common in eastern Oregon; and American marten, who are now in decline and ranked as "Vulnerable."

People also need the solace of wild lands as the world is increasingly industrialized, polluted, and separating people from natural ways of living and a relationship with the natural Earth.

Blue Mountains Biodiversity Project has long-standing concerns over the logging and roading of undeveloped lands, which are some of the last strongholds for wildlife and unimpeded natural ecological processes to occur outside of roadless areas and Wilderness Areas.

*Please clearly identify the location and size of any undeveloped lands identified by the Forest Service so that we can evaluate which areas are artifacts of the GIS system not recording early past logging, and which have likely never been roaded or logged.
* Drop any logging in undeveloped lands. We are strongly opposed to any logging or other development in such rare relatively pristine areas, which serve as scientific reference conditions, undisturbed wildlife habitat, fish strongholds, and primitive recreation areas
* We are opposed to converting unmanaged lands to managed lands wherever they exist.

Our associated comments include these:

"We strongly oppose any commercial logging in Old Forest Preserves. We strongly oppose logging and roading in undeveloped lands. If logging in RHCAs, Old Forest Preserves, and Undeveloped lands were dropped, then we could negotiate over scaling down the foot print of alternative 2 by dropping commercial logging in the already minimal amounts of moist mixed conifer forest, including all the old growth moist mixed conifer sale units." (BMBP comments p. 6, par. 2)

“We are strongly opposed to any commercial logging and re-opening of closed roads or building “temporary” roads in Old Growth Management Areas, the Steins Pillar Recreation Area, RHCAs, and undeveloped lands.” (BMBP comments, p. 7)

“The “special report” of forest health issues within the Steins Pillar Recreation area is claimed on EA p. 12, last par., to describe “insect and disease disturbances that are affecting stand structure with findings that are applicable to the rest of the planning area.” Yet there is no further detail as to what the insect and disease disturbances are, as to what insects and diseases were found, whether these were at endemic or epidemic levels, and why the findings would be “applicable to the rest of the planning area.” There is no scientific citation given, no summary of the report, and no further explanations. Why should we trust such a claim when none of the details are divulged, giving us no clue as to what the report’s findings might be, and with no disclosure of the scientific methodology involved, as required by NEPA.” (BMBP comments, p. 5) Notably when we went for a recreational hike in the Steins Pillar Recreation Area, we saw no sign of any insect or disease epidemic at all. This was during the 2021 summer, while we were in the area field surveying the Mill Creek sale units.

Resolution:
*Drop all commercial logging and road construction or re-opening in the Old Growth Management Areas; all undeveloped lands within the project area; the Steins Pillar Recreation Area; RHCAs; all never logged forest in the project area (see our survey sheets); and the Summit trail.

Road Concerns regarding “temporary” road construction and re-opening of many miles of currently closed roads:

The Forest Service has developed an excessive road network that could reach the moon and back multiple times. The National Forest road system is more extensive than the U.S. highway system. The Forest Service can’t keep up with the maintenance of so many roads.

Closed roads and so-called “temporary” roads are rarely fully decommissioned and are often not effectively closed. This has led to increased access for livestock, illegal firewood cutting, fur trapping, and introduction and dispersal of invasive plants, which diminish native plant biodiversity.

Roads also become a constant source of excess sediment into streams, degrading fish habitat and obstructing attainment of Riparian Management Objectives. Roads also fragment forest habitat and cause increased human disturbance that causes elk and other wildlife species, such as songbirds and owls, to abandon roadside habitat, such as elk avoiding roads and losing about 300 feet of otherwise suitable habitat on either side of roads with traffic.

The Forest Service needs to stop constructing more roads, not re-open all closed roads that are not being maintained for seasonal use, and greatly reduce the existing road system by fully decommissioning all roads that are ecologically destructive, limit habitat for disturbance sensitive species, have hydrological connections to streams, or are redundant, unnecessary, or difficult to maintain.

Examples of our comments regarding roads causing widespread detrimental soil impacts, human disturbance to wildlife, and potential increased wildlife exposure to poaching:

“This is a terribly high mileage of closed road re-opening, from 44.9 miles under alt. 2 to 49.66 miles [under alt. 3, and 49.65 miles under alt. 4] would be an irretrievable commitment to detrimental soil impacts and would cause much more human disturbance through increased access.” (See Table 77 on p. 227 of the FEA. This comment was updated based on the FEA for the Table # and the page #. BMBP Comment, p. 19, par. 4)

“Table 78 on p. 229 reveals how excessive “temporary” road construction would be at 55.77 miles of ground disturbance under alt. 2, 71.42 miles of disturbance under alt. 4, and an even more extreme 86.26 miles of ground disturbance from “temporary” road construction under alt. 3. This is the most excessive mileage of “temporary” roads that I’ve seen for a single timber sale over the past 32 years of forest monitoring.” (BMBP comment, p. 19, par. 5, updated for changes in the miles of ground disturbance and the changed Table and page numbers in the FEA.)

An example of consequences of so much road construction and opening:

Cumulative effects analysis must take into consideration the cumulative effects over time of past management, including prior reduction of hiding and thermal cover and increased access for human disturbance.

Yet this is absent from the cumulative effects analysis for Gray wolf. The analysis lacks specific outcomes from past management. There is no specification as to what kind of degradation and how much degradation to habitat conditions for wolf prey species derived from the McKay and Spears timber sales and earlier timber sales. (BMBP comments, p. 14, par. 8)

Our other comments regarding impacts to detrimental soil impacts, wildlife species sensitive to disturbance and road impacts to RHCAs also support our position: See our comments regarding deer and elk security concerns and our concerns over "temporary" road construction and closed road re-opening in RHCAs.

Resolution

BMBP has commented on our concerns re: 'temporary' road construction and the re-opening of miles of currently closed roads. See our comments cited and quoted above. Many of our suggested resolution remedies are already requested under the heading of other issues, such as ESA—re: Gray wolf, potential Clean Water Act violations, and under NFMA—MIS viability.

*Drop the re-opening of closed roads that are not being maintained for seasonal use or were closed for ecological protection reasons, such as hydrological connections, soil erosion, and wildlife disturbance, as well as closed roads that have already grown over, or would require reconstruction.
*Drop re-opening of closed roads and 'temporary' road-building in, or adjacent to RHCAs.
*Drop all 'temporary' road construction.
*Decommission fully all roads within RHCAs except for major roads not causing ecological damage.
*Reduce overall road density to less than Forest Plan standards, based on best available science.

Potential Violation of Snag Density and Size Requirements

Our comments explain our concerns: See our snag density and abundance related comments under NFMA MIS species viability above regarding Primary Cavity Excavating woodpeckers and Pileated woodpecker. Our comments expressed concern over the elimination of future large snags by logging large hazard trees and logging too many existing mature trees through planned logging to very low basal area retention. re: Pileated woodpecker, other Primary Cavity excavating woodpeckers, and Northern goshawk. For instance:

"The cumulative effects analysis for Primary Cavity Excavators fails to quantify the amount of existing snag levels and future snag recruitment from the action alternatives. Instead, the analysis minimizes the potential combined loss of existing snags and the loss of future snag recruitment due to logging of mature and large trees by calling it "the potential for a slight negative trend" in future snag recruitment. The analysis does not disclose what level of snag recruitment loss would be considered "slight" and how much future snag recruitment loss there could be and with what effects to the viability of Primary Cavity Excavators.

No scientific methodology is disclosed for the conclusion that there is only potential for a "slight" negative trend in future snag recruitment.

The cumulative effects analysis for primary cavity excavating woodpeckers is inadequate due to reiteration of project design criteria that have consistently failed to avoid consequent declines in snag abundance for wildlife in timber sale after timber sale." (BMBP comments, p. 19)

Resolution:

BMBP has commented on our objection that the Mill Creek Project proposed actions could lead to a significant reduction in existing and future snag density and abundance in potential violation of Forest Plan standards.

Resolution to our objection regarding snag density includes the following modifications to the Mill Creek project:
*Scale down the timber sale so that less snags are lost and more mature trees are allowed to grow and become snags and logs to increase their abundance for wildlife.

*Increase the lowest basal area in the variable density retention range to be at least a low-range of at least 80 square feet of basal area in dry Ponderosa pine forest and at least 100 square feet of basal area in the mixed conifer stands, with higher average basal areas to allow for more natural rates of mortality over time to create snags and down wood into the future.
*Reduce the scale of commercial logging and snag reduction overall by dropping best wildlife habitat sale units based on our survey sheets, including moister mixed conifer habitat suitable for Pileated woodpecker and American marten, and stands with abundant snags currently suitable for Primary Cavity Excavating woodpeckers. Small diameter non-commercial thinning up to 9" dbh could usually still be done in these stands without harming the woodpecker species.
*Reduce planned re-opening of closed roads as suggested above under Road Density to reduce the amount of hazard tree felling involved and prevent future increased illegal snag felling for firewood.
*Drop the construction of 'temporary' roads, as these provide access for illegal snag felling for firewood as well as increasing project-associated hazard tree snag felling.
*Buffer and protect existing large snags and pockets of abundant snags from logging.

Potential Violation of Soil Protection Standards

Protecting soils from heavy equipment use, steep slope logging, and road construction and re-opening is critical for the integrity, fertility, and productivity of soils.

Organic matter such as forest litter and coarse woody debris are critical to retain for soil nutrient cycling, fertility, and carbon storage. Detrimental soil impacts from heavy equipment can last for 40-70 years or more. Logging on steep slopes and ash top soils is especially harmful, as logging on steep slopes displaces soils, contributing excess sediment to streams, and could trigger landslides or mass wasting on unstable slopes.

Ash soils are easily displaced but not replaced except in geologic time—e.g. the eruption of Mount Mazama that created Crater Lake and dispersed ash into soils across eastern Oregon and Southeast Washington. Displacement of ash soils is an irreplaceable loss.

Biomass "fuels" reduction is detrimental to soil organic matter, especially in combination with commercial logging. Logging to low basal area retention of trees contributes to loss of future organic matter for soil fertility and carbon storage. Roads are a long-term loss of productive soils and forest.

We are concerned that the cumulative impacts to soils from commercial logging to very low basal areas, logging on steep slopes, potential logging on sensitive soils, and overlapping heavy equipment use from logging, grapple piling, and biomass removal, would violate Forest Plan standards for detrimental soil impacts.

During field surveying of the commercial sale units, we witnessed very non-productive, thin and marginal soils especially on the steep slopes planned for logging. The slopes had hardly any plant cover, even in June. This could be from sensitive, marginal soil types and/or from past commercial logging combined with livestock grazing over a long period of time, with legacy soil and plant cover damage.

Our comments support our objection:

"This is a terribly high mileage of closed road re-opening, from 44.9 miles under alt. 2 to 49.66 miles [under alt. 3, and 49.65 miles under alt. 4] would be an irretrievable commitment to detrimental soil impacts and would cause much more human disturbance through increased access." (See Table 77 on p. 227 of the FEA. This comment was updated based on the FEA for the Table # and the page #. BMBP Comment, p. 19, par. 4. This comment is summarized in the FEA as Comment #108, on FEA p. 380.)

"Table 78 on p. 229 reveals how excessive "temporary" road construction would be at 55.77 miles of ground disturbance under alt. 2, 71.42 miles of disturbance under alt. 4, and an even more extreme 86.26 miles of ground disturbance from "temporary" road construction under alt. 3." (BMBP comment, p. 19 par. 5)

See our other comments referring to ground disturbance, concerns about use of heavy equipment in RHCAs, and ground disturbance from logging that could negatively affect Sensitive plant species (under Endangered Species Act violations below).

<u>Resolution</u>

BMBP has commented on our objection that the Mill Creek Project as proposed could violate Forest Plan soil protection standards. See our comments quoted and cited above.

To resolve this objection, the Forest Service needs to do the following:

*Drop sale units which are acknowledged to have already high degrees of detrimental soil impacts or sensitive soils likely to lead to violation of Forest Plan standards for soil protection with proposed management.

*Drop logging of any slopes greater than 35% to reduce potential erosion, loss of soil integrity, and potential sedimentation of creeks, if adjacent.

*Drop any sale units or parts of sale units unlikely to meet Forest Plan standards for detrimental soil standards without further mitigation, as mitigation is unlikely to be 100% effective.

*Drop all proposed construction of "temporary" roads, which are seldom fully decommissioned and become de facto system roads.

*Drop all re-opening of closed roads that are not being maintained as seasonal roads or that are ecologically destructive, such as with erosion problems or hydrological connections, or which fragment wildlife security habitat, increasing human disturbance.

Undeveloped Lands

Blue Mountains Biodiversity Project has long-standing concerns over the logging and roading of undeveloped lands, which are some of the last strongholds for wildlife and unimpeded natural ecological processes to occur outside of roadless areas and Wilderness Areas.

Our comments explain our concerns, specifically in the context of the Mill Creek project:

"Undeveloped Areas:

The undeveloped lands analysis should not be based solely on areas of 1,000 acres or more. The Malheur NF analysis identifies undeveloped lands of 100 acres or more, providing an opportunity to save smaller areas of last relatively pristine habitat for wildlife, last undisturbed or non-degraded areas for recreational nature study and solace and for reference conditions for different habitat types that are near areas where management has taken place, to guide restoration efforts based on more natural conditions.

An undeveloped area of 1,160 acres is far more valuable for preservation next to the Mill Creek Wilderness and the Wildcat Campground than for logging.

We are strongly opposed to any commercial logging, roading, and biomass removal in undeveloped lands. Drop all commercial logging, biomass reduction and "temporary" road construction within the identified undeveloped lands. See Adam and Drea's survey sheets and photos of likely undeveloped lands in commercial sale units, with no signs of past logging. Natural forest areas with no past logging or road construction are now very rare and critical to preserve in an undeveloped condition for wildlife habitat, primitive recreation, carbon sequestration and storage, and local reference conditions by which to compare the effects of logging and road construction. See Table 85 on EA p. 229 for planned acreages of commercial logging, biomass reduction, non-commercial thinning, and prescribed burning planned for the undeveloped area." (BMBP comments, p. 19, last three par.s)

Resolution:

*Please clearly identify the location and size of any undeveloped lands identified by the Forest Service so that we can evaluate which areas are artifacts of the GIS system not recording early past logging, and which have likely never been roaded or logged.

* Drop all logging or road construction or re-opening in undeveloped lands. We are strongly opposed to any logging or other development in such rare relatively pristine areas, which serve as scientific reference conditions, undisturbed wildlife habitat, fish strongholds, and primitive recreation areas

* We are opposed to converting unmanaged lands to managed lands wherever they exist.

***** See Adam and Drea's survey sheets and photos of likely undeveloped lands in commercial sale units, with no signs of past logging.

The Mill Creek Project Would Violate the Endangered Species Act

We are very concerned that the Forest Service is not adhering to the intent and management guidance of the Endangered Species Act. We are concerned regarding Forest Service disregard for the need to maintain sufficient suitable habitat and conditions to prevent a trend toward federal uplisting for Threatened-listed Gray wolf; Sensitive-listed Columbia Spotted frog and Redband trout; Vulnerable-ranked American marten; potential Threatened Canada lynx; Sensitive-listed Pacific fisher; potential Threatened-listed Wolverine; and Sensitive-listed plant species. All of these species have known active or potential suitable habitat in the Mill Creek project area that is potentially threatened by proposed management plans.

Our comments explain our concerns regarding potential violation of the Endangered Species Act through degradation or elimination of suitable and core habitat setting back species recovery, threatening loss of population viability, or otherwise contributing to a federal uplisting trend for the species:

Examples of our comments re: Threatened-listed Gray wolf:

"The EA analysis warns that: "Prey such as elk and Mule deer may be displaced during project implementation, which may include a shift onto nearby private lands…. This temporary shift in prey may encourage wolves to increase their presence in those same habitats as they disperse through the area, increasing potential for conflicts with private landowners…." (FEA p. 108, par. 5). Given these analysis findings, potential impacts to dispersing and foraging wolves could be significant to wolf recovery, as wolves may be shot, poisoned, or trapped if they are attracted to private lands where there is livestock. They could also be killed by the Oregon Department of Fish and Wildlife (ODFW) based on livestock predation judged to be by wolves. Thus the effects to dispersing wolves, who add to genetic diversity and help expand wolf range and establish new packs are not "insignificant and discountable", as claimed on FEA p. 108, last par."

"We had a positive daylight sighting by myself and two volunteers of a huge black wolf in the Paulina District of the Ochoco in the Black Mountain timber sale area. Seeing a wolf in the wild is a thrilling experience. We want Mill Creek project management to be more restrained so as not to drive Mule deer and wolves onto private lands by maintaining more hiding and thermal cover." (BMBP comments on p. 14 under "Gray wolf." The first par. of these comments has been revised in response to different wording and a different page number in the FEA for the original quote from the draft EA.)

Other BMBP comments re: Gray wolves include more comments on BMBP comment page 14 and one comment quoted above regarding road concerns and cumulative effects to wolves.

Comments re: Sensitive wolverine:

"Wolverine use very extensive home ranges for a pair of about 150 square miles, so wolverine could use most forest areas as scavenging habitat and dispersal habitat. The Ochoco National Forest on the east side of highway 26 could have suitable wolverine denning habitat at higher elevations. The Mill Creek Wilderness Area could be used as security habitat within the analysis area. Effects to wolverine should have been considered in the EA." (BMBP comments, p. 14, 1st full par., with most of this comment also identified under Consideration of Public Comments as Comment #73, on FEA p. 372.)

Comments re: Sensitive Lewis' woodpecker:

Effects to Lewis' woodpecker should have been considered in the EA analysis, as they select for old burns such as the Mill Creek fire. A Lewis' woodpecker pair nested where I live in dry Ponderosa pine and juniper forest at 3,400 to 3,700 feet elevation, using an old burn from 1996 for nesting (with successful fledglings) for about four to five years and still forage there with their young, so it is possible that Lewis' woodpeckers use the old burned areas from the Mill Creek fire in the project area. Lewis' woodpeckers also use riparian areas. Any potential impacts from logging and roading in RHCAs will <u>not</u> be mitigated if commercial logging or tree felling is allowed there as planned. (BMBP comments, p. 14, 2nd full par. The first sentence of these comments are identified in the Consideration of Public Comments as Comment 74, FEA p. 372.)

We also had comments regarding effects to Sensitive White-headed woodpecker regarding earlier planned logging removal of large tree, which is identified as Comment 75 in Consideration of Public Comments on FEA p. 372.

Comments re: Sensitive-listed plant species:

"We are very concerned about logging and roading impacts to Sensitive Calochortus longebarbatus var peckii (Peck's Mariposa lily), as it is a restricted local endemic threatened with extinction throughout its range in eastern Oregon. Most of the Peck's Mariposa lily is on the Ochoco National Forest. Only use non-commercial thinning by hand and prescribed burning outside of the spring reproductive season in potential Peck's Mariposa lily habitat.

Since Moonwort species (Botrychium) are extremely hard to find (I've only seen one in 32 years of field surveying) and often don't emerge at all in various years, not using heavy equipment and not logging or doing road construction or re-construction in RHCAs would help protect any Botrychium species and other Sensitive riparian plants that may occur.

We are also opposed to steep slope logging due to potential negative impacts to Sensitive plant species in riparian areas below the steep slopes, with potential sediment increases. See p. 79 of the EA, 2nd par. We are also opposed to "temporary" road construction and logging within RHCAs due to potential impacts to as yet undiscovered Sensitive plants." (BMBP comments on p. 13. The comments on Peck's Mariposa Lily are condensed as Comment 132, and our comments re: Botrychium species are condensed as Comment 133, both in Consideration of Public Comments, on FEA p. 396.)

Re: Invasive Plants as a threat to Sensitive plants and Plant biodiversity:

"With extensive bare ground areas in the Mill Creek project area and already established exotic invasive plants, including in riparian areas, cattle grazing and past timber sales have created a lot of potential for out of control invasive plant populations, which are called "not systematically inventoried or controlled" on EA p. 94. Thus, we are deeply concerned, based on both our field surveying and the EA, that the extensive ground disturbance and increased road access from the proposed Mill Creek timber sale should be significantly scaled down or dropped altogether. Closed road re-opening should be cancelled and ground disturbance should be kept to a minimum by thinning far less acreage with less intensive logging and biomass reduction. There should also be no "temporary" road construction, which often is never fully decommissioned, becoming de facto system roads that increase access for introduction and dispersal of exotic invasive plants. Avoid using burn piles. Do non-commercial thinning by hand. Drop much of the commercial logging proposed based on our recommendations." (BMBP comments, p. 13, par. 4. Parts of our comments on invasive plants are identified as Comments 135 and 136, on FEA p. 396, under Consideration of Public Comments.)

There are additional comments regarding invasive plants on p. 13 of our comments.

Comments relevant to contributing to a trend toward federal listing for wildlife species under the ESA can also be found quoted above under NFMA—MIS viability, re: MIS woodpeckers and re: American marten. Comments relevant to contributing to a trend toward federal listing for aquatic and riparian species can also be found under Forest Plan violations—INFISH re: Sensitive Redband trout and Columbia Spotted frog.

<u>Resolution:</u>

Blue Mountains Biodiversity Project has extensively commented on our objection regarding violations of the Endangered Species Act. See our comment quotations and citations in the paragraphs above. Some of the species addressed in this objection have remedies cited under NFMA—MIS and other species viability above, that are also applicable to the ESA violations.
Additional partial resolutions are by species below:

Re: Sensitive Redband trout and Columbia Spotted frog and Sensitive riparian plant species:
*Drop all heavy equipment use and related commercial-size logging in potential Columbia Spotted frog habitat and Redband trout habitat stream reaches and within RHCAs in general except for aspen stand restoration-related conifer thinning up to 15" dbh or less, as long as trees contributing to bank stability and primary stream shading are retained. Buffer and protect any Sensitive plants found in current or pre-implementation surveys.

Re: Gray wolf:

*Retain more good security cover (hiding and thermal) for elk and deer where there is high use by elk and deer, and through dropping sale units suitable in habitat for other density-related species, such as Northern goshawk, American marten, and Pileated woodpecker.
*Drop construction of ‘temporary’ roads and greatly reduce the proposed re-opening of closed roads to protect Gray wolf security during dispersal as much as possible.
*Drop logging and roading in all identified undeveloped or never logged lands.

Re: potential Pacific fisher:
*Drop all commercial logging of LOS stands with suitable habitat for Pacific fisher, such as old growth moister mixed conifer.
*Retain more mature Grand fir and Douglas fir wherever it would naturally occur (e.g. in moist mixed conifer, in riparian zones, on North to Northeast facing slopes, and in high elevation mixed conifer) so that more mature Grand fir and Douglas fir will survive to become suitable hollow denning trees.
*Drop all known suitable Pacific fisher habitat
*Drop all logging and roading in undeveloped or never logged lands in the project area.

Re: potential Wolverine:
*Drop all logging and roading in undeveloped lands in the project area.

Re: Sensitive Lewis’ woodpecker and White-headed woodpecker:
*Scale back the timber sale commercial logging and preserve more mature trees to grow into large and old trees needed by both of these woodpecker species. Buffer all large snags from logging. Don’t log any trees >/= 21” dbh as proposed in alternative 4 Modified.

Re: Sensitive plants: See our resolution remedies in our comments re: Sensitive plants above.

IV. The Mill Creek Project Would Violate the Clean Water Act

See section V, below, for further objections based on potential violations of the Clean Water Act and Aquatics concerns.

<u>Resolution</u>

*Drop planned commercial size logging and heavy equipment use in the RHCAs, except for aspen stand restoration-related conifer thinning up to 15” dbh which retains all conifers contributing to stream bank stability or primary shading of a stream.
*Drop all re-opening of closed roads and construction of ‘temporary’ roads within, or adjacent to, RHCAs.
*Drop any planned logging equipment stream crossings.

Inadequate Analysis and Mitigation Regarding Effects to Climate Change

Once again, the Forest Service fails to accept responsibility for their increasing contributions to climate change through the increasing scale and pace of incremental deforestation and carbon storage reduction through repeated timber sales at an accelerated pace, scale, and intensity, including the Mill Creek project timber sale. See our related comments below:

“As usual, the Forest Service’s analysis of carbon and climate change is so biased that it could have been written by a timber lobbyist. The carbon and climate change section of the EA fails to disclose significant controversy that would refute and correct many of these statements and assumptions, such as failing to recognize the cumulative contributions to Greenhouse gas emissions producing the climate change disasters; the assertion that the Mill Creek timber sale does not fall into the main contributor of Greenhouse gases as “Forestry”’ that there is higher release of CO2 emissions by wildfire, drought, and insects/disease than by logging, when logging is Oregon’s biggest contributor to CO2 emissions; by failing to disclose the contributions of timber sale Greenhouse gas emissions and its reduction of forest carbon sequestration and storage; and that the proposed actions “are positive factors in carbon sequestration.” (BMBP comments, p. 20)

Resolution

BMBP has often commented regarding Forest Service failure to acknowledge and mitigate their contributions to catastrophic climate change through their increased intensity and scale of commercial logging to unsustainable levels in multiple large timber sales, including the Mill Creek project.

To resolve this problem, the Forest Service needs to make the following modifications to the Mill Creek project, as suggested in other proposed resolution remedies above:
* Significantly decrease the geographic scale of the Mill Creek project commercial logging of mature trees.
* Significantly decrease the intensity of planned commercial logging by leaving higher minimum and average basal area per acre.
* Retain all large tree structure, including snags, down wood, and large live conifer trees in all aspen stands (equal to or greater than 15" dbh to allow for increased growth into large and old trees) to retain the most significant existing carbon storage and increase the biodiversity of the aspen stands.
* Retain more mature trees to sequester carbon and become large trees by dropping the best wildlife habitat from logging as per our survey sheet recommendations.
*Retain more soil sequestration of carbon by dropping excessive down wood removal (as in biomass "fuels" reduction)
*Drop logging in sensitive soil areas and in sale units that would exceed Forest Plan detrimental soil impact standards, as specified above.

V. BMBP's Aquatics-Focused Objections

We are heartened that the agency greatly decreased the amount of planned logging within RHCAs. As described in the Draft Decision Notice, commercial logging has been decreased to a total of 58 acres and noncommercial logging has been decreased to 774 acres. While we greatly appreciate these key steps in protecting streams and water quality, we remain concerned about the still large-scale impacts of 832 acres of thinning (commercial + noncommercial), along with prescribed burning on 1,053 acres within RHCAs—for a total of 1,885 acres of logging and burning within RHCAs (Draft Decision Notice pg. 4, Table DN-1).

We are also concerned that the final decision may include modifications that would increase logging in RHCAs, or seek to re-incorporate large tree logging. We sincerely hope that the USFS further scales back or drops logging within RHCAs, but at the very least does not modify the final decision to increase impacts of logging or roading within RHCAs.

We remain concerned that the planned logging and burning within RHCAs, as well as extensive upland logging, may result in:

- Violations of the Clean Water Act (CWA) and State standards for water quality
- Violations of Forest Plan standards for RMOs
- Degradation of water quality, such as increases in stream temperature and excess fine sediments
- Retarding attainment of RMOs
- Alteration of watershed hydrology including increase in peak flows, erosion, sediment movement,
- Changes to stream channels such as ongoing erosion and instream sediment production
- Degradation of habitat and water quality in headwater and intermittent streams
- Loss of connectivity for aquatic and terrestrial species
- Destruction or degradation of wildlife habitat in riparian forests
- Loss of viability and downward trends for special status, at-risk, or imperiled aquatic species such as Redband trout
- Exacerbation of the negative effects of climate change on streams and aquatic species

CWA, State and Forest Plan Water Quality Standards:

Water temperatures in streams within the project area exceed state and Forest Plan water quality standards. The FEA and Aquatics Report do not include clear data summaries. The NorWeST stream temperature data showed stream temperatures in the project area well above the 18 degree Celsius state temperature standard in many stream reaches, with some temperatures-- for example in Mill Creek-- reaching well above 20 degrees Celsius with temperatures such as 25 degrees Celsius. There are likely many more impaired streams and stream reaches that exceed temperature and other water quality standards within the project area. It is also not clear whether the FS has submitted all the water quality monitoring data it possesses to ODEQ.

The FEA (pg. 178) inappropriately downplays stream temperature violations within the project area by that "[o]n average, stream temperatures are right at the 18 degree C threshold set forth in the Oregon State water quality standards (Aquatics Report, Appendix A, Figure A-5) for trout and salmon rearing and migration but higher than the desired threshold of 13.0ºC for spawning." Many stream temperatures are well in excess of RMOs and/or water quality standards. Calculating an average of stream temperatures across the area is not in keeping with RMOs or state water quality standards, and inappropriately masks the severity of water quality violations in specific streams.

In addition, streams within the Mill Creek project area are subject to state *and* Forest Plan water quality standards. The INFISH RMO is 13 degrees—a standard which the FS is violating. Unless the standard is changed, the FS has a clear responsibility to abide by it, rather than attempt to dismiss and ignore the existing standard. The Mill Creek analyses note that the RMO is based on "Bull trout presence or potential". Do streams in the project area have the potential to support Bull trout, thereby aiding in their recovery? Did Bull trout once exist within the project area? Does the project area provide clean cold water that is important Bull trout further downstream, and so INFISH standards recognized the importance of a colder standard for the area?

From the Mill Creek Aquatics Report and BE:

> *"The temperatures in the INFISH Interim Riparian Management Objectives are based on Bull Trout presence or potential. Redband Trout are the only salmonid currently present in the watershed. The Ochoco National Forest has incorporated into the LRMP to not measurably increase the 7-day moving average daily maximum water temperature on any adult holding habitat or spawning or rearing habitats in the planning area based on these interim RMOs. The state water quality standards more accurately reflect attainable conditions and target species (Redband Trout) found in the project area. The state standards (340-041-0028, approved by EPA Mar 2004) identify the seven-day-average maximum temperature of streams listed as having salmon and trout rearing and migration should not exceed 18.0ºC (64.4ºF). The state standards identify the seven-day-average maximum temperature of streams listed as having salmon and trout spawning should not exceed 13.0ºC (55.4ºF)."*

Temperature exceedances within some of these creeks are often substantial and frequent. Please see BMBP's addendum materials for our downloaded data from ODEQ's database. The spreadsheet is an accompaniment to NorWeST monitoring locations; you can visit the USDA's NorWeST site for monitoring location ID numbers.

Streams in violation of state and Forest Plan standards are proposed for logging within their RHCAs. While there is a clear and pressing need to prioritize the protection of stream water quality and habitat, the FS is instead focused on prioritizing HRV in order to conduct widespread and heavy logging. Logging and associated activities as proposed in the Mill Creek sale FEA are likely to raise stream temperatures, in violation (or further violation) of state (as well as Forest Plan) standards. Even small or localized temperature increases may be in violation of standards, and can have significant, negative, and long-term effects on imperiled fish in these watersheds. Should the FS move forward with this project, such significant effects need to be fully analyzed using an Environmental Impact Statement (EIS).

We also want to note that shade within RHCA buffers, while certainly an important factor in protecting stream temperatures, is often a poor predictor of stream temperature. To emphasize this point, we've included excerpts below from the USFWS 2010 Final Rule (50 CFR Part 17 Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for Bull Trout in the Coterminous United States; Final Rule). These excerpts discuss how other activities and watershed dynamics, even in uplands, can negatively affect stream temperature (bolded emphases added). While the excerpts discuss a specific HPC for Plum Creek, the watershed hydrology dynamics are general and apply to other forests as well.

- *"Adequate stream temperatures are addressed in a number of ways, including the use of buffers that provide shade,* ***road-management practices that avoid sedimentation, and maintenance of natural hydrologic regimes that contribute cool water to streams.***

  The buffers on streams and wetlands are designed to provide adequate shade and to avoid increasing sunlight exposure, which could result in stream warming. Stream buffers and road standards also ***address sediment delivery to avoid artificial filling of pools, which could lead to increased stream warming.*** *The HCP addresses bank stability and large wood recruitment which should help store fine sediment and provide for suitable substrates for bull trout spawning. It also includes provisions to manage forest cover in the rain-on-snow subbasins to maintain normal storm flows, and is designed to maintain floodplains and wetlands in a manner that retains the functions of the hyporheic zone and off-channel habitats. Water quality and quantity are addressed through a variety of* *mechanisms, including protecting the natural hydrograph and addressing sediment and temperature needs. HCP provisions that protect the natural environment should assist native fish in maintaining a competitive advantage over nonnative species."*

- *"**Stream temperature is addressed through a number of avenues including buffers that provide shade, road-management practices that avoid sedimentation, riparian and grazing management, and maintenance of natural hydrologic regimes that contribute cool water to streams**. The buffers on streams and wetlands are expected to provide natural levels of shade to avoid increasing sunlight, which could result in stream warming. **Further, road and wetland prescriptions are expected to maintain the natural hydrological regime so that streams are not abnormally dry during periods of the year when this could exacerbate warming problems. Stream buffers and road standards also address sediment delivery, which will in turn avoid artificial filling of pools, which could lead to increased stream warming. The HCPs are designed to maintain floodplains and wetlands in a manner that retains the functions of the hyporheic zone and off-channel habitats. Water quality and quantity are addressed through a variety of mechanisms, including protecting the natural hydrograph and addressing sediment and temperature.** Provisions of the HCPs that protect the natural environment should assist native fish in maintaining a competitive advantage when that is possible."*

While we understand that stream shade is a very important component of RHCAs and in protecting stream temperatures, other activities and dynamics can and do affect stream temperatures, such as upslope logging, road-related activities, and thinning within RHCAs. It's also important to note that the FS plans to log (both NCT and CT) and burn approximately 1,885 acres of within RHCAs in the Mill Creek sale. Such extensive logging will not only affect stream shade, it will also negatively impact water quality and stream habitats through a variety of mechanisms as described above in the USFWS's 2010 Final Rule for Bull trout.

There is a glaring lack of consistent correlation between stream temperatures and stream shade in other creeks within timber sales on eastside forests. For example, in several recent sales in the Malheur National Forest, stream shade is not a strong or reliable predictor of stream temperature. In many instances, shade standards were being met, but stream temperature standards were *not* being met. Hence, attainment of stream shade standards is not a reliable indicator for the attainment of stream temperature standards. Detailed examples are given below:

In the Camp Lick timber sale, nine out of 13 streams for which both stream shade and temperature data were reported in NEPA documents (Camp Lick Aquatics Report Table 3) showed stream shade meeting standards while stream temperature *did not* meet standards. So, using stream shade as a surrogate for temperature would fail in one or more stream reaches in 69% of creeks for which data were collected. Looked at another way (broken down by reaches rather than streams) in the 25 reaches for which both stream shade and temperature were reported in Camp Lick NEPA documents, the data show streams meeting stream shade standards but NOT meeting stream temperature standards in 13 out of 25 reaches. That's a 52% failure rate regarding the accuracy of using stream shade as a surrogate for stream temperature. Only one instance went the other direction—i.e., showed stream shade standards not being met, while the stream shade standard was met.

In the Big Mosquito timber sale, using stream shade as a surrogate for temperature failed in one or more reaches in 80% of creeks for which data were collected (Big Mosquito Aquatics Report Table 1). Stated another way, four out of five streams for which both stream shade and temperature data were reported showed stream shade meeting standards while stream temperature did *not* meet standards.

In the Ragged Ruby timber sale NEPA documents (Ragged Ruby Final Aquatics Report Table 3) shows that using stream shade as a surrogate for temperature would have failed in one or more reaches in 42% of streams for which data were reported. Five of the twelve streams showed stream shade meeting standards while stream temperature did not meet standards.

In the Magone timber sale, data for both stream shade and temperature were provided for six reaches across six streams (i.e., one reach per stream; Magone Aquatics Resources Report Table 1). In three of the six streams, stream shade was reported as meeting objectives, while stream temperature was not. This reflects a failure rate of 50% if the attainment of stream shade objectives was used as a surrogate for predicting attainment of stream temperature standards.

There is evidence showing that headwaters and tributaries are very sensitive to temperature increases due to logging impacts and have a substantial effect on downstream temperatures. Studies such as Pollock et al. 2009, which found that stream temperature was more closely associated with degree of logging within catchments than with streamside vegetation (Pollock et al. 2012). Another example is Guenther et al. 2012, which found increases in stream temperature in relation to selective logging. The Guenther study found increases in bed temperatures and in-stream daily maximum temperatures in relation to 50% removal of basal area in both upland and riparian areas. Increases in daily maximum temperatures varied within the harvest area from 1.6 to 3 degrees Celsius.

Headwater streams and non-fish bearing streams are particularly at risk and need more, not less, protection than they currently have. In order to protect downstream fish bearing reaches, headwater streams need at least as much protection as larger downstream reaches (Rhodes et al. 1994; Erman et al. 1996; Espinosa et al. 1997). Negative impacts to upstream reaches, such as higher temperatures, increased sediment loading, down-cutting, and altered hydrographs also negatively affect downstream reaches. In the Mill Creek project area, this is particularly relevant to the headwater streams and draws present throughout the project.

Protecting groundwater storage, groundwater flows, and hyporheic flows associated with intermittent streams is crucial for protecting temperatures in larger downstream perennial streams. Cold water inputs from intermittent streams to downstream reaches are essential providing cold water refugia for special-status and imperiled aquatic organisms, including ESA-listed fish (Caissie 2006; Ebersole et al. 2015; Grant & Swanson 1990; Groom et al. 2011 (a); Groom et al. 2011 (b); Jones & Grant 1996; Pollock et al. 2009). Patches of cold water refugia are crucial for fish. Shallow groundwater patterns can be important for influencing stream temperatures (Poole et al. 2008), and so are likely vulnerable to upslope logging (Caissie 2006). In research in eastern Oregon, Ebersole 2015 found that dry streams supplied cold water to downstream reaches at confluence sites. Such cold water refugia habitats are important for fish, which were observed at these locations.

Logging within RHCAs or forest wetlands can magnify water quality and hydrology impacts from upland logging (Hicks et al. 1991; Moore & Wondzell 2005). Studies such as Janisch et al. (2011 and 2012) and Buttle et al. (2009) found that wetlands associated with headwater and low order streams are more common and influential on stream hydrology and water quality than previously realized. Many of the wetlands associated with first order streams are small and fall below the size requirements for protection in relation to timber sales (Janisch et al. 2011; Janisch et al. 2012; Buttle et al. 2009). Janisch et al. 2012 found streams in headwater catchments with wetlands had larger and more consistent increases in temperature in relation to adjacent logging than did the catchments that did not contain wetlands (Janisch et al. 2012). The authors found that streams with wetlands present in their catchments tended to have streams with finer sediments in their substrates. BMBP is opposed to commercial logging and extensive/heavy NCT thinning within RHCAs.

Even limited logging within RHCAs may compromise the ability of the riparian buffer to protect streams or ameliorate the negative impacts from upland logging, including increased stream temperatures and the delivery of sediment and nutrients into waterways. Logging adjacent to streams will substantially worsen these ecologically damaging dynamics. Small streams are particularly vulnerable to temperature, even with limited selective logging. There is evidence to suggest that wider buffer widths may be necessary to protect stream temperatures, particularly in intermittent and headwater streams, and particularly when logging within 100’ of streams. Parameters that influence stream temperatures include, stream shade, overland flow, groundwater and hyporheic flows, and groundwater storage. Alteration of these parameters can increase stream temperatures, especially in small streams. Logging alters these parameters, and degrades the ability of these parameters to support cold water, and is likely to increase stream temperatures. (Caissie 2006; Davies & Nelson 1994; DeWalle 2010; Kiffney et al. 2003; Groom et al. 2011 (a); Groom et al. 2011 (b); Jones et al. 2006; Sweeney & Newbold 2014; Pollock et al. 2009; Wigington et al. 2006; Poole et al., 2008; Ebersole et al. 2015; Poole & Berman 2001; Newcombe & Jensen 1996).

Studies have found selective logging may be associated with increases of instream fine sediments (Kreutzweiser et al. 2005, Miserendino and Masi 2010), changes in macroinvertebrate community structure or metrics (Flaspohler et al. 2002, Kreutzweiser et al. 2005), alterations in nutrient cycling and leaf litter decomposition rates (Lecerf and Richardson 2010), and increases in stream temperatures (Guenther et al. 2012). Flaspohler et al. (2002) noted that changes to biota associated with selective logging were found decades after logging. While these studies did not take place in eastern Oregon, they strongly suggest that alterations caused by logging within riparian buffer zones may result in significant changes in water quality parameters and stream biota in many areas; these results are likely tied to dynamics that may be common to many forested streams to varying degrees.

The FS itself has acknowledged that: “[r]esearch has shown that effective vegetated filter strips need to be at least 200 to 300 feet wide to effectively capture sediment mobilizing by overland flow from outside the riparian management area”

(Draft Blue Mountains Forest Plan Revision vol. 2 pg. 52). In addition, Best Management Practices may need to be specially designed to ensure protection of Bull trout (USFWS 2010).

We also want to note the already high soil detremental conditions in many sale units. This potentially raises concerns regarding erosion and sediment delivery into streams, as well as ground water impairment.

We also want to highlight here the importance of protecting stream temperature in order to provide for recovery of sensitive and at-risk species such as Redband trout.

BMBP discussed these issues and our concerns in our comments on the Draft Environmental Assessment for the Mill Creek project, pg. 32.

PACFISH/INFISH and Riparian Management Objectives (RMOs):

PACFISH/INFISH no-cut stream buffers should be adhered to and fully implemented. No commercial logging should occur with RHCAs, and noncommercial logging should be dropped or severely scaled back. Logging within RHCAs will retard the attainment of RMOs, including quantitative standards such as stream temperature, fine sediment, pool depth, embeddedness, LWD, and other RMOs. The FS appears to be lacking key baseline data for RMOs within the project area, particularly in relation to fine sediments and stream temperatures.

For example, the FEA acknowledges that *"There is very little measured sediment data for the project area so certain assumptions must be made to assess both the existing condition of sediment delivery within the watershed and to be able to compare that with the proposed action(s)."*

Compliance with RMOs and state standards should not rely entirely on BMPs and PDCs, which are largely voluntary and subjective. Unfortunately, the FEA does just that, and makes sweeping and largely unsubstantiated assumptions regarding BMPs and PDCs completely eliminating all potential fine sediment inputs. The FEA states: "*It is assumed that there will be no anticipated detectable sediment delivery from the vegetation management units because of widespread use of BMPs and specific project design criteria (PDCs), and variation in the landscape roughness factors."*

The FEA goes on to note: *"Small portions of McKay (69 acres, 0.11%) and Lower Ochoco Creek (197 acres, 0.26%) overlap the project area, and ~1.28 miles of reopened existing temporary harvest roads within the Lower Ochoco Creek Watershed. Given these small acreages, for this analysis* ***it is assumed*** *that there will be no significant contributions to EHA and sediment delivery from these two watersheds and therefore, EHA and sediment delivery in those watersheds will not be analyzed further in this EA."* Localized impacts have been shown to have negative and potentially long-term impacts on water quality and vulnerable aquatic species.

In addition, the watershed ratings (FEA pg. 168) discloses that more than half of watersheds are not meeting "good" condition in their watershed ratings.

Overwhelming evidence shows that logging has negative effects on streams, water quality, and watershed hydrology. This is especially true for logging within riparian corridors, but is also true in regard to upland logging, particularly when large tree logging, logging on steep slopes and sensitive soils, and road-related activities are proposed. The Forest Service consistently fails to adequately consider the well-documented risks of logging and associated activities (such as road-related activities) on water quality, streams, and watershed hydrology.

In addition to some of the negative effects described above, logging is likely to increase surface runoff and overland flow, potentially delivering warmer water (and excess sediments) into streams more quickly and with a greater volume. This can affect peak flows, increase stream temperatures, and cause erosion as well as changes to in-stream structures and habitats. This is particularly a concern given the especially the extensive and heavy logging proposed in the Mill Creek project. Increased surface runoff and faster delivery of water into streams also means that less water becomes groundwater. This decreases groundwater storage, groundwater flows, and hyporheic flows (Coutant 1999; Croke & Hairsine 2006; Jones & Grant 2006). Logging can cause decreases in summer baseflows in the long-term. Decreased canopy cover due to logging can cause more snow to accumulate in these more open areas, which alters the timing and magnitude of runoff from snow melt. This can also cause changes to peak flows (Harr & Coffin 1992). Should the Mill Creek project move forward, it would create more open canopies across the landscape, which would then increase solar radiation inputs in watersheds, and as a result may increase the amount of early snow melt. This, in turn, may further alter peak flows and groundwater recharge and the hyporheic cold water delivery downstream, including to perennial streams (Caissie 2006). Logging alters microclimates, creating hotter, drier, and windier conditions that stretch beyond forests directly affected and into adjacent forests, sometimes for distances of hundreds of feet. Such microclimate edge effects could extend into the entirety of riparian buffers, especially in smaller headwater streams (Chen et al. 1995; Brosofske et al. 1997; Chen et al. 1992).

The FS is relying heavily on the Harley 2020 paper for the agency's rationale for logging within RHCAs because, supposedly, the "outer portion" of RHCAs is essentially the same as upslope regions. The Aquatics Report states, for example: "Studies in the Blue Mountains have found that fires rarely stopped at the edge of riparian areas. Rather, they typically, although not always, burned right through the riparian area (Harley et al. 2020).

However, we are extremely concerned about the agency's reliance on a small number of studies to ignore long-held and widely agreed upon scientific consensus regarding the importance of riparian buffers, such as the no-cut buffers required under PACFISH/INFISH. The Harley paper, for example, has small sample sizes, particularly with regard to north/northeast facing slopes and streams. We are very concerned that these and other crucial details are being overlooked or ignored by the FS.

For example, the Harley 2020 study shows sample sites that are predominantly on south or west facing slopes. The Baker study area plots have a total of 35 upland sites. 20 of those appear to be on primarily on south-facing slopes. Of the 15 sites that have more of a northern or eastern slope orientation, 5 appear to also include strong southern or western influences, as they are somewhat northwest or southeast facing. Of the 35 upslope sites in the Baker study area, only 10 appear to be clearly on slopes that have a strong north, northeast, or east orientation.

In the Dugout study area, there appear to be a total of approximately 75 upland sites. Only 12 of those sites appear to be on slopes with strong and predominant north, northeastern, or eastern facing. Of these, four of which are on ridgetops.

Riparian sites are almost entirely situated all on the larger order streams within the study area, which tend to be less incised and more open. Only 8 suites were situated on smaller tributaries, and only one of these sites faces N/NE.

Figure from the Harley paper:

Eastern Oregon riparian versus upland fires   *Int. J. Wildland Fire*   603

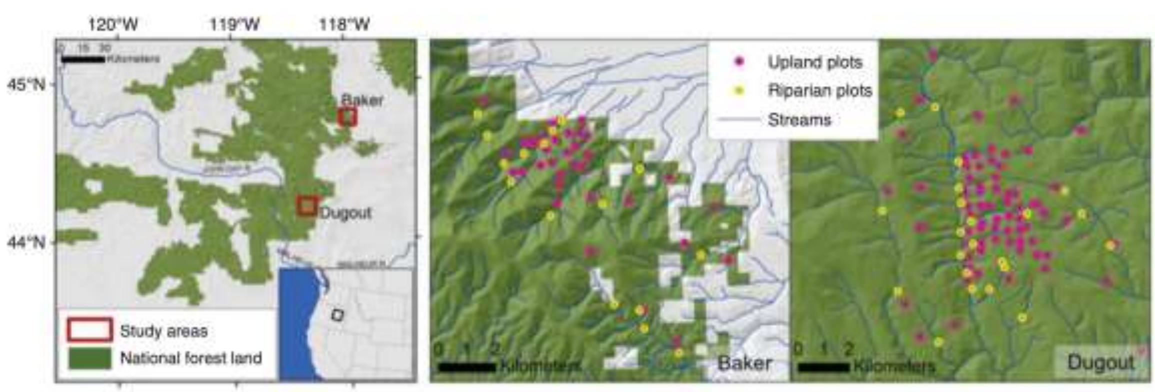


Fig. 1. Location of Baker and Dugout study areas and riparian and upland plots in the Blue Mountains of eastern Oregon, USA. Most of the riparian plots were sampled for this study and most of the upland plots were sampled for an existing study (Heyerdahl *et al.* 2001).

The Haley paper also notes that "[i]n the two study sites in the Blue Mountains of eastern Oregon during the period 1650–1900, **historical fires burned more frequently in upland forests compared with adjacent, downslope riparian forests.**" However, the difference between riparian and upland fire intervals at both Baker (5 years) and Dugout (3 years) was not statistically significant (P . 0.10) and likely not ecologically relevant.

The lack of a statistically significant signal can be due to a variety of factors, including small sample size. In this instance, the sample size for sites representing north/northeast facing sites was an even smaller proportion of an already small sample size, and seems to have constituted far less than half of the sample sites. While statistically significant differences were not found between upland and riparian forests, there was a clear trend pointing to a difference between the two-- even with the small data set in this one scientific study. Given the paucity of information being used to rationalize extensive logging within RHCAs, the FS has a responsibility to, at the very least, take into account data trends and the more detailed and fine-scale results within these two studies. The authors in the Haley et al. study go on to dismiss any ecological significance, but do not provide any evidence or rationale for this dismissal.

In addition, the FS has ignored ample and well-documented evidence regarding the negative impacts logging and associated activities have on RMOs such as stream temperatures, fine sediments, LWD, pool frequency, and others, as well as peak and base flows, watershed hydrology, and other parameters.

The Harley study relies heavily on results from Olson 2000 (a master's thesis). The Olson 2000 study notes that sample size may well have played a role in not finding statistically significant differences in relation to aspect:

> *"When fire return intervals were separated according to aspect, no significant differences in fire return interval lengths were found between aspects. When riparian and upslope fire return intervals were compared within each aspect, the only significant difference was that west-facing riparian fire return intervals were longer and had a wider confidence interval than west-facing upslope fire return intervals.* ***It is very likely that the results of aspect analyses suffer from a small sample size. Perhaps with a larger sample size more significant differences would have been found between the different aspects, since it appears there may be a trend of decreasing fire return interval lengths from west-facing plots to east-facing plots to north-facing plots (Figure 19). Additionally, riparian fire return intervals appear to be somewhat longer than upslope fire return intervals for each of these three aspects, and the difference between the riparian and upslope fire return intervals may be decreasing from west-facing plots to east-facing plots to north-facing plots. There are too few fire return intervals from south-facing plots to comment on where they fall within the trend."***

Other excerpts from Olson's 2000 master's research showing important details that were not captured in FS characterizations:

> *"When both riparian and upslope plots within only the Marble Creek drainage were analyzed, only the riparian fire return intervals from the* ***north-facing halves of the riparian plots stood out as being different than the other aspect categories*** *(Figure 15). They were significantly longer than their upslope counterparts (26 year and 15 year WMPIs, respectively, p = 0.01, two-tailed Mann-Whitney U-Test for unmatched samples) and* ***were also significantly longer than fire return intervals from the southfacing halves of the riparian plots*** *(15 year WMPI, p = 0.01, two-tailed Mann-Whitney UTest for unmatched samples)."*

> *"More fires burned into the south aspects of the riparian plots than fires that burned into the north aspects of the riparian plots, and this is true for all fire extent size classes.* ***This may indicate that fires on southfacing slopes tended to back down into the riparian zone and then stop along the creek, whereas either fewer fires occurred on north-facing slopes, or they were less likely to back down into the riparian zone."***

> *"Stream Size Comparisons. Fire return interval lengths in riparian forests are slightly longer but not statistically different from fire return interval lengths in upslope forests, and this is consistent for plots along both large and small streams."*

The study analysis appears to include very small isolated fires in determining fire return intervals. For example, very small fires that burn only a few trees (for example after a possible lighting strike) seem to be included in determining watershed-scale fire return intervals.

In review of these maps, we note that there were substantial portions of the study area that had no evidence of any fire, including the headwaters/upper watersheds of Mill, Marble, and Salmon Creeks. This suggests that there are areas, particularly within riparian areas and in the upper watersheds, that have longer fire return intervals and have been acting as fire refugia for centuries. Such forests provide important habitat for species that rely on mature and old forests, and dense and complex canopy forests. These forests also provide cold clean water.

Several locations that did show repeated fire along the mid and lower portions of Mill and Marble creeks appeared to have very isolated and small-scale fire activity, possibly suggesting not only extremely small fires such as those related to lighting strikes that burn less than one acre—they also suggest that those locations are attracting repeated fire strikes at the same ridge tops or topographically high point.

Olson 2000 mapped fire years for "every year there was clear evidence of fire scarring" (Appendix E. pp. 181- 237) showing 1428 through 1972. We want to note some finer scale detail from those maps that we observed:

For the Mill, Marble, and Salmon watersheds:

- There appears to be no evidence of fire scars shown on the maps for the upper portions of these. Also there looks to be little to no logging in at least a portion of these areas, meaning these mature and old forests have been acting as fire refugia since at least 1428.
- The maps also show no evidence of fire for these more incised, steep watersheds between 1428-1529 (~100 years).
- Between 1529 and 1645, there are only isolated incidents of evidence of fire scars at single sites in these watersheds, with the exception of 1581 when there was a second location that had "probable" fire evidence. So, between 1428 and 1646 there was no evidence of more than one isolated small fire until 1646 for the three watersheds (~218 years), with the exception of the "probable" other single location.
- Mill Creek had only isolated evidence of fire scars at single sites, with two exceptions, one with 2 sites showing evidence and the other with five (in 1783 and the other in 1828, respectively). So, aside from single isolated locations showing evidence of fire scarring within Mill Creek, there was no evidence of fire in Mill Creek between 1428 and 1782 (352 years); between 1784 and 1827 (43 years); or between 1829 and 1972 (143 years).

In addition, fire scar analyses have limitations (as does all ecological study methodology). We are concerned that some of the potentially important implications of the limitations with fire scar analyses are being ignored by the FS—with potentially very unfortunate and negative ramifications for forests. For example, we are concerned that the fire scar analyses may be artificially inflating the frequency of fire regimes because small localized fires are overrepresented and/or conflated with fire return intervals (rather than recognized as often very localized, sometimes tiny events). For example, an isolated lighting strike that burns a handful of trees, sometimes repeatedly on the same ridge in different years, does not a fire return interval make.

Use of composite fire intervals tend to shorten the time between fires and give a false interpretation of the past fire history. For example, personal communications from George Wuerthner, in our communication regarding limitations of fire scar analyses used in research with similar methodology, include:

> *"Take a hypothetical situation: Let's say you have a 1000 acre study area. You note a fire someplace in that 1000 acres every single year over a hundred year period. However, for argument's sake, each of those fires burns less than a single acre. So you have a total of 100 fires and a fire interval of 1 year. I.e. the fire scar history suggests there is a fire every year. But because each fire is less than an acre, you have only burned 100 acres in a hundred years or only 10% of the 1000 acre study site. Even at a fire every year, it would require 1000 years to get to the fire rotation.*
>
> *This is why it's important to note how large the fire is. You can do this in a number of ways including using air photos, fire atlas, or Government Land Office survey notes as Baker has done.*

Using fire scars, the best way to do this is to only include fires that burn a significant amount of the study area. In other words, again using the 1000 acres. You would ignore all the fires that are only recorded at one or even a few sights and assume they are small fires of no consequence. After all we are trying to get to the notion of how important fire was in any area and the kind of fire that burned. The only fires you would include would be the years when the majority of the study sites burned, preferably across much of the 1000 acres. You could also note the occurrence of even-aged stands across large areas that might indicate regrowth after a stand replacement blaze. That would give you the real fire rotation."

Similarly, personal communications from William Baker, in our communication regarding limitations of fire scar analyses used in research with similar methodology (and so are also relevant here), include:

"There are no estimates of historical fire rotations, the essential rate parameter of historical fires. Composite fire interval estimates are done within each site, not across sites, which is OK. But, there is little correction to remove small fires, so their MFRI is close to a mean CFI-all fires in the Baker (2017) terminology. Using Baker (2017 Table 2), to estimate fire rotation, for mean CFI--all fires, we would multiply MFRI by 2.44. For the range of MFRIs in their Table 1, which is 10.6-21.2 years, the estimated range of historical fire rotations would then be 25.9 to 51.7 years.

Based on these fire rotations, these were not frequent-fire forests with fire rotations < 25 years that would have kept fuel loads generally reduced, since fuels can recover within about 10-20 years usually. Instead, historically there would have been ample time for fuels to fully recover between fires, including plenty of fully regrown shrubs, many small trees, lots of small wood, some larger wood etc. and some stands with higher tree density. It is important to estimate fire rotations because it is well accepted now in the scientific fire community that the MFRI used in Johnston et al. does not estimate historical rates of burning and should not be used to guide restoration programs (Baker 2017). See the quotes in this paper from well fire historians that make this very clear.

Also, in the intro Johnston et al. suggest fire regimes would have been mixed severity, but then they did no reconstruction of fire severity, which of course is essential where fires where historically mixed in severity. The paper doesn't say so explicitly, but seems to assume that all fires were low-severity, and the final paragraphs even imply that higher-severity fires did not occur. Of course, what would be expected is that in moister forests, more of the fires that occurred would be higher-severity, including substantial patches of high-severity fire, whereas in ponderosa of course more of the fires would have been low-severity, with fewer that were higher-severity, as has been shown nearly everywhere that fire severities have been reconstructed in these kinds of forests. Showing, as they do, that MFRI did not differ between dry and moist forests has little meaning, since it is not the occurrence of fires, but instead fire size and fire severity that would be expected to differ. They have no data on the essential fire-severity parameter of historical fire regimes in ponderosa pine and mixed-conifer forests in their study areas, and certainly cannot conclude that historical fire regimes would have been similar in these two types of forest.

Also, their historical basal area estimates are based on just extant (live) historical trees, not dead trees present on the forest floor. Although fires may have been suppressed, there are many other sources of continuing tree mortality that could have killed and even removed many of the smaller trees present in the late-1800s (e.g., bark beetles, drought, competition, root rots etc.). They did not compare their basal area estimates to early historical reports, such as Munger 1917 to see whether extant live historical trees even approximately estimate basal area, tree density, and tree diameter distributions in the late-1800s to early 1900s. It is well known that smaller trees present in the late-1800s would likely have burned, died from competition or other mortality agents, and decomposed since then, particularly in moister forests. Since logging is often aimed at smaller trees, and they have no validation at all that smaller trees are correctly reconstructed by using just extant live trees that happen to still be present, this study does not provide a sufficiently sound basis for any restoration logging program."

BMBP discussed these issues and our concerns in our comments on the Draft Environmental Assessment for the Mill Creek project, pg. 37.

Roads

There is overwhelming evidence based on peer-reviewed science that road and haul-related activities proposed in the project harm water quality and imperiled aquatic species– particularly at the scale and intensity which the Mill Creek FEA is proposing.

Increasing road densities in the Mill Creek project area would be harmful to aquatic habitats as well as to terrestrial and avian species that are sensitive to forest fragmentation and road-related disturbances. Note: "temporary" roads are not temporary, and the FS loses credibility and public trust every time the agency attempts to claim otherwise, despite evidence and common sense. ESA-listed fish and aquatic species continue to be jeopardized and face downward population trends as a result of high road densities across eastside forests. As a result, it is all the more important NOT to build or rebuild roads in the few areas that aren't already overburdened with a high density of roads.

The bloated road networks on National Forests lands threaten the long-term viability of imperiled fish and aquatic species. The Forest Service notes (USFS 2015) that "*[t]he most important road related environmental issue is the effects of roads on aquatic resources in general, and specifically Threatened, Endangered and Sensitive aquatic species (bull trout, mid-Columbia steelhead, and Columbia spotted frog).*" Increased road densities have been correlated with low population levels and declines of aquatic species that rely on clean, cold waters (USFWS 2010a). Of particular concern are roads that interact with stream channels. Such roads are likely to have disproportionately negative effects on water quality and sensitive fish (USFS 2018). Sedimentation from roads is known to be one of the largest contributors for degradation to water quality as well as a source of degradation to fish habitat and spawning areas. Roads in disrepair create safety issues and conflicts with protection for natural resources, especially for those such as water quality, aquatic species, and functioning wetland processes.

Carnefix and Frissell (2009) discussed impacts from roads, and show that significant negative impacts to sensitive aquatic species are present at road densities greater than one mile per square mile: *"Multiple, convergent lines of empirical evidence summarized herein support two robust conclusions: 1) no truly "safe" threshold for road density exists, but rather negative impacts begin to accrue and be expressed with incursion of the very first road segment; and 2) highly significant impacts (e.g., threats of extirpation of sensitive species) are already apparent at road densities on the order of 0.6 km per square km (1 mile per square mile) or less. Therefore, restoration strategies prioritized to reduce road densities in areas of high aquatic resource value from low-to-moderately-low levels to zero-to-low densities (e.g., 1 mile per square mile, lower if attainable) are likely to be most efficient and effective in terms of both economic cost and ecological benefit. By strong inference from these empirical studies of systems and species sensitive to humans' environmental impact, with limited exceptions, investments that only reduce high road density to moderate road density are unlikely to produce any but small incremental improvements in abundance, and will not result in robust populations of sensitive species."*

Fish stocks are stronger and better distributed in areas of little or no management and low road densities, even in fire suppressed areas, and even if severe fires occur. Numerous studies and reports show that many benefits are gained by leaving forests unroaded, and to their own ecological processes (including processes involving fire, insects, and disease). (Bader 2000; Bradley et al. 2002; DellaSala et al. 2011; Frissell and Carnefix 2007; Reiman and Clayton 1997, Reiman et al. 2000, Thurow et al. 2001; Public Lands Initiative/Trout Unlimited 2004; Western Native Trout Campaign 2001).

The Federal Registrar, Department of the Interior Fish and Wildlife Service 50 CFR part 17 (2010) Final Rule for Revised Designation of Critical Habitat for Bull Trout states (emphases added): *"Sedimentation negatively affects bull trout embryo survival and juvenile bull trout rearing densities (Shepard et al. 1984, p. 6; Pratt 1992, p. 6). "An assessment of the interior Columbia Basin ecosystem revealed that increasing road densities were associated with declines in four nonanadromous salmonid species (bull trout, Yellowstone cutthroat trout (Oncorhyncus clarkii bouvieri), westslope cutthroat trout (O. c. lewisi),* ***and redband trout (O. mykiss spp.))*** *within the Columbia River basin, likely through a variety of factors associated with roads. Bull trout were less likely to use highly roaded basins for spawning and rearing and, if present in such areas, were likely to be at lower population levels (Quigley and Arbelbide 1997, p. 1183). These activities can directly and immediately threaten the integrity of the essential physical or biological features..."* (USFWS 2010).

The NOAA 5-Year Review of Snake River Salmonids notes the synergistic negative effects of both logging and roads occurring in watersheds: *"Information from the [PACFISH Biological Opinion Monitoring Program] PIBO monitoring program indicates that unmanaged or reference reaches (streams in watersheds with little or no impact from road building grazing, timber harvest, and mining) on Federal lands in the Interior Columbia basin (including the Snake River basin) are in better condition than managed streams (Al- Chockhachy et al. 2010b). In particular, managed watersheds with high road densities or livestock grazing tend to have stream reaches with worse habitat conditions than streams in reference watersheds.*"

We are also concerned that constructing "temporary" roads, conducting extensive road maintenance, and creating skid trails, cable corridors, and haul routes is likely to result in potentially massive amount of felling and logging of large trees. Such road, cable, and haul corridors often results in logging and felling of large trees. Trees adjacent, in, or near these corridors may be considered "danger" trees, or simply be in the way of road construction or cable or haul corridors. What is the FS's estimate of number of large trees cut due to designation as "hazards" or felled along roads or skyline corridors (including roads that are not major routes, closed or overgrown roads, or temporary roads)?

Felling of trees for "temporary" roads, skyline logging or cable-assisted corridors, and other similar actions may result in excessive and widespread logging of large trees. Allowing large trees to be sold in these circumstances incentivizes cutting them, and inappropriately sidesteps environmental analyses and public transparency. We have similar concerns about logging within fuel breaks and ember reduction zones.

For example, BMBP's recent post-logging field surveys in National Forests in Eastern Oregon suggest that the cutting of old and large trees during logging implementation is extensive. The pictures below are of recent felling of large and mature or old Ponderosa pine trees, most of which were felled as "hazard" trees or for road, haul, skid trails, or cable corridors in the Big Mosquito and Camp Lick timber sales in the Malheur NF. Dozens of large mature and old Ponderosa pines were felled in the Big Mosquito sale. In the Camp Lick sale, BMBP found legacy Ponderosa pines felled as part of either "hazard" tree felling or "temporary" road and other road-related work. The FS confirmed that many of the trees depicted in the pictures below were sold at the mill. What is the USFS's estimation of the number of old and large trees not "targeted" for logging that will nevertheless be felled as part of logging implementation in the Mill Creek sale?

The Mill Creek FEA claims on pg. 291 that: “Trees removed for stream restoration that are within 30 feet of an old tree (Van Pelt 2008) will be cut down, as opposed to being pushed or pulled out of the ground. No old trees would be removed.”

However, the Van Pelt guidelines do not include guidelines for aging Grand fir. The guidelines themselves note that characteristics such as bark thickness and furrows which are used to age other species of trees are not reliable for aging Grand fir trees. The Forest Service does not have a reliable or objective method for aging Grand fir, and so does not have any way to ensure that old Grand fir (150 years or older) will not be felled/logged as a part of the Mill Creek timber sale.

In addition, it is disingenuous for the Forest Service to continually refer to trees 80-149 years old as 'young'. These trees were previously considered to be 'mature', which is an important distinction for as these trees have often begun to develop mature and old characteristics important for wildlife species.

BMBP discussed these issues and our concerns in our comments on the Draft Environmental Assessment for the Mill Creek project, pg. 40.

Imperiled aquatic species

We are extremely concerned that logging, roading, and associated actions proposed in the Mill Creek sale will negatively affect imperiled and at-risk species and their habitats. For example, we are concerned that species such as Redband trout, Columbia spotted frog, lamprey, imperiled caddisflies, mollusks, and other at-risk aquatic species may experience downward population trends, or lethal or limiting habitat conditions as a result of project implementation. We are also concerned activities such as road construction may result in lethal impacts, either directly during heavy equipment use or through increased stream temperatures and fine sediments.

Potential negative effects to special status species, including Redband trout, due to logging and roading are well documented, particularly when conducted near riparian areas and when risks from climate change are considered. For example, the USFWS 2010 Final Rule for Bull Trout states:

> *"Timber harvest and road building in or close to riparian areas can immediately reduce stream shading and cover, channel stability, and large woody debris recruitment and increase sedimentation and peak stream flows (Chamberlin et al. 1991, p. 180; Ripley et al. 2005, p. 2436). These activities can, in turn, lead to increased stream temperatures, bank erosion, and decreased long-term stream productivity. The effects of road construction and associated maintenance account for a majority of sediment loads to streams in forested areas; in addition, stream crossings also can impede fish passage (Shepard et al. 1984, p. 1; Cederholm and Reid 1987, p. 392; Furniss et al. 1991, p. 301). Sedimentation affects streams by reducing pool depth, altering substrate composition, reducing interstitial space, and causing braiding of channels (Rieman and McIntyre 1993, p. 6), which reduce carrying capacity. Sedimentation negatively affects bull trout embryo survival and juvenile bull trout rearing densities (Shepard et al. 1984, p. 6; Pratt 1992, p. 6). An assessment of the interior Columbia Basin ecosystem revealed that increasing road densities were associated with declines in four nonanadromous salmonid species (bull trout, Yellowstone cutthroat trout (Oncorhyncus clarkii bouvieri), westslope cutthroat trout (O. c. lewisi), and redband trout (O. mykiss spp.)) within the Columbia River basin, likely through a variety of factors associated with roads. Bull trout were less likely to use highly roaded basins for spawning and rearing and, if present in such areas, were likely to be at lower population levels (Quigley and Arbelbide 1997, p. 1183). These activities can directly and immediately threaten the integrity of the essential physical or biological features described in PCEs 1 through 6."*

BMBP raised concerns in our Draft EA comments about the logging and roading proposed in the FEA will harm at-risk and imperiled aquatic species, including Redband trout and Columbia spotted frog. (BMBP Draft EA Comments, pg. 44). Our concerns include, among others, a stark lack of baseline data about current population status or trends of these species. The Forest Service does not seem to know the population trends of Redband trout and any other at-risk aquatic and riparian species that would be impacted by the project. We also remain concerned that the agency is downplaying the risk levels for potential extirpation of Redband trout and Columbia spotted frogs.

Mill Creek FEA pg. 394 (Response to public comments):

> *"Within the project area and the Mill Creek sub-watershed,* ***regular population assessments of Redband trout are not done*** *but the most important threat to the Redband population is a lack of water (Tim Porter, ODFW, Personal Communication, February 2024). Discharge data from the Oregon Water Resources Department gage # 14083400 shows that since 2010 the mainstem of Mill Creek has had multiple months of no flow every year. Additional anecdotal data from Ochoco National Forest staff also indicates no flow at temperature monitoring sites on multiple tributaries to Mill Creek within the project data over multiple years during the summer and fall months. There is an adfluvial migratory population of Redband trout that move from Ochoco Reservoir upstream into the*

> *Ochoco and Mill Creek sub-watersheds, and that life history of fish was monitored by the ODFW;* ***however, that monitoring has not been conducted since 2005****. Nevertheless, the lack of year-round water within the Mill Creek watershed has most likely negatively affected the overall Redband population within the sub-watershed, as juvenile fish would have very little chance of survival within the mainstem Mill Creek and tributaries because they have been dry.*
> *Because of this****, it is hard to say the trend of the local population as it is drastically impacted by changes in discharge based on climatic conditions such as snowpack, precipitation, and air temperature.****"*

Baseline data on population size and trends are an integral part of determining how management actions (such as logging) will affect long-term viability of imperiled fish. Lack of baseline data precludes any credible work to monitor the effects of management on aquatic species such as Redband trout, and makes adaptive management impossible. How can the agency claim that the proposed actions will not cause long-term harm or downward population trends if the agency does not have baseline data? It cannot. Without baseline data about population trends for Redband trout, the agency cannot determine how it's actions will affect the populations. For example, smaller populations—especially those already experiencing downward trends-- may have more difficulty recovering in the long term, even from short-term effects of management actions. Smaller populations may also be more vulnerable to isolation and genetic bottlenecks.

Even localized increases at the subwatershed or reach scale can jeopardize imperiled or Sensitive-listed species such as Redband trout—especially if the problem is repeated in multiple stream reaches across the landscape. At-risk aquatic species such as Bull trout are already suffering from fragmented and small populations. Creating additional negative impacts across the landscape as a result of increased logging large trees is extremely risky at best. Small and isolated populations make for fragile populations (that are subject to declines due to localized events, genetic drift, and other factors). Reiman et al. (2001) noted that: ***"…vulnerable aquatic species could be impacted in the short term in ways from which they could not easily recover…"*** even in cases where the management actions resulted in long-term benefits in later years.

The negative effects on water quality parameters such as stream temperature from proposed logging within this sale and from ongoing logging throughout the region are already putting Redband and other aquatic species at risk. The increased stream temperatures that would result from the proposed logging and roading in this FEA would exacerbate the already dire situation for water quality and imperiled aquatic species across eastside Forests.

The FEA repeatedly states that restoration actions are necessary to address channel incising and other long-term issues. However, the FEA fails to differentiate between less controversial and less environmentally risky strategies such as large wood placement in streams versus logging within streamside riparian corridors.

The agency has given no evidence that logging benefits water quality, fish, wildlife, or wildlife habitat. If the FS has this evidence, please provide it. In addition, the USFS is not legally obligated to manage for HRV. The agency is, however, legally obligated to ensure the long-term viability of native species. The Mill Creek FEA clearly reflects the FS's narrow focus on HRV, which they've used to justify logging, rather than considering the best courses of action (and non-action) for water quality, fish, and wildlife.

Forest Service determinations that Redband trout and other special-status species and their habitats will not experience negative long-term impacts such as downward population trends and loss of viability rests largely on the relatively small percentage of habitat that will be affected, at the scale of the forest, by this project. The FS repeatedly makes such statements in their determinations that species won't experience significant cumulative impacts as a result of this project. However, the FS provides no analyses of other projects that could affect these species habitats at the scale of the Forest. In addition, the FS fails to give a rationale for the scale of analyses it uses, nor for switching between them inappropriately to mask potential impacts. Similarly, because the project area includes significant portions of Wilderness, the intensity and scale of logging and roading is masked by, essentially, averaging these actions across Wilderness area as well as areas experiencing heavy management. In addition, for Redband trout and other aquatic species, the scale of analyses for cumulative impacts should have included subwatershed and watershed scale as well as the Forest Scale.

In addition to the likely negative due to direct and indirect impacts, cumulative impacts as a result of logging, roading, and other actions proposed as part of the Mill Creek sale are likely to negatively impact water quality, stream habitats, and riparian forests. Climate change, management including past, recent, and future logging, livestock grazing, existing and planned roads, etc. are likely to have cumulative impacts on aquatic and riparian species and habitats in combination with the Mill Creek sale.

Further, what are the cumulative impacts of livestock grazing and planned logging and roading within the Mill Creek project area? The USFWS 2010 Bull Trout Final Rule notes, for example:

> "Improper livestock grazing can promote streambank erosion and sedimentation and limit the growth of riparian vegetation important for temperature control, streambank stability, fish cover, and detrital input (Platts 1991, pp. 397–399). In addition, grazing often results in increased organic nutrient input in streams (Platts 1991, p. 423). These activities can directly and immediately threaten the integrity of the essential physical or biological features described in PCEs 1 through 8."

The FS repeats, throughout the FEA and Aquatics Report, that passive restoration is not adequate for addressing water quality impairments or for moving streams towards attainment of RMOs. However, the FS inappropriately conflates logging/thinning with other less controversial or risky strategies for stream restoration. Placing large wood in streams or working to address floodplain connectivity, for example, are active management techniques that would address stream and water quality impairments. Logging does not address the drivers or causes of stream degradation or water quality impairments. Logging does not mimic natural disturbance or other processes or dynamics necessary for truly healthy forest ecosystems. The FS has not adequately considered or avoided the risks and likely negative effects on streams and water quality that will result from logging/thinning in RHCAs.

BMBP discussed these issues and our concerns in our comments on the Draft Environmental Assessment for the Mill Creek project, pg. 44.

Risk to wildlife and fish from fire is overstated, while ignoring the benefits of mixed-severity fires including high severity fire.

The ecological risks of wildfire are overstated in the Mill Creek EA, and fail to recognize that these forests evolved with mixed severity wildfire (including high severity fire) and rely on wildfire for many ecosystem processes. For example, native trout and salmonids also evolved with wildfire and other disturbances in the PNW and-- provided their populations are not too fragmented and impacted by logging and roads-- recover fairly quickly from wildfire. The USFS proposed Forest Plan Revision (2014) vol 2. Pg. 60 noted: **"***Redband trout and bull trout have been shown to recolonize severely burned drainages within two years, provided the drainages were physically accessible (i.e., no culvert barriers, and provided that other fish in unburned areas were close enough to discover and move back into the recently burned habitat."* Logging and roads pose greater threats to forests, aquatic habitats, and imperiled fish than wildfire.

We note that a recently published study has found pattern of "Falsification of the Scientific Record" in Government-Funded Wildfire Studies Short Summary of the Newly Release Study " The study is *Countering Omitted Evidence of Variable Historical Forests and Fire Regime in Western USA Dry Forests: The Low-Severity-Fire Model Rejected*". The John Muir project summarizes the study:

"An unprecedented new study, Baker et al. (2023), published in the peer-reviewed journal Fire, exposed a broad pattern of scientific misrepresentations and omissions by government forest and wildfire scientists. This "falsification of the scientific record" is driving bad policies and government mismanagement of public forests, including clearcutting and commercial logging of mature and old-growth trees under deceptive euphemisms like "thinning", "restoration", and "fuel reduction". In particular, studies funded by the U.S. Forest Service, an agency that financially benefits from commercial logging on public lands, have presented a falsified narrative that historical forests had low tree densities and were heavily dominated by low-severity fires, using this narrative to push for increased commercial logging. While Baker et al. (2023) documents a broad pattern of scientific omissions by Forest Service studies, it focuses on Hagmann et al. (2021), a Forest Service study that has received much media attention and has been used as the justification for a series of unprofessional public attacks and character assassination efforts by Forest Service-funded scientists against independent forest/fire scientists. Centrally, Baker et al. (2023) found that, while Hagmann et al. (2021) was presented ostensibly as a review, that paper listed a series of studies by independent scientists, and then listed the Forest Service's published critiques of those studies, but never mentioned the stacks of reply studies by independent scientists that completely refuted and discredited the Forest Service critiques. Through this glaring omission of a huge body of scientific evidence, Hagmann et al. (2021) created the false appearance that the Forest Service critiques were the last word on the subject. The scientific

reply studies by independent scientists note that the Forest Service critiques do not challenge the central evidence or conclusions of the initial studies, and the reply articles provide exhaustive evidence documenting why the tangential critiques in the Forest Service articles are unfounded and inaccurate–all of which was concealed by Hagmann et al. (2021). The corrected scientific record, based on all of the evidence, shows that historical forests were highly variable in tree density, and included "open" forests as well as many dense forests. Further, historical wildfire severity was mixed and naturally included a substantial component of high-severity fire, which creates essential snag forest habitat that rivals old-growth forest in terms of native biodiversity. These findings have profound implications for climate change mitigation and community safety, as current forest policies that are driven by the distorted narrative result in forest management policies that reduce forest carbon and increase carbon emissions, while diverting scarce federal resources away from proven community wildfire safety measures like home hardening, defensible space pruning, and evacuation assistance."

BMBP discussed these issues and our concerns in our comments on the Draft Environmental Assessment for the Mill Creek project, pg. 45.

Climate Change

Logging in RHCAs is likely to exacerbate some of the negative effects of climate change on riparian and stream ecosystems. Stream temperature is a primary concern. Actions that minimize increased water temperatures are important for maintaining cold water refugia. The Independent Scientific Advisory Board (2007) states:

"Adequate protection or restoration of riparian buffers along streams is the most effective method of providing summer shade. This action will be most effective in headwater tributaries where shading is crucial for maintaining cool water temperatures. Expanding efforts to protect riparian areas from grazing, logging, development, or other activities that could impact riparian vegetation will help reduce water temperature increases. It will be especially important to ensure that this type of protection is afforded to potential thermal refugia. Removing barriers to fish passage into thermal refugia also should be a high priority."

Many native aquatic species, including Redband trout, require very cold headwater streams for spawning, and so are likely to be disproportionately affected by stream temperature increases due to climate change. (ISAB 2007). Salmon face serous threats to their continued existence due to climate change, and are predicted to suffer significant habitat loss. The Independent Scientific Advisory Board (2007) notes that according to some research predictions:

"[T]emperature increases alone will render 2% to 7% of current trout habitat in the Pacific Northwest unsuitable by 2030, 5%-20% by 2060, and 8% to 33% by 2090. Salmon habitat may be more severely affected, in part because these fishes can only occupy areas below barriers and are thus restricted to lower, hence warmer, elevations within the region. Salmon habitat loss would be most severe in Oregon and Idaho with potential losses exceeding 40% by 2090."

Commercial logging and heavy-handed NCT activities in RHCAs may exacerbate the issue of high stream temperatures, putting imperiled fish in additional jeopardy. Even localized temperature increases may have negative effects on struggling fish populations, especially when repeated in numerous streams across the landscape. Past and current logging, grazing, and roads have increased stream temperatures to ecologically and legally unacceptable extremes. High stream temperatures, as well as increased fine sediment in many areas, are likely the pressing risks to fish viability and stream ecosystems. The synergistic effects of climate change, high temperatures, and increased fine sediments warrant actions such as protecting shade, ecosystem integrity, and terrestrial and aquatic connectivity. Wildfire is far less of a threat to these parameters than widespread logging in RHCAs.

Hutto et al. 2016 note, in relation to climate change, that increased efforts towards fuels reduction would be an untenable emphasis:

> *"Any perceived problem with future changes in fire behavior cannot be solved by redoubling our effort to treat this particular climate change symptom by installing widespread fuel treatments that do nothing to stop the warming trend, and do little to reduce the extent or severity of weather-driven fires (Gedalof et al. 2005). Therefore, fuel management efforts to reduce undesirable effects of wildfires outside the xeric ponderosa pine forest types could be more strategically directed toward creating fire-safe communities….Fuel treatment efforts more distant from human communities may carry the negative ecological consequences we outlined earlier and do little to stop or mitigate the effects of fires that are increasingly weather driven (Rhodes and Baker 2008, Franklin et al. 2014, Moritz et al. 2014, Odion et al. 2014)."*

Logging in streamside corridors is likely to decrease connectivity, especially connectivity in mixed-conifer areas that currently serve as important corridors and are among the last remaining areas that can provide connectivity for species that are associated with mature and complex forests. Commercial logging, in order to be viable, is likely to further incentivize removal of a greater number of trees, and further exacerbate an already concerning situation.

Increasing connectivity is the most commonly recommended strategy for preserving biodiversity in the face of climate change, according to a review of 22 years of scientific recommendations (Heller and Zavaleta 2009). Increasing connectivity includes actions such as removing barriers to species dispersal, locating reserves near each other, and reforestation. Other commonly recommended connectivity-related actions include creating "ecological reserve networks [i.e.,] large reserves, connected by small reserves, stepping stones"; "protecting the "full range of bioclimatic variation"; increasing the number and size of reserves; and creating and managing buffer zones around reserves (Heller and Zavaleta 2009). Large blocks of habitat that are well-connected to each other are important for the long-term survival for many species in the face of climate change.

It is essential that we preserve core habitats and connectivity corridors because these areas are very important for maintaining genetic diversity, facilitating movement and migration, and providing for range and habitat needs. Connectivity corridors also allow for species to colonize new areas or recolonize after disturbances, which will help species adapt to shifts in geographic range due to climate change. Many species are already facing threats to their viability due to fragmentation and a lack of connectivity; climate change threatens to severely exacerbate risks to their continued survival by further fragmenting habitats.

We are concerned about the potential negative effects of logging in RHCAs on numerous bird species, especially those likely to be vulnerable to climate change. Many birds that are threatened by climate change-driven range shifts are also threatened by logging and other practices on the Malheur NF and other NFs in eastern Oregon. Bird species that rely on denser forests and complex canopy structure are also suffering widespread habitat loss due to logging that targets mature mixed-conifer forests—these provide needed complexity and forest density. Logging in RHCAs may have disproportionately negative effects on climate- endangered and climate-threatened birds because RHCAs currently provide some of the best remaining habitat for these birds–many of which breed in eastern Oregon and rely on denser mixed-conifer forests and/or old growth mixed-conifer forests. This includes species such as: Boreal owl; Northern pygmy owl; Northern saw-whet owl; Pine grosbeak; Vaux's swift; Hermit thrush; Three-toed woodpecker; Varied thrush; Evening grosbeak; Hammond's flycatcher; Townsend's warbler; Cordilleran flycatcher; Winter wren; Hairy woodpecker; Great gray owl; and Pine siskin (Csuti et al 1997; Langham et al. 2015). Multiple large timber sales across the Malheur National Forest and other National Forests in eastern Oregon are targeting denser mixed- conifer forests. This represents a significant portion of mixed-conifer forests in the region, and has resulted in widespread degradation and elimination of wildlife habitat for species that depend on these forests. While we are, again, very appreciative that the USFS has greatly scaled back commercial and noncommercial logging in RHCAs, we remain extremely concerned about the remaining commercial and NCT logging and burning within RHCAs.

Global climate change is a massive, unprecedented threat to humanity and forests. Climate change is caused by excess CO 2 and other greenhouse gases transferred to the atmosphere from other pools. All temperate and tropical forests, including those in this project area, are an important part of the global carbon cycle. There is significant new information reinforcing the need to conserve all existing large stores of carbon in forests, in order to keep carbon out of the atmosphere and mitigate climate change. The agency must do its part by managing forests to maintain and increase carbon storage. Logging would add to cumulative total carbon emissions so is clearly part of the problem, so it must be minimized and mitigated. Logging would not only transfer carbon from storage to the atmosphere but future regrowth is unlikely to ever make up for the effects of logging, because carbon storage in logged forests lags far behind carbon storage in unlogged forests for decades or centuries.

Forests are carbon sinks—they store carbon in both the soils and the vegetation. Carbon sinks are important for mitigating the impacts of climate change. The U.S. has many forests owned by the public and managed by the Forest Service. Harvesting wood "represents the majority of [carbon] losses from US forests...." (Harris et al., 2016). Additionally, (Achat et al., 2015) has estimated that intensive biomass harvests could constitute an important source of carbon transfer from forests to the atmosphere. Pacific Northwest forests hold live tree biomass equivalent or larger than tropical forests. (Law and Waring, 2015). "Alterations in forest management can contribute to increasing the land sink and decreasing emissions by keeping carbon in high biomass forests, extending harvest cycles, reforestation, and afforestation." (Law et al., 2018). The FS omits an honest carbon accounting of the carbon outputs of this project.

(Buotte et al., 2019) published an article prioritizing forest lands for preservation based on "carbon priority ranking with measures of biodiversity." The researchers mapped "high carbon priority forests in the western US exhibit features of older, intact forest with high structural diversity[], including carbon density and tree species richness." Here is the map from that article:

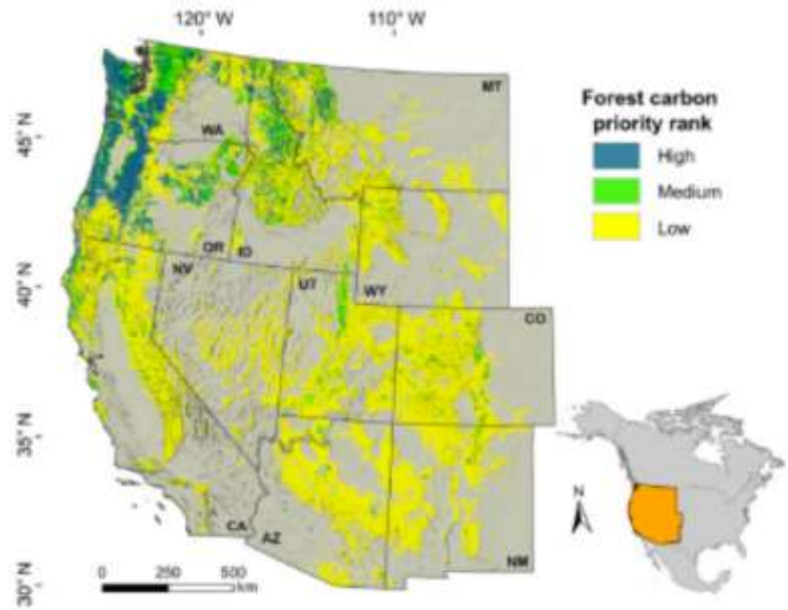


FIG. 1. Forested land in the western conterminous United States classified into priority for preservation to mitigate climate change based on the spatial co-occurrence of low vulnerability to drought and fire and low, medium, and high potential carbon sequestration. WA, Washington; ID, Idaho; MT, Montana; OR, Oregon; CA, California; NV, Nevada; UT, Utah; CO, Colorado; AZ, Arizona; NM, New Mexico.

Millar et al. 2007 state:

> *"Over the last several decades, forest managers in North America have used concepts of historical range of variability, natural range of variability, and ecological sustainability to set goals and inform management decisions. An underlying premise in these approaches is that by maintaining forest conditions within the range of pre-settlement conditions, managers are most likely to sustainably maintain forests into the future. We argue that although we have important lessons to learn from the past, we cannot rely on past forest conditions to provide us with adequate targets for current and future management. This reality must be considered in policy, planning, and management. Climate variability, both naturally caused and anthropogenic, as well as modern land-use practices and stressors, create novel environmental conditions never before experienced by ecosystems. Under such conditions, historical ecology suggests that we manage for species persistence within large ecoregions."*

Mildrexler, et al., 2020 note that given the urgency of keeping additional carbon out of the atmosphere and continuing carbon accumulation from the atmosphere to protect the climate system, it would be prudent to continue protecting ecosystems with large trees for their carbon stores, and also for their co-benefits of habitat for biodiversity, resilience to drought and fire, and microclimate buffering under future climate extremes.

The FS fails to consider how climate change is already, and is expected to be even more in the future, influencing forest ecology. This has vast ramifications as to whether or not the forest in the project area will respond as the FS assumes.

Global warming and its consequences are effectively irreversible which implicates certain legal consequences under NEPA and NFMA and ESA (e.g., 40 CFR § 1502.16; 16 USC §1604(g); 36 CFR §219.12; ESA Section 7; 50 CFR §§402.9, 402.14). All net carbon emissions from logging represent "irretrievable and irreversible commitments of resources."

The Committee of Scientists, 1999 recognized the importance of forests for their contribution to global climate regulation. Also, the 2012 Planning Rule recognizes, in its definition of Ecosystem services, the "Benefits people obtain from ecosystems, including: (2) Regulating services, such as long term storage of carbon; climate regulation...”

Climate change science suggests that logging for sequestration of carbon, logging to reduce wild fire, and other manipulation of forest stands does not offer benefits to climate. Rather, increases in carbon emissions from soil disturbance and drying out of forest floors are the result. The FS can best address climate change through minimizing development of forest stands, especially stands that have not been previously logged, by allowing natural processes to function. There is scientific certainty that climate change has reset the deck for future ecological conditions. For example, (Sallabanks, et al., 2001): *“(L)ong-term evolutionary potentials can be met only by accounting for potential future changes in conditions. ...Impending changes in regional climates ...have the capacity for causing great shifts in composition of ecological communities.”*

Furthermore, any supposedly carbon sequestration from logging are usually more than offset by carbon release from ground disturbing activities and from the burning of fossil fuels to accomplish the timber sale, even when couched in the language of restoration. Reducing fossil fuel use is vital. Everything from travel planning to monitoring would have an important impact in that realm. Reducing CO2 emissions is the most effective way to combat climate-driven wildfires—not more logging, which increases carbon emissions. Logging is the largest cause of carbon emissions in Oregon (DellaSala 2022; Law et al. 2018).

Weather events—not the presence of grand fir—are the primary drivers of large, high severity wildfires (Keyser and Westerling 2017). *Moritz et al. 2014,* Odion et al. (2014). Large severe fires are climate driven, and are expected to increase as a result of climate change. Fuels reduction activates have little to no impact on large, climate-driven fires. While logging and burning forests sometimes correlates to reduced fire severity or altered fire behavior— this is only true for fire events that are not weather and climate driven, and only for a very short period of time before these logged and burned areas start to grow back and “fuels reduction treatments” are no longer effective [cite]. Forests often grow back more densely and homogenously than before they were logged, creating an even more flammable situation [cite]. Creating artificially open forest canopies makes more susceptible to heat, solar radiation, and wind, and can exacerbate fire risk Heavy, industrial-scale logging increases fire risk.

More protected forests are not at increased risk of more frequent or severe fires. A recent study from Bradley et al. (2016) challenges USFS assumptions about the fire risk associated with more protected areas—those area that have been less-managed or less-logged, but may still have experienced some degree of fire exclusion (such as Wilderness areas. riparian corridors have also, of course, seen much more protection than upland areas). The authors state:

> *“There is a widespread view among land managers and others that the protected status of many forestlands in the western United States corresponds with higher fire severity levels due to historical restrictions on logging that contribute to greater amounts of biomass and fuel loading in less intensively managed areas, particularly after decades of fire suppression. This view has led to recent proposals—both administrative and legislative—to reduce or eliminate forest protections and increase some forms of logging based on the belief that restrictions on active management have increased fire severity. We investigated the relationship between protected status and fire severity using the Random Forests algorithm applied to 1500 fires affecting 9.5 million hectares between 1984 and 2014 in pine (Pinus ponderosa, Pinus jeffreyi) and mixed-conifer forests of western United States, accounting for key topographic and climate variables.* ***We found forests with higher levels of protection had lower severity values even though they are generally identified as having the highest overall levels of biomass and fuel loading. Our results suggest a need to reconsider current overly simplistic assumptions about the relationship between forest protection and fire severity in fire management and policy”***

“Protected forests burn at lower severities: We found no evidence to support the prevailing forest/fire management hypothesis that higher levels of forest protections are associated with more severe fires based on the RF and linear mixed-effects modeling approaches. On the contrary, using over three decades of fire severity data from relatively frequent-fire pine and mixed-conifer forests throughout the western United States, we found support for the opposite conclusion—burn severity tended to be higher in areas with lower levels of protection status (more intense management), after accounting for topographic and climatic conditions in all three model runs. Thus, we rejected the prevailing forest management view that areas with higher protection levels burn most severely during wildfires.”

There is a very short window of time that "treatments" will be effective, usually ~10-15 years. "Treated" (logged) areas having a vanishingly small chance of encountering a wildfire during that 10-15 year window of time (Rhodes and Baker 2008). However, the FS appears to be planning to repeatedly "manage" forests (i.e., logging, burning, and roading) on a 10-15 year cycle across the project area and perhaps across much of the region in numerous timber sales. Such "management" is impractical, expensive, ineffective, and would have catastrophic consequences for fish, wildlife, and water quality.

Home hardening is the most effective strategy for keeping communities safe. Jack Cohen's USFS study (1999) includes in the study abstract:

> "*Understanding how ignitions occur is critical for effectively mitigating home fire losses during wildland fires. The threat of life and property losses during wildland fires is a significant issue for Federal, State, and local agencies that have responsibilities involving homes within and adjacent to wildlands. Agencies have shifted attention to communities adjacent to wildlands through pre-suppression and suppression activities. Research for the Structure Ignition Assessment Model (SIAM) that includes modeling, experiments, and case studies indicates that effective residential fire loss mitigation must focus on the home and its immediate surroundings. This has significant implications for agency policy and specific activities such as hazard mapping and fuel management."*

The Forest Service is not going to be able to log its way to safer communities or restored forests. In fact, most home losses to fire in the US are the result of grass fires. Radeloff et al. 2023 found that most homes that burned in the US were destroyed by grass and shrub fire, not forest fire. This dynamic highlights the realities of climate-driven wildfire and lack of efficacy in logging to control fire behavior. Reporting from CNN about the study notes:

> "*Over the last three decades, the number of US homes destroyed by wildfire has more than doubled as fires burn bigger and badder,* a recent study found*. Most of those homes were burned not by forest fires, but by fires racing through grass and shrubs.*
>
> *The West is most at risk, the study found, where more than two-thirds of the homes burned over the last 30 years were located. Of those, nearly 80% were burned in grass and shrub fires."*

We also want to note that recent research found that the majority of fire ignitions that cross jurisdictional boundaries start on private lands, not public, and that most fires are started by human activity. OSU Newsroom coverage discussed the Downing et al. 2022 study:

> *"The study area covered almost 141 million acres across 11 states and included 74 national forests.*
>
> *Of all ignitions that crossed jurisdictional boundaries, a little more than 60% originated on private property, and 28% ignited on national forests. Most of the fires started due to human activity."*

We are concerned that building and reopening roads will further increase human access to these and other timber sale areas, which in turn increases the risk of human-caused ignitions. In addition, we note that this study counters the common narrative that fires are going to 'pop out' of National Forests to affect nearby communities.

BMBP discussed these issues and our concerns in our comments on the Draft Environmental Assessment for the Mill Creek project, pg. 46.

Additional discussion on forest ecology, wildfire, logging, and prescribed burning:

Several studies suggests that numerous species are more negatively affected by thinning than by wildfire. Example include Olive-sided flycatchers, lynx, Pacific fisher, Spotted owls, flying squirrels, and other species. Robertson and Hutto (2007) provide evidence for the harmful effects of thinning to some species in their study *Is selectively harvested forest an ecological trap for Olive-sided flycatcher?* The authors state that:

> *"Human activities that closely mimic the appearance but not the fundamental quality of natural habitats could attract animals to settle whether or not these habitats are suitable for their survival or reproduction. We examined habitat selection behavior and nest success of Olive-sided Flycatchers (Contopus cooperi) in a naturally occurring burned forest and an anthropogenically created habitat type—selectively harvested forest. Olive-sided Fly- catcher*

density and nestling provisioning rates were greater in the selectively harvested landscape, whereas estimated nest success in selectively harvested forest was roughly half that found in naturally burned forest. Reduced nest success was probably a result of the relatively high abundance of nest predators found in the artificially disturbed forest. ***These results are consistent with the hypothesis that selectively harvested forest can act as an "ecological trap" by attracting Olive-sided Flycatchers to a relatively poor-quality habitat type. This highlights the importance of considering animal behavior in biodiversity conservation."***

We note that the Forest Service does not have a legal mandate to manage forests for HRV. They are, however, responsible for ensuring the viability of the full compliment of native species, as well as species such as Bull trout and other ESA-listed species. We are very concerned that the FS is myopically focused on shifting tree species composition and structure, rather than on protecting values such as native species and water quality. We are concerned about issues such as the likely loss of snags, downed wood, and other key wildlife habitat. We are also concerned that the FS's answer to native diseases or pests that serve ecological functions is ecologically destructive logging (i.e., in relation to mistletoe, laminated root rot, native bark beetles, etc.).

Furthermore, we are very concerned that the FS has systematically overlooked evidence that mixed-severity fire regimes are more widespread than generally acknowledged by the agency. For example, Baker et al. 2023 discuss in their abstract:

"The structure and fire regime of pre-industrial (historical) dry forests over ~26 million ha of the western USA is of growing importance because wildfires are increasing and spilling over into communities. Management is guided by current conditions relative to the historical range of variability (HRV). Two models of HRV, with different implications, have been debated since the 1990s in a complex series of papers, replies, and rebuttals. The "low-severity" model is that dry forests were relatively uniform, low in tree density, and dominated by low- to moderate-severity fires; the "mixed-severity" model is that dry forests were heterogeneous, with both low and high tree densities and a mixture of fire severities. Here, we simply rebut evidence in the low-severity model's latest review, including its 37 critiques of the mixed-severity model. A central finding of high-severity fire recently exceeding its historical rates was not supported by evidence in the review itself. A large body of published evidence supporting the mixed-severity model was omitted. These included numerous direct observations by early scientists, early forest atlases, early newspaper accounts, early oblique and aerial photographs, seven paleo-charcoal reconstructions, ≥18 tree-ring reconstructions, 15 land survey reconstructions, and analysis of forest inventory data. Our rebuttal shows that evidence omitted in the review left a falsification of the scientific record, with significant land management implications. The low-severity model is rejected and mixed-severity model is supported by the corrected body of scientific evidence."

Similarly, the FS fails to analyze, for example, what proportion of Forests have been logged to "restore" Ponderosa pine? What portions of Forests outside of wilderness and roadless areas are currently considered Ponderosa pine plantations? What portion of forests outside of Wilderness and Roadless are currently considered to be young Ponderosa-pine dominant forests? What portion of these forests have been previously logged/thinned? What portion has been logged within the past 20, 50, and 80 years?

We also have concerns about prescribed fire, particularly landscape-scale prescribed fire in sensitive or remote areas (including RHCAs) that historically burned with mixed severity, including high severity. The FS also does not seem to account for the dynamic nature and natural variability and complexity of the landscape, or for fire refugia. Also, prescribed fires should not take place in the spring, as the potential to harm nesting birds, butterflies, and other species who are nesting or reproducing at that time is high.

Pilliod et al. 2006 examined potential unintended negative effects on wildlife and habitats due to thinning and prescribed fire. We are concerned that similar negative effects on wildlife and habitats will occur in the widespread logging in riparian corridors. For example, we are concerned about possible losses of snags and dead wood (both in direct response to the project and decreased future recruitment). Snags and downed wood have lower densities in logged forests. Similarly, we are concerned about the negative effects on density-and closed canopy-dependent species, negative effects on alpha and beta biodiversity, declines in mammal populations, and other unintended negative effects on the flora and fauna and habitats in the project area. Highlights from their study include:

> *“Large-scale prescribed fires and thinning are still experimental tools in ecological restoration (box 1), and unanticipated effects on biodiversity, wildlife and invertebrate populations, and ecosystem function may yet be discovered (Allen and others 2002; Carey and Schumann 2003).”*
>
> *“Species that prefer closed-canopy forests or dense understory, and species that are closely associated with those habitat elements that may be removed or consumed by fuel reductions, will likely be negatively affected by fuel reductions. Some habitat loss may persist for only a few months or a few years, such as understory vegetation and litter that recover quickly. The loss of large-diameter snags and down wood, which are important habitat elements for many wildlife and invertebrate species, may take decades to recover….”*
>
> *“Wildlife and invertebrate species that depend on down wood, snags, dwarf mistletoe (Arceuthobium spp.) brooms, dense forests with abundant saplings and small poles, and closed-canopy forests for survival and reproduction are likely to be detrimentally affected by fuel treatments that alter these habitat elements”*
>
> *“Implementation of any thinning or prescribed burning is likely to result in loss of snags, future snags, and down wood that are important stand attributes of healthy forests and critical components of wildlife and invertebrate habitat”*
>
> *Loss of large-diameter snags and down wood can take years to decades to recover, as indicated by wildland fire research (Passovoy and Fule 2006).”*
>
> *“There is a great need for long-term observational and preferably experimental studies on the effects of a range of fuel reduction treatments at multiple spatial scales (stand or larger).”*

It is crucial to recognize that prescribed fire is not the same as wildfire. Prescribed burns can and do cause ecologically important damage to crucial wildlife habitat, particularly if done in ecologically inappropriate areas such as fire and climate refugia. We are also concerned about the loss of snags and downed logs, and note that prescribed burns do not necessarily mimic the same dynamics as wildfire. In addition, timing of prescribed burns, such as those done in spring, potentially interrupts delicate life cycle rhythms of wildlife, such as egg laying and hatching and can harm insects, butterflies, nesting birds, and other species. and that prescribed fire can cause lasting, long-term negative reductions in snags, logs, and dead wood habitats (Arkle and Pilliod, 2010; Pilliod et al. 2006).

Another concern we have that much of the prescribed burning in the project area could be comprised of burning slash. Such burning can severely damage soils, and often supports some of the highest concentrations of invasive weeds on Forests. Damaged soils can also contribute to erosion and ultimately fine sediment inputs into streams. The USFS notes that prescribed fire units would include jackpot burning, which involves “burning of slash concentrations to reduce excess slash generated in harvest and/or non-commercial thinning units. Generally, jackpot burning is used to burn pockets of slash within a unit or to ignite specific targets within the unit without spread through the remainder of the unit. Jackpot burning would be accomplished through hand ignition techniques.”

We are also concerned about negative impacts on wildlife habitats from thinning in riparian areas, even when snags removal is not intended. For example, Pollock et al. (2012) found that selective logging may cause riparian forests to develop characteristics outside of normal late seral conditions in reference stands. Pollock and Beechie (2014) study found that:

> *“Because far more vertebrate species utilize large deadwood rather than large live trees, allowing riparian forests to naturally develop may result in the most rapid and sustained development of structural features important to most terrestrial and aquatic species”.*

The August 2017 "Science Findings" from the PNW Research Station discussed the importance of snags and wildfire, and found that many more snags are needed than current regulations or standards provide for. Riparian forests are disproportionately used by wildlife and birds, and so these findings are particularly relevant to Riparian Reserves. The following quotes are from August 2017 "Science Findings" from the PNW Research Station:

- *In dry forests, a mixed-severity fire that kills trees is an important but underappreciated strategy for providing enough snags for cavity-dependent species. Low-severity prescribed fires may not provide enough snags for these species.*

- *Suitable snags are limited, such that snag availability drives landscape-level habitat selection by some species. For example, white-headed woodpeckers selected severely burned patches for nesting, which was initially puzzling because this species does not characteristically forage in burns.*

- *Within burns used by at-risk woodpeckers, the majority (86 to 96 percent) of seemingly suitable trees contained unsuitably hard wood; wood hardness limits nest site availability for these declining species.*

- *This suggests that past studies that did not measure wood hardness counted many sites as available to cavity-excavating birds when actually they were unsuitable. "By not accounting for wood hardness, managers may be overestimating the amount of suitable habitat for cavity-excavating bird species, some of which are at risk," Lorenz says.*

- *"Based on their results, Lorenz and her colleagues see the critical role that mixed-severity fires play in providing enough snags for cavity-dependent species. Low-severity prescribed fires often do not kill trees and create snags for the birds. "I think humans find low-severity fires a more palatable idea. Unfortunately or fortunately, these birds are all attracted to high-severity burns," Lorenz says. "The devastating fires that we sometimes have in the West almost always attract these species of birds in relatively large numbers." Many studies have shown that a severely burned forest is a natural part of western forest ecosystems. Snags from these fires attract insects that love to burrow beneath charcoal bark. And where there are insects, there are birds that love eating these insects. Lorenz and her colleagues stress that providing snags that woodpeckers can excavate is crucial for forest ecosystem health in the Pacific Northwest, where more than 50 wildlife species use woodpecker-excavated cavities for nesting or roosting."*

The Forest Service claims that Douglas and Grand firs and other less fire-resistant trees are present in larger numbers and higher densities across the landscape than they were historically, as a consequence of fire suppression. However, the Forest Service abuses this rationale by applying it overly broadly and aggressively, and uses it as an excuse to extensively log old growth and mature forests– including in ecologically inappropriate areas such as forests with ample evidence of historic mixed-conifer and high-density forests, on north and east facing slopes; deep gulches and narrow valleys; forests on soils that hold more nutrients and moisture (such as ash soils); and other areas that show historic evidence of supporting mixed-conifer forests in general and Grand fir in particular. The Forest Service is using flawed assumptions that lack adequate scientific backing in order to log in ecologically inappropriate and sensitive areas, and to large trees across many thousands of acres—despite the documented deficit in large trees across the landscape and their importance to wildlife.

A recent study from Bradley et al. (2016) challenges USFS assumptions about the fire risk associated with more protected areas—those area that have been less-managed or less-logged, but may still have experienced some degree of fire exclusion (such as Wilderness areas. riparian corridors have also, of course, seen much more protection than upland areas). The authors state:

> *"There is a widespread view among land managers and others that the protected status of many forestlands in the western United States corresponds with higher fire severity levels due to historical restrictions on logging that contribute to greater amounts of biomass and fuel loading in less intensively managed areas, particularly after decades of fire suppression. This view has led to recent proposals—both administrative and legislative—to reduce or eliminate forest protections and increase some forms of logging based on the belief that restrictions on active management have increased fire severity. We investigated the relationship between protected status and fire severity*

using the Random Forests algorithm applied to 1500 fires affecting 9.5 million hectares between 1984 and 2014 in pine (Pinus ponderosa, Pinus jeffreyi) and mixed-conifer forests of western United States, accounting for key topographic and climate variables. ***We found forests with higher levels of protection had lower severity values even though they are generally identified as having the highest overall levels of biomass and fuel loading. Our results suggest a need to reconsider current overly simplistic assumptions about the relationship between forest protection and fire severity in fire management and policy"***

"Protected forests burn at lower severities: We found no evidence to support the prevailing forest/fire management hypothesis that higher levels of forest protections are associated with more severe fires based on the RF and linear mixed-effects modeling approaches. On the contrary, using over three decades of fire severity data from relatively frequent-fire pine and mixed-conifer forests throughout the western United States, we found support for the opposite conclusion—burn severity tended to be higher in areas with lower levels of protection status (more intense management), after accounting for topographic and climatic conditions in all three model runs. Thus, we rejected the prevailing forest management view that areas with higher protection levels burn most severely during wildfires."

In addition, recent research suggests that Grand fir forests are more fire resistant than generally assumed by the agency. Moris et al. 2022 found:

"The grand fir forest type had severity values at the same level of forest types dominated by fire-resister species despite grand fir was classified as a fire-avoider species. … In many ponderosa pine forests maintained historically by a high frequency, low-severity fire regime, the transition towards denser forests dominated by Douglas-fir and grand fir would explain why ponderosa pine and Douglas-fir still compose a significant proportion of basal area in the grand fir forest type, and many maintain large, old, fire-resistant ponderosa pine trees (Johnston et al. 2021; Merschel et al. 2021). Therefore, the particular structure and composition of these "recent" grand fir forests (e.g., Merschel et al. 2014), with an important presence of large-diameter trees of fire-resistant species, may provide latent fire resistance (Larson et al. 2013)."

Odion et al. (2014) noted, based on extensive literature review of landscape-scale evidence of historical fire severity patters in Ponderosa pine and mixed conifer forests:

"There is widespread concern that fire exclusion has led to an unprecedented threat of uncharacteristically severe fires in ponderosa pine (Pinus ponderosa Dougl. ex. Laws) and mixed-conifer forests of western North America. These extensive montane forests are considered to be adapted to a low/moderate-severity fire regime that maintained stands of relatively old trees. ***However, there is increasing recognition from landscape-scale assessments that, prior to any significant effects of fire exclusion, fires and forest structure were more variable in these forests. Biota in these forests are also dependent on the resources made available by higher-severity fire."***

"… most forests appear to have been characterized by mixed-severity fire that included ecologically significant amounts of weather-driven, high-severity fire."

"….paleoecological studies also support mixed-severity fire regimes for the ponderosa pine and mixed-conifer forests. These studies have found charcoal depositions from major fire episodes in ponderosa pine and interior Douglas-fir forests occurring for millennia in the northern Rockies (central Idaho: [100,101]), Klamath [102], Sierra Nevada [103], eastern Oregon Cascades [104], and southwestern USA [105–107]. ***These major episodes are generally interpreted as large, severe fire events [101– 107].***

"The high-severity fire rotations […] do not support the hypothesis that low/moderate-severity fire regimes were predominant in the majority of ponderosa pine and mixed-conifer forests of western North America. In all the large, forest landscapes for which data covering at least 70 years exist, high-severity fire rotations ranged from

about 217 to 849 years [57], and were mostly 200–500 years. This is generally less than potential tree lifespans. For combined moderate- and high-severity fires in the eastern Cascades, rotations were 115–128 years"

"The majority of the evidence did not support the low/moderate-severity fire hypothesis, but, instead, supported the alternate hypothesis that mixed-severity fire shaped these forest landscapes. This finding applies to Pacific states ponderosa pine, Jeffrey pine, and California mixed-conifer forests, as well as ponderosa pine and mixed-conifer forests in the eastern Cascades, Rockies and southwestern USA, where low/moderate-severity regimes have often been applied."

"In addition, patch sizes of high severity fire in the central Rockies have not increased [58]. Our assessment of high-severity rotations based upon existing literature also revealed a generally lower incidence of high-severity fire in these forests in recent decades…"

"Based on direct observations of fire behavior, high winds (generally 10 m open wind speeds .32–35 kilometers/hr) may subject virtually any conifer forest, regardless of fuel density, to crown fire [108]. Thus, empirical data call into question a major premise of the low/moderate-severity fire regime: that ponderosa pine and mixed-conifer forests may be completely resistant to crown fire. Fire intensity increases with winds, and at winds of .30 km/hr spot fires may be ignited over 1 km ahead of the fire front [109]. The coalescing of separate spot fires with the fire front can further energize wind-driven fire [110,111]. Severe droughts also intensify fires by reducing fuel moisture to extremely low levels, allowing crown fire under less windy conditions [108,112]. Severe drought years throughout much of western North America occurred from 1856 to 1865, 1870 to 1877 and 1890 to 1896 [113]. The extensive high-severity fires of 1910 (the Big Burn in Idaho and Montana), when large areas of drier forests burned at high severity prior to fire exclusion–much of it in ponderosa pine–illustrate how fire behavior that is rare temporally due to extreme climate and weather can dominate in space [1]. Many fire episodes in the charcoal records that exceed modern fires undoubtedly involve combinations of extreme wind, drought, and mass fire."

"The importance of multiple lines of evidence has been stressed in determining whether mixed-severity fire regimes applied historically [122]. ***Our results illustrate broad evidence of mixed-severity fire regimes in ponderosa pine and mixed-conifer forests of western North America. Prior to settlement and fire exclusion, these forests historically exhibited much greater structural and successional diversity than implied by the low/moderate-severity model"***

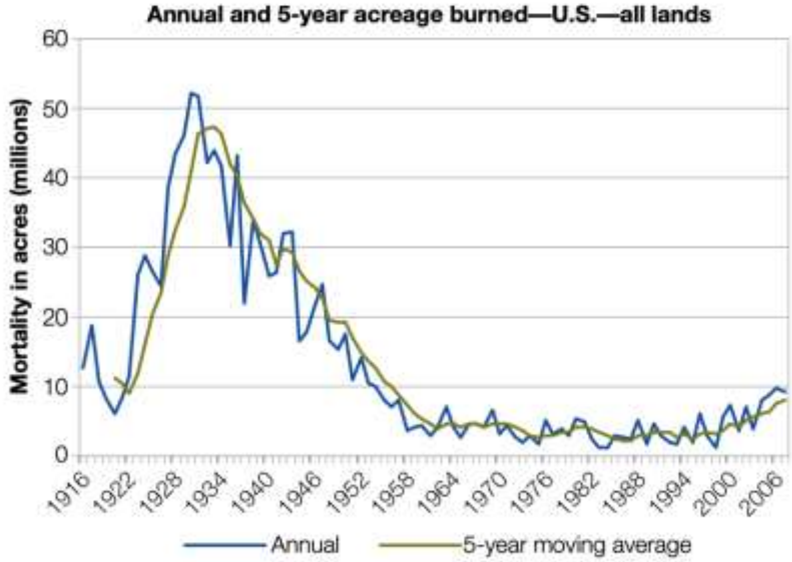
"To improve clarity in communication, we propose that ''low/ moderate-severity'' be applied to those regimes where, as the term implies, high-severity fire is absent. These circumstances appear to be quite rare in the ponderosa pine and mixed-conifer forests of western North America. Therefore, a fire regime with a high-severity component of any amount should not be classified as low/moderate-severity"

"Our findings suggest a need to recognize mixed-severity fire regimes (Table 2) as the predominant fire regime for most of the ponderosa pine and mixed-conifer forests of western North America"

Evidence that Mixed-severity fires are still within historic range of variability in the west is also provided by the research of Pierce and Meyer (2008). They examined the size and frequency of fire-related debris flows within alluvial fans in Idaho dating back approximately 2,000 years. They found that evidence of small frequent fires historically coincided with multi-decadal climatic cycles of greater moister or drought, and that larger fires corresponded to drought cycles. Today's high severity fires were found to be within natural range of variability.

In addition, data from the USFS National Report on Sustainable Forests (2010) shows that fire extent was much more prevalent than today across the US:

Figure 16-1. Total acreage burned.



Source: USDA Forest Service, Forest Health Protection

Hessberg et al. (2007) found that historically mixed-conifer forests were dominated by dense forests. Many of the mixed conifer forests in the region are closed canopy forests that are highly interwoven complex ecosystems that provide high quality habitat for numerous species such as goshawk, marten, Pileated, Lewis woodpecker, and others. Much peer-reviewed scientific research on mixed-conifer forests has suggested that thinning is likely not needed, effective, nor ecologically beneficial in moist mixed-conifer forest to prevent fire, does not mimic the complex natural fire regime (Noss et al, 2006; Lindenmayer et al. 2009) and threatens to increase fire risk (Lindenmayer et al. 2009). The moist, mixed forest type is fragile and vulnerable to the chronic negative impacts of industrial commercial logging. Mature and old-growth moist mixed conifer stands have dense, moist interiors and little wind, which inhibit the spread of wildfire (Lindenmayer et al. 2009; Morrison and Smith 2005; Rhodes 2007). Large fires are climatically driven and fuels reduction treatments can be insignificant to prevent fire spread under these conditions. However, the post-fire habitat is significantly degraded by the logging that happens in the name of fuels reduction prior to the fire.

High intensity wildfires produce unique ecological conditions compared to low intensity fires. High intensity fires are historically natural, and unique, and are integral to the biodiversity of flora and fauna in the region. Favoring lower severity fires across the region in management activities may create unnatural ecological situations that are deleterious to the wildlife, ecological processes, and biodiversity of the area. An example of the importance of post-fire areas occurring after high intensity fires include the findings of Donato et al. (2008):

> *"[S]evere fires are typically expected to be deleterious to forest flora and development; however, these results indicate that in systems characterized by highly variable natural disturbances (e.g. mixed-severity fire regime), native biota possess functional traits lending resilience to recurrent severe fire. Compound disturbance resulted in a distinct early seral assemblage (i.e. interval- dependent fire effects), thus contributing to the landscape heterogeneity inherent to mixed-severity fire regimes. Process-oriented ecosystem management incorporating variable natural disturbances, including 'extreme' events such as SI severe fires, would likely perpetuate a diversity of habitats and successional pathways on the landscape."*

Evidence that mixed-severity fires are still within historic range of variability in the west is also provided by the research of Pierce and Meyer (2008). They examined the size and frequency of fire-related debris flows within alluvial fans in Idaho dating back approximately 2,000 years. They found that evidence of small frequent fires historically coincided with multi-decadal climatic cycles of greater moister or drought, and that larger fires corresponded to drought cycles. Today's high severity fires were found to be within natural range of variability.

Williams and Baker have published several studies suggesting that forests in eastern Oregon were considerably more dense than estimates commonly asserted by agencies (Baker 2012; Williams and Baker 2012; and Baker and Williams 2015). Their research has received criticism by some, such as Fule et al. (2014). However, Williams and Baker (2014) provided in-depth responses to these criticisms and clear rationales and defense of their methods; their response was peer-reviewed and published. Their work should not be discounted; rather, it should be considered part of the ongoing conversation and part of the scientific controversy involved in these discussions. Williams and Baker (2014) note:

> *"Government wildland fire policies and restoration programmes in dry western US forests are based on the hypothesis that high- severity fire was rare in historical fire regimes, modern fire severity is unnaturally high and restoration efforts should focus primarily on thinning forests to eliminate high-severity fire. Using General Land Office (GLO) survey data over large dry-forest landscapes, we showed that the proportion of historical forest affected by high-severity fire was not insignificant, fire severity has not increased as a proportion of total fire area and large areas of dense forest were present historically….. In response, Fulé et al. …suggest that our inferences are unsupported and land management based on our research could be damaging to native ecosystems. Here, we show that the concerns of FE are unfounded. Their criticism comes from misquoting W&B, mistaking W&B's methods, misusing evidence (e.g. from Aldo Leopold) and missing substantial available evidence. We also update corroboration for the extensive historical high-severity fire shown by W&B. We suggest that restoration programmes are misdirected in seeking to reduce all high-severity fire in dry forests, given findings from spatially extensive GLO data and other sources."*

> *"The best possible historical baseline for dry forests is likely to come from systematically combining all sources. Past studies that supported the past incomplete historical baseline, which suggested that low-severity fire primarily maintained historical dry forests, were often spatially limited, incomplete samples of larger landscapes. Tree-ring methods can reconstruct to fine scales back to the late 1800s, but are difficult to complete across large landscapes (but see Heyerdahl et al., 2001). Palaeoecological reconstructions can provide key temporal evidence, but are also difficult to replicate across large landscapes. GLO data, in contrast, can be used to develop reconstructions across hundred of thousands to millions of hectares. New findings from GLO data have challenged past findings about the nature of the historical baseline in dry forests, but it is the role of science to continually test past findings. Refining the historical baseline should help avoid misuse of evidence, false narratives, and misdirected restoration and provide a sound scientific foundation for predicting the effects of climatic change on wildfire and forests."*

Through the lens of species presence and evolutionary history

Mixed-severity fires (including high severity fires) create habitat that is necessary for species within the ONF and eastern Oregon, suggesting that high severity fires are natural and historically present, as well as necessary. High severity fires create important habitat that is very high in biodiversity, and may be rare compared to historic norms.

The evolutionary history and very existence of Black-backed woodpeckers suggests that large high-severity fires must regularly occur within their range. We are concerned that current fire suppression efforts (including thinning) through the region will continue to exclude high-severity wildfires (and continue despite project implementation) and threaten the viability of Black-backed woodpeckers and other species that depend on high-severity wildfire. Hutto et al. (2008) noted that:

> ***"Without embracing an evolutionary perspective, we run the risk of creating restoration targets that do not mimic evolutionarily meaningful historical conditions, and that bear little resemblance to the conditions needed to maintain populations of native species****, as mandated by law (e.g., National Forest Management Act of 1976)."*

> *"The degree to which the black-backed woodpecker is restricted to burned forest conditions in the intermountain west is truly remarkable. Although this species has been detected outside burned forest conditions, particularly in unburned, beetle-killed forests, the numbers therein are small, and nest success therein is substantially lower than in burned forests (Saab et al. 2005). Neither Powell (2000) nor Morrissey et al. (2008), for example, found any*

black-backed woodpeckers in surveys of mountain pine beetle-infested mixed-conifer forests even though they located northern flickers and three-toed, hairy, downy, and pileated woodpeckers. Similarly, a regionwide bird survey across a series of unburned, beetle-infested conifer forests within the Forest Service Northern Region (Cilimburg et al. 2006) yielded only two black-backed woodpecker detections (0.46 % of 433 point counts). This is less than one-tenth of the frequency of detection in forests burned 6 yr (Saab et al. 2007), so the probability of a severe fire occurring somewhere within an entire watershed in any given 6-year window is very high. Thus, when viewed on a landscape scale, it becomes easy to imagine that a sufficiently mobile plant or animal species (e.g., fire morel [Morchella angusticeps]; jewel beetle, Buprestidae; blackbacked woodpecker) could become specialized to use a burned forest condition that is ephemeral on a local scale but always present somewhere in the larger landscape."

"...[T]he patterns of distribution and abundance for several other bird species (black-backed woodpecker [Picoides arcticus], buff-breasted flycatcher [Empidonax fulvifrons], Lewis' woodpecker [Melanerpes lewis], northern hawk owl [Surnia ulula], and Kirtland's warbler [Dendroica kirtlandii]) suggest that severe fire has been an important component of the fire regimes with which they evolved. ***Patterns of habitat use by the latter species indicate that severe fires are important components not only of higher-elevation and high-latitude conifer forest types, which are known to be dominated by such fires, but also of mid-elevation and even low-elevation conifer forest types that are not normally assumed to have had high-severity fire as an integral part of their natural fire regimes.*** *Because plant and animal adaptations can serve as reliable sources of information about what constitutes a natural fire regime, it might be wise to supplement traditional historical methods with careful consideration of information related to plant and animal adaptations when attempting to restore what are thought to be natural regimes."*

"In addition, two lines of evidence suggest that it is the more severe fires that are needed to create conditions most suitable for this fire specialist: (1) not only is the black-backed woodpecker restricted to burned forests, but its distribution within burned forests is also relatively restricted to the more severely burned conditions (Kotliar et al. 2002, Smucker et al. 2005, Russell et al. 2007, Hutto 2008); (2) black-backed woodpecker nest sites occur in locations that harbor significantly larger and more numerous trees than occur around randomly selected sites within a burn (Saab and Dudley 1998, Kotliar et al. 2002, Russell et al. 2007). ***Such nesting locations would be difficult to find in forests maintained as low-density, open, park-like stands due to frequent, low-severity fire."***

"How could a species evolve to depend on a condition that occurs only infrequently? The answer lies with the distribution and abundance of such fires across space and time. ***The return interval for severe fire in one location may be several hundred years, but black-backed woodpecker populations persist in a particular re for >6 yr (Saab et al. 2007), so the probability of a severe fire occurring somewhere within an entire watershed in any given 6-year window is very high.*** *Thus, when viewed on a landscape scale, it becomes easy to imagine that a sufficiently mobile plant or animal species (e.g., re morel [Morchella angusticeps]; jewel beetle, Buprestidae; black-backed woodpecker) could become specialized to use a burned forest condition that is ephemeral on a local scale but always present somewhere in the larger landscape."*

BMBP discussed these issues and our concerns in our comments on the Draft Environmental Assessment for the Mill Creek project, pg. 24.

EFFICACY OF "FUELS REDUCTION":

The short-term and temporary nature of the perceived fuels reduction benefits from most project are not likely to result in meaningful changes to fire intensity, size, or severity. Most projects designed to reduce fuels note that perceived benefits are estimated to affect fire behavior for approximately 20 years. If the estimated effectiveness is only approximately 20 years, then the justification for this project is even more tenuous. For example, Rhodes and Baker (2008) found that:

"[u]sing extensive fire records for western US Forest Service lands, we estimate fuel treatments have a mean probability of 2.0-7.9% of encountering moderate-or high-severity fire during an assumed 20-year period of reduced fuels."

Is the FS planning repeated entries into riparian areas to log and burn every 15 to 20 years? Given that riparian corridors are disproportionately relied upon by many species for connectivity, key habitat, thermal refugia and shade, and other parameters provided by these often denser, complex forests—what effect will repeated thinning and/or prescribed burning every ~15 years have on the species that rely on riparian corridors for at least part of their life cycles?

Hutto et al. 2016 note, in relation to climate change, that increased efforts towards fuels reduction would be an untenable emphasis:

"Any perceived problem with future changes in fire behavior cannot be solved by redoubling our effort to treat this particular climate change symptom by installing widespread fuel treatments that do nothing to stop the warming trend, and do little to reduce the extent or severity of weather-driven fires (Gedalof et al. 2005). Therefore, fuel management efforts to reduce undesirable effects of wildfires outside the xeric ponderosa pine forest types could be more strategically directed toward creating fire-safe communities….Fuel treatment efforts more distant from human communities may carry the negative ecological consequences we outlined earlier and do little to stop or mitigate the effects of fires that are increasingly weather driven (Rhodes and Baker 2008, Franklin et al. 2014, Moritz et al. 2014, Odion et al. 2014)."

DellaSala et al. 2022 highlight the often-overlooked negative environmental impacts of logging and thinning in the name of fire suppression:

"*Active Management Approach (MFAMA) in an attempt to contain wildfires increasingly influenced by top down climate forcings. Wildfire suppression activities aimed at stopping or slowing fires include expansive dozerlines, chemical* retardants *and* igniters*, backburns, and cutting trees (live and dead), including within roadless and wilderness areas. MFAMA involves logging of large, fire-resistant live trees and snags;* mastication *of beneficial shrubs; degradation of wildlife habitat, including* endangered species *habitat; aquatic impacts from an expansive road system; and logging-related* carbon emissions*. Such impacts are routinely dismissed with minimal environmental review and defiance of the precautionary principle in environmental planning. Placing restrictive bounds on these activities, deemed increasingly ineffective in a* change climate*, is urgently needed to overcome their contributions to the global biodiversity and* climate crises*. We urge land managers and decision makers to address the root cause of recent fire increases by reducing* greenhouse gas emissions *across all sectors, reforming industrial* forestry *and fire suppression practices, protecting carbon stores in large trees and recently burned forests, working with wildfire for ecosystem benefits using minimum suppression tactics when fire is not threatening towns, and surgical application of thinning and prescribed fire nearest homes."*

Baker et al. 2023 determined that nature-based solutions that emphasize natural disturbances are a viable and important strategy:

"Natural disturbances, unlike mechanical treatments, select survivors that are more likely to be genetically adapted to survive future disturbances and climate change, while perpetuating ecosystem services. Natural disturbances also could ecologically restore forest heterogeneity, better maintain carbon storage, and reduce management needs. A fully developed disturbance-based NbS could more effectively adapt dry forests to climate change within ~30–40 years if active management is reprioritized to protect the built environment and communities near public forests."

Noss et al. 2006 also highlighted the paradigm shift needed for true restoration:

"One barrier to better use of ecological science is that individuals involved in developing fire policies and practices have tended to be specialists in fire and fuel management, not ecologists, conservation biologists, or other broadly

trained scientists. It is not surprising, therefore, that current forest law does not adequately incorporate ecological considerations in its implementation and tends to promote a narrow definition of restoration that focuses almost exclusively on fuels (DellaSala et al. 2004; Schoennagel et al. 2004)."

"True ecological restoration requires the maintenance of ecological processes, native species composition, and forest structure at both stand and landscape scales. Because forests are highly variable over space and time, few universal principles exist for integrating insights from ecology and conservation biology into fire management policies. Nevertheless, one fundamental principle is that managed forests should not only support the desired fire regime but also viable populations of native species in functional networks of habitat (Hessberg et al. 2005). A common-sense conservation goal is to achieve forests that are low maintenance and require minimal repeated treatment. With time, in a landscape of sufficient size, the right end of the restoration continuum (Figure 4) could be reached, where natural fire maintains the system in the desired state. Indeed, wildland fire use is the cheapest and most ecologically appropriate policy for many forests. We envision a future where fire is seen by land managers and the public as the key to healthy forests, but where each forest and each patch of the forest mosaic is recognized for its individuality and managed accordingly. Above all, a guiding principle of forest management should be a precautionary approach that avoids ecological harm."

BMBP discussed these issues and our concerns in our comments on the Draft Environmental Assessment for the Mill Creek project, pg. 25.

<u>Resolution:</u>

The proposed resolutions in Sections I – IV will address the concerns raised in this section.

Thank you for your consideration of these objections. We look forward to meeting with you to work on a resolution to our concerns. Many other remedies for resolution were suggested throughout our comments.

Sincerely,

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COPIES OF ALL REFERENCES AND CITATIONS ARE PROVIDED ON A FLASH DRIVE STORAGE DEVICE INCLUDED WITH BMBP'S PHYSICAL COPY OF THESE OBJECTIONS SUBMITTED VIA USPS CERTIFIED MAIL.

References:

BMBP Aquatics Addendum

BMBP Additional Aquatics Notes

USDA NorWeST Stream Temperature Data Spreadsheet

Citations for Mill Creek objection:

Achat, D., Fortin, M., Landmann, G. et al. Forest soil carbon is threatened by intensive biomass harvesting. Sci Rep 5, 15991 (2015). https://doi.org/10.1038/srep15991

Al-Chokhachy, R.; Roper, B.; Archer, E. 2010. Evaluating the Status and Trends of Physical Stream Habitat in Headwater Streams within the Interior Columbia River and Upper Missouri River Basins Using an Index Approach. American Fisheries Society.

Alila et al. 2009

Al-Chokhachy, R.; Roper, B.; Archer, E. 2010. A Review of Bull Trout Habitat Associations and Exploratory Analyses of Patterns across the Interior Columbia River Basin. North American Journal of Fisheries Management 30-464-480.

Arkle, Robert & Pilliod, David. (2010). Prescribed fires as ecological surrogates for wildfires: A stream and riparian perspective. Forest Ecology and Management. 259. 893-903. 10.1016/j.foreco.2009.11.029.

Bader, M., 2000. Based Ecosystem Protection in the Northern Rocky Mountains of the United States. Alliance for the Wild Rockies. USDA Forest Service Proceedings RMRS-P-15-VOL-2. 2000. Accessed at: http://www.fs.fed.us/rm/pubs/rmrs_p015_2/rmrs_p015_2_099_110.pdf

Baker, W. and Ehle, D. 2001. Uncertainty in surface-fire history: the case of ponderosa pine forests in the western United States. Can. J. For. Res. 31:1205-1226 (2001) DOI: 10.1139/cjfr-31-7-1205.

Baker, W. L. 2012. Implications of spatially extensive historical data from surveys for restoring dry forests of Oregon's eastern Cascades. Ecosphere 3: article 23.

Baker, W. L. 2015. Are high-severity fires burning at much higher rates recently than historically in dry-forest landscapes of the western USA? PLOS One 10(9), e0136147.

Baker, W. L. and M. A. Williams. 2015. Bet-hedging dry-forest resilience to climate-change threats in the western USA based on historical forest structure. Frontiers in Ecology and Evolution 2, article 88.

Baker 2017. Personal Communication from William L. Baker to George Wuerthner, Dated October 17 2017, To explain the Johnston fire-history results.

Baker et al. 2023. Countering Omitted Evidence of Variable Historical Forests and Fire Regime in Western USA Dry Forests: The Low-Severity-Fire Model Rejected.

Baker, W.L.; Hanson, C.T.; DellaSala, D.A. 2023. Harnessing Natural Disturbances: A Nature-Based Solution for Restoring and Adapting Dry Forests in the Western USA to Climate Change. Fire 2023, 6, 428. https://doi.org/10.3390/fire6110428

Beechie, T. 2001. Empirical predictors of annual bed load travel distance, and implications for salmonid habitat restoration and protection. Earth Surface Processes and Landforms 26,1025-1034

Beechie, T.; Veldhuisen, C.; Schuett-Hames, D.; DeVries, P.; Conrad, R.; and Beamer, E. 2005. Monitoring treatments to reduce sediment and hydrologic effects from roads. Pages 35-65. Methods for monitoring stream and watershed restoration. *(Book)*

Beechie, T.; Imaki, H.; Greene, J.; Wade, A.; Wu, H.; Pess, G.; Roni, P.; Kimabll, R.; Standord, J.; Kiffney, P.; Mantua, N. 2012 Restoring salmon in a changing climate. Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/rra.2590

Benda, L. and Dunne, T. 1997. Stochastic forcing of sediment routing and storage in channel networks. Water Resources Research 33, 2849-2863.

Benda, L.; Hassan, M.; Church, M.; and May, C. 2005. Geomorphology of steep headwaters: the transition from hillslopes to channels. Journal of the American Water Resources association 41, 835–851.

Bond, Monica L.; Siegel, Rodney B.; Hutto, Richard L.; Saab, Victoria A.; Shunk, Stephen A. 2012. A new forest fire paradigm: The need for high-severity fires. The Wildlife Professional. Winter 2012: 46-49.

Bilby, R. and Bisson, P 1998. Function and distribution of large woody debris. Pages 324-326 River ecology and management: Lessons from the Pacific coastal ecoregion.

Birdsey RA, DellaSala DA, Walker WS, Gorelik SR, Rose G and Ramírez CE (2023) Assessing carbon stocks and accumulation potential of mature forests and larger trees in U.S. federal lands. *Front. For. Glob. Change* 5:1074508. doi: 10.3389/ffgc.2022.1074508

Bisson, P; Bilby, R.; Bryant, M.; Dolloff, C.; Grette, G.; House, R.; Murphy, M.; Koski, K.; and Sedell, J. 1987. Large woody debris in forested streams in the Pacific Northwest: past, present, and future. Pages 143-190. Streamside management: forestry and fishery interactions. University of Washington.

Bradley, C.; Rhodes, J.; Kessler, J.; Frissell, C., 2002. An Analysis of Trout and Salmon Status and Conservation Values of Potential Candidates in Idaho and Eastern Washington. Published by: The Western Native Trout Campaign; the Center for Biological Diversity, The Biodiversity Conservation Alliance, and the Pacific Rivers Council.

Bradley, C. M., C. T. Hanson, and D. A. DellaSala. 2016. Does increased forest protection correspond to higher fire severity in frequent-fire forests of the western United States? Ecosphere 7(10):e01492. 10.1002/ecs2.1492

Brosofske, K.; Chen, J.; Naiman, R.; and Franklin, J. 1997. Harvesting effects on microclimatic gradients from small streams to uplands in western Washington. Ecological Applications Vol. 7, 1188–1200.

Bryce, S.; Lomnicky, S.; Gregg, A.; Kaufmann, P. 2010. Protecting sediment-sensitive aquatic species in mountain streams through the application of biologically based streambed sediment criteria. J.N. Am. Benthol. Soc., 2010, 29(2):657-672.

Buotte, P. C., B. E. Law, W. J. Ripple, and L. T. Berner. 2020. Carbon sequestration and biodiversity co-benefits of preserving forests in the western United States. Ecological Applications 30(2): e02039. 10.1002/eap.2039.

Bull E.; Parks, C.; Torgersen, T., 1997. Trees and Logs Important to Wildlife in the Interior Columbia River Basin. GTR 391. USDA FS.

Buttle, J.; Creed, I.; Moore, R..; 2009. Advances in Canadian Forest hydrology, 2003-2007. Canadian Water Resources Journal, 34(2), 113.

Caissie, D., 2006. The thermal regime of rivers: a review. Freshwat. Biol. 51, 1389– 1406.

Campbell, J.; Harmon, M.; Mitchell, S. 2012. Can fuel-reduction treatments really increase forest carbon storage in the western US by reducing future fire emissions? *Front Ecol Environ* 2012; 10(2): 83–90, doi:10.1890/110057.

Carnefix and Frissell 2009. Aquatic and Other Environmental Impacts of Roads: The Case for Road Density as Indicator of Human Disturbance and Road Density Reduction as Restoration Target; a Concise Review. The Pacific Rivers Council.

Cederholm C., Reid L., Salo E. (1980). Cumulative effects of logging road sediment on salmonid populations in Clearwater River, Jefferson County, Washington. College of Fisheries, University of Seattle, Washington.

Chen, J.; Franklin, J.; and Spies, T.1992. Vegetation responses to edge environments in old-growth Douglas-fir forests. Ecological Applications 2, 387-396.

Chen, J.; Franklin, J.; and Spies, T. 1995. Growing-season microclimatic gradients from clearcut edges into old-growth Douglas-fir forests. Ecological Applications 5, 74-86.

Cline, Steven Paul. 1977. The Characteristics and Dynamics of Snags In Douglas-Fir Forests of the Oregon Coast Range. : Oregon State University.

Cline 1997. The Characteristics and Dynamics of Snags In Douglas-Fir Forests of the Oregon Coast Range. Oregon State University.

Corn, P. and Bury, B. 1989 Logging in Western Oregon: Responses of Headwater Habitats and Stream Amphibians.

Coutant, C. 1999. Perspectives on temperature in the Pacific Northwest's fresh waters. Environmental Sciences Division Publication, US Dept. of Energy, Tennessee.

Croke, J.C., Hairsine, P.B., 2006, Sediment delivery in managed forests: a review: *Environmental Review*, v. 14, p. 59-87

Csuti, B.; Kimerling, J.; O'Neill, T.; Shaughnessy, M.; Gaines, E.; Huso, M. (1997). Atlas of Oregon Wildlife: Distribution, Habitat, and Natural History. Oregon State University Press, Corvallis, Oregon.

Cushman 2006 Effects of habitat loss and fragmentation on amphibians: A review and prospectus. Biological Conservation 128 (2006) 231 – 240.

Davies, P. and Nelson, M. 1994. Relationships between riparian buffer widths and the effects of logging on stream habitat, invertebrate community composition and fish abundance. Australian Journal of Marine and Freshwater Research 45:1289–1305.

DellaSala, D.; Karr, J.; Olson, D.; 2011. Roadless areas and clean water. Journal of Soil and Water Conservation, 66(3): 78A-84A. Accessed at: http://www.jswconline.org/content/66/3/78A.full.pdf

DellaSala; March 16, 2022: Testimony of Dr. Dominick A. DellaSala for March 16, 2022 Hearing on "Fighting Fire with Fire: Evaluating the Role of Forest Management in Reducing Catastrophic Wildfires" in the House Committee on Oversight and Reform, Subcommittee on Environment. https://oversight.house.gov/sites/democrats.oversight.house.gov/files/DellaSala%20Testimony.pdf

DellaSala DA, Mackey B, Norman P, Campbell C, Comer PJ, Kormos CF, Keith H and Rogers B (2022) Mature and old-growth forests contribute to large-scale conservation targets in the conterminous United States. Front. For. Glob. Change 5:979528. doi: 10.3389/ffgc.2022.979528

Dominick A. DellaSala, Bryant C. Baker, Chad T. Hanson, Luke Ruediger, William Baker, Have western USA fire suppression and megafire active management approaches become a contemporary Sisyphus?, Biological Conservation, Volume 268, 2022, 109499, ISSN 0006-3207.

DeWalle, D. 2010. Modeling stream shade: Riparian buffer height and density as important as buffer width. Journal of the American Water Resources Association 46:2 323-333.

Donato, D.; Fontaine, J.; Robinson, D.; Kauffman, B.; Law, B. 2008. Vegetation response to a short interval between high-severity wildfires in a mixed-evergreen forest. Journal of Ecology 2008 doi: 10.1111/j.1365-2745.2008.01456.x

Downing, W.M., Dunn, C.J., Thompson, M.P. *et al*. Human ignitions on private lands drive USFS cross-boundary wildfire transmission and community impacts in the western US. *Sci Rep* **12**, 2624 (2022). https://doi.org/10.1038/s41598-022-06002-3

Ebersole, J.; Liss, W.; and Frissell, C. 2003 Thermal Heterogeneity, stream channel morphology, and salmonid abundance in northeastern Oregon streams. Canadian Journal of Fisheries and Aquatics Sciences.

Ebersole, J.; Wigington, P.; Liebowitz, S.; and Comeleo, R. 2015. Predicting the occurrence of cold-water patches at intermittent and ephemeral tributary confluences with warm rivers. Freshwater Science 34(1):111–124.

Erman, D.C., Erman, N.A., Costick, L., and Beckwitt, S. 1996. Appendix 3. Management and land use buffers. Sierra Nevada Ecosystem Project Final Report to Congress, Vol. III, pp. 270- 273. Wildland Resources Center Report No. 39, University of California, Davis.

Espinosa, F.A., Rhodes, J.J., and McCullough, D. A. 1997. The failure of existing plans to protect salmon habitat on the Clearwater National Forest in Idaho. J. Env. Management 49: 205-230.

Flaspohler, D., Fisher, C., Huckins, C., Bub, B., and Van Dusen, P., (2002). Temporal patterns in aquatic and avian communities following selective logging in the Upper Great Lakes Region. Forest Science, 48(2): 339– 349.

Freeman, M.; Pringle, C.; and Jackson, C. 2007. Hydrologic connectivity and the contribution of stream headwaters to ecological integrity and regional scales. Journal of the American Water Resources Association 43(1):5-14.

Frissell, C. and Carnefix, G.; 2007. The Geography of Freshwater Conservation: Roadless Areas and Critical Watersheds for Native Trout. Wild Trout IX symposium. Accessed at: http://www.blm.gov/or/plans/wopr/pub_comments/paper_documents/Paper_1989-2023/WOPR_PAPER_01989.120001.pdf

Frissell, C.; Baker, R.; DellaSala, D.;Hughes, R.; Karr, J.; McCullough, D.; Nawa, R.; Rhodes, J.; Scurlock, M.; and Wissmar, R. 2014. Conservation of aquatic and fishery resources in the Pacific Northwest: Implications of new science for the aquatic conservation strategy of the Northwest Forest Plan. Prepared for the Coast Range Association.

Fulé, P.Z., Swetnam, T.W., Brown, P.M., Falk, D.A., Peterson, D.L., Allen, C.D., Aplet, G.H., Battaglia, M.A., Binkley, D., Farris, C., Keane, R.E., Margolis, E.Q., Grissino-Mayer, H., Miller, C., Sieg, C.H., Skinner, C., Stephens, S.L. and Taylor, A. (2014), Correspondence. Global Ecology and Biogeography, 23: 825-830. https://doi.org/10.1111/geb.12136

Gomi, T.; Sidel, R.; and Richardson, J. 2002. Understanding processes and downstream linkages of headwater streams. BioScience 52:905-916.

Gomi, Takashi & Moore, R. & Hassan, Marwan. (2005). Suspended Sediment Dynamics in Small Forest Streams of the Pacific Northwest. JAWRA Journal of the American Water Resources Association. 41. 877 - 898. 10.1111/j.1752-1688.2005.tb03775.x.

Grant, G. and Swanson, F. 1990. Implications of timber harvest pattern on hydrologic and geomorphic response of watersheds. Eos, Transactions, American Geophysical Union 71:1321.

Groom, J.; Dent, L.; Madsen, L; and Fleuret, J. 2011. Response to western Oregon (USA) stream temperatures to contemporary forest management. Forest Ecology and Management 262:1618-1629.

Groom J.; Dent, L.; and Madsen, L. 2011. Stream temperature change detection for state and private forests in the Oregon Coast Range. Water Resources Research 47, W01501.

Gucinski, Hermann & Furniss, Michael J & Ziemer, Robert & Brookes, Martha & Service, Forest & Furniss, Hermann & Ziemer, Michael & Brookes, Robert & H, Martha. (2001). Forest Roads: A Synthesis of Scientific Information. General Technical Reports of the US Department of Agriculture, Forest Service.

Guenther, S., Gomi, T., and Moore, R. (2012). Stream and bed temperature variability in a coastal headwater catchment: influences of surface-subsurface interactions and partial-retention forest harvesting. Hydrological Processes, 28: 1238–1249.

Haeseker, S.; Harris, J.; Barrows, M.; Gallion, D.; Koch, R.; Bowerman, T.; Connor, M.; Al-Chokhachy, R.; Skalicky, J.; and Anglin D. (2014) Walla Walla River Bull Trout Ten Year Retrospective Analysis and Implications for Recovery Planning. Funded by U.S. Fish and Wildlife Service and U.S. Geological Survey, Utah Cooperative Fish and Wildlife Research Unit, Department of Watershed Sciences, and Utah State University.

Harr, D. and Coffin, B. 1992. Influence of Timber Harvest on Rain-On-Snow Runoff:A Mechanism for Cumulative Watershed Effects. Interdisciplinary Approaches in Hydrology and Hydrogeology, American Institute of Hydrology pp. 455-469

Harris, N.L., Hagen, S.C., Saatchi, S.S. *et al*. 2016. Attribution of net carbon change by disturbance type across forest lands of the conterminous United States. *Carbon Balance Manage* 11, 24 (2016). https://doi.org/10.1186/s13021-016-0066-5

Hart and Preston 2020 Fire weather drives daily area burned and observations of fire behavior in mountain pine beetle affected landscapes. Environ. Res. Lett. 15 054007.

Heller, N. and Zavaleta, E. 2008. Biodiversity management in the face of climate change: A review of 22 years of recommendations. BIOLOGICAL CONSERVATION 142 (2009) 14–32

Henjum, M.; Karr, J.; Bottom, D.; Perry, D.; Bednarz, J.; Wright, S.; Beckwitt, S.; Beckwitt, E. 1994. Interim Protections for Late-Successional Forests, Fisheries, and Watersheds; National Forests East of the Cascade Crest, Oregon, and Washington Eastside Forests Scientific Society Panel. A Report to the Congress and President of the United States, Eastside Forests Scientific Society Panel.

Hemstad, N.; Merten, E.; and Newman, R. 2006. Effects of riparian forest thinning by two types of mechanical harvest on stream fish and habitat in northern Minnesota. ***Canadian Journal of Forest Research.*** 38.2 (Feb. 2008): p247.

Hessburg, P. Salter, B.; James, K. Re-examining fire severity relations in pre-management era mixed conifer forests: inferences from landscape patterns of forest structure. Landscape Ecol (2007) 22:5–24 DOI 10.1007/s10980-007-9098-2

Heyerdahl et al 2001. Spatial controls of historical fire regimes: a multiscale example from the interior west, usa. Ecology, 82(3), 2001, pp. 660-678.

Heyerdahl, E.; Brubaker, L.; Agee, J. 2002. Annual and decadal climate forcing of historical fire regimes in the interior Pacific Northwest, USA. The Holocene 12,5 (2002) pp. 597–604.

Hicks, B., Beschta, R., and Harr, D. (1991). Long-term changes in streamflow following logging in western Oregon and associated fisheries implications. Water Resources Bulletin, (27):2.

Hutto, R. L., R. E. Keane, R. L. Sherriff, C. T. Rota, L. A. Eby, and V. A. Saab. 2016. Toward a more ecologically informed view of severe forest fires. Ecosphere 7(2):e01255. 10.1002/ecs2.1255.

Independent Scientific Advisory Board 2007. Climate Change Impacts on Columbia River Basin Fish and Wildlife.

Janisch, J.; Foster, A.; Ehinger, W.; 2011. Characteristics of small headwater wetlands in second-growth forests of Washington, USA. Forest Ecology and Management 261 (7) 1265-1274, ISSN 0378-1127, 10.1016/j.foreco.2011.01.005.

Janisch , J..; Wondzell, S.; Ehinger, W.; 2012. Headwater stream temperature: Interpreting response after logging, with and without riparian buffers, Washington, USA. Forest Ecology and Management 270 (2012) 302–313.

Johnson and O'Neil 2001 Wildlife Habitat Relationships in Oregon and Washington

Jones, J. and Grant, G. 1996. Peak flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon. Water Resources Research 32(4) pp. 959-974.

Jones, J. 2000. Hydrologic processes and peak discharge response to forest removal, regrowth, and roads in 10 small experimental basins, western Cascades, Oregon. Water Resources Research 36(9) pp. 2621-2642

Jones, K.; Poole, G.; Meyer, J.; Bumback, W.; and Kramer, E. 2006. Quantifying Expected Ecological Response to Natural Resource Legislation: A Case Study of Riparian Buffers, Aquatic Habitat, and Trout Populations. Ecology and Society 11:15.

Kaufmann, P.; and Faustini, J. 2012. Simple measures of channel habitat complexity predict transient hydraulic storage in streams. Hydrobiologia 685: 69–95.

Kelsey, H. 1982. Influence of magnitude, frequency, and persistence of various types of disturbance on geomorphic form and process. Pages 150-153 in Sediment budgets and routing in forested drainage basins. USFS PNW GTR-141.

Kelsey, H. 1982. Hillslope evolution and sediment movement in a forested headwater basin, Van Duzen River, north coastal California. Pages 86-96 in Sediment budgets and routing in forested drainage basins. USFS PNW GTR-141, Portland, Oregon.

Kiffney, P.; Richardson, J.; and Bull, J. 2003. Responses of Periphyton and Insects to Experimental Manipulation of Riparian Buffer Width Along Forest Streams. Journal of Applied Ecology. 40: 1060-1076.

Kreutzweiser , D., Capell, S., and Good, K. (2005). Macroinvertebrate community responses to selection logging in riparian and upland areas of headwater catchments in a northern hardwood forest. *Journal of the North American Benthological Society*, 24(1):208- 222.

Kreutzweiser, D. and Capell, S. (2001). Fine sediment deposition in streams after selective forest harvesting without riparian buffers. Canadian Journal of Forest Research, v. 31 p. 2134-2142.

Langham G.; Schuetz J.; Distler T; Soykan C.; Wilsey C. (2015) Conservation Status of North American Birds in the Face of Future Climate Change. PLoS ONE 10(9): e0135350. https://doi.org/10.1371/journal.pone.0135350

Law et al 2013 Thinning effects on forest productivity: consequences of preserving old forests and mitigating impacts of fire and drought.

Law, B.E. and R.H. Waring (2015) Carbon implications of current and future effects of drought, fire and management on Pacific Northwest forests. Forest Ecology and Management 355: 4-14. dx.doi.org/10.1016/j.foreco.2014.11.023.

Law, B. E., Hudiburg, T. W., Berner, L. T., Kent, J. J., Buotte, P. C., and Harmon, M. (2018). Land use strategies to mitigate climate change in carbon dense temperate forests. Proc. Nat. Acad. Sci. U.S.A. 115, 3663–3668. doi: 10.1073/pnas.172006411

Law, B.E., Berner, L.T., Buotte, P.C. et al. Strategic Forest Reserves can protect biodiversity in the western United States and mitigate climate change. Commun Earth Environ 2, 254 (2021). https://doi.org/10.1038/s43247-021-00326-0

Law, B.E., April, 2021, Congressional Testimony, "WILDFIRE IN A WARMING WORLD: OPPORTUNITIES TO IMPROVE COMMUNITY COLLABORATION,CLIMATE RESILIENCE, AND WORKFORCE CAPACITY"

Law, B.E.; Moomaw, W.R.; Hudiburg, T.W.; Schlesinger, W.H.; Sterman, J.D.; Woodwell, G.; 2022. The Status of Science on Forest Carbon Management to Mitigate Climate Change and Protect Water and Biodiversity.

Law, B.E.; Moomaw, W.R.; Hudiburg, T.W.; Schlesinger, W.H.; Sterman, J.D.; Woodwell, G.M. Creating Strategic Reserves to Protect Forest Carbon and Reduce Biodiversity Losses in the United States. Land 2022, 11, 721. https://doi.org/10.3390/land11050721.

Law et al 2022 Strategic reserves in Oregon's forests for biodiversity water and carbon to mitigate and adapt to climate change.

Lecerf, A. and Richardson, J. (2010). Litter decomposition can detect effects of high and moderate levels of forest disturbance on stream condition. Forest Ecology and Management, 259 (2010) 2433– 2443.

Lewis, J.; Mori, S.; Keppeler, E.; Ziemer, R.; 2001. Impacts of Logging on Storm Peak Flows, Flow Volumes and Suspended Sediment Loads in Casper Creek, California. *In:* Land Use and Watersheds: Human Influence on Hydrology and Geomorphology in Urban and Forest Areas: American Geophysical Union pp. 85-126.

Lindenmayer, D.; Hunter, M.; Burton, P.; Gibbons, P. 2009. Effects of logging on fire regimes in moist forests. Conservation Letters (2009) 1–7

Madej, M. and Ozaki, V. 1996. Channel response to sediment wave propagation and movement, Redwood Creek, California, USA. Earth Surface Processes and Landforms 21:911-927.

Marshall, D.; Hunter, M.; Contreras, A. (2003) Birds of Oregon A General Reference. Oregon State University Press, Corvallis, Oregon.

McCullough, Dale A., Bartholow, John M., Jager, Henriëtte I., Beschta, Robert L., Cheslak, Edward F., Deas, Michael L., Ebersole, Joseph L., Foott, J. Scott, Johnson, Sherri L., Marine, Keith R., Mesa, Matthew G., Petersen, James H., Souchon, Yves, Tiffan, Kenneth F. and Wurtsbaugh, Wayne A.(2009). Research in Thermal Biology: Burning Questions for Coldwater Stream Fishes',Reviews in Fisheries Science,17:1,90 — 115

Meigs, G. W., J. L. Campbell, H. S. J. Zald, J. D. Bailey, D. C. Shaw, and R. E. Kennedy. 2015. Does wildfire likelihood increase following insect outbreaks in conifer forests? Ecosphere 6(7):118. http://dx.doi.org/10.1890/ ES15-00037.1
Meredith, C.; Roper, B.; and Archer, E. 2014. Reductions in instream wood in streams near roads in the interior Columbia River Basin. North American Journal of Fisheries Management 34(3):493-506.

Mildrexler, David J., Logan T. Berner, Beverly E. Law, Richard Birdsey and William R. Moomaw. “Large Trees Dominate Carbon Storage in Forests East of the Cascade Crest in the United States Pacific Northwest.” Frontiers in Forests and Global Change (2020).

Millar, C.I., Stephenson, N.L. and Stephens, S.L. 2007. Climate Change and Forests of the Future Managing in the Face of Uncertainty. Ecological Applications, 17: 2145-2151.

Miller, Craig, personal communication, September 2020.
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Miserendino, L. and Masi, C. (2010). The effects of land use on environmental features and functional organization of macroinvertebrate communities in Patagonian low order streams. Ecological Indicators, 10(2): 311-319.

Moore, D. and Wondzell, S. 2005. Physical hydrology and the effects of forest harvesting in the Pacific Northwest: A review. Journal of the American Waters Association, 41(4) pp. 763-784

Moriarty, K.; Epps, C.; Zielinski, W. 2016 Forest Thinning Changes Movement Patterns and Habitat Use by Pacific Marten. Journal of Wildlife Management 80(4):621-633; 2016; DOI: 10.1002/jwmg.1060.

Moris, J.; Matthew J. Reilly, Zhiqiang Yang, Warren B. Cohen, Renzo Motta, Davide Ascoli 2022. Using a trait-based approach to asses fire resistance in forest landscapes of the Inland Northwest, USA. Landsc Ecol (2022) 37:2149–2164 https://doi.org/10.1007/s10980-022-01478-w

Morrison and Smith 2005. Fire Regime Condition Classes and Forest Stewardship Planning On the Mt. Hood National Forest. Pacific Biodiversity Institute.

Newcombe, C. and Jensen, J. 1996. Channel Suspended Sediment and Fisheries: A Synthesis for Quantitative Assessment of Risk and Impact. North American Journal of Fisheries Management Vol. 16, No. 4.

Nieber, J.; Arika, C.; Lenhart, C.; Titov, M.; and Brooks, K. 2011. Evaluation of buffer width on hydrologic function, water quality, and ecological integrity of wetlands.

Nietch, C.; Borst, M.; Schubauer-Berigan, J.; 2005. Risk management of sediment stress: a framework for sediment risk management research. Environmental Management 36:175–194.

National Oceanic and Atmospheric Administration (NOAA) 1996. Coastal Salmon Conservation: Working Guidance for Comprehensive Salmon Restoration Initiatives on the Pacific Coast.

National Oceanic and Atmospheric Administration (NOAA) 2009. Conservation and Recovery Plan for Oregon Steelhead Populations in the Middle Columbia River Steelhead Distinct Population Segment.

National Oceanic and Atmospheric Administration (NOAA) 2011. 5-Year Review: Summary and Evaluation of Snake River Sockeye, Snake River Spring-Summer Chinook, Snake River Fall-Run Chinook, Snake River Basin Steelhead. National Marine Fisheries Northwest Region.

National Oceanic and Atmospheric Administration (NOAA) 5-Year Review of Snake River Salmonids.

Noss, R.; Franklin, J.; Baker, W. 2006. Ecology and Management of Fire-prone Forests of the Western United States. Society of Conservation Biology.

Odion DC, Hanson CT, Arsenault A, Baker WL, DellaSala DA, et al. (2014) Examining Historical and Current Mixed-Severity Fire Regimes in Ponderosa Pine and Mixed-Conifer Forests of Western North America. PLoS ONE 9(2): e87852. doi:10.1371/journal.pone.0087852.

Odion DC, Hanson CT, Baker WL, DellaSala DA, Williams MA (2016) Areas of Agreement and Disagreement Regarding Ponderosa Pine and Mixed Conifer Forest Fire Regimes: A Dialogue with Stevens et al.. PLoS ONE 11(5): e0154579. doi:10.1371/journal.pone.0154579.

Olson 2000. Master's thesis: Fire in riparian zones: a comparison of historical fire occurrence in riparian and upslope forests in the Blue Mountains and southern Cascades of Oregon.

Olson and Weaver 2007. Vertebrate assemblages associated with headwater hydrology in western Oregon managed forests. Society of American Foresters.

Oregon Dept. of Environmental Quality. Maps displaying water quality standards that are in effect for Clean Water Act purposes.

Pacific Northwest Research Station 1999 Science Findings 1999 Dead and Dying Trees: Essential for Life in the Forest. https://www.fs.fed.us/pnw/sciencef/scifi20.pdf

Pacific Northwest Research Station 2017 Science Findings August

Pearl, C.; Adams, M.; Bury, B.; Wente, W.; McCreary, B. 2009. Evaluating Amphibian Declines with Site Revisits and Occupancy Models: Status of Montane Anurans in the Pacific Northwest USA. Diversity 2009, I, 166-181; doi:10.3390/d1020166.

Pierce, J. and Meyer, G. 2008. Long-term fire history from alluvial fan sediments: the role of drought and climate variability, and implications for management of Rocky Mountain forests. *International Journal of Wildland Fire* 2008, *17*, 84–95

Pilliod, D.; Bull, E.; Hayes, J.; Wales, B. 2006. Wildlife and Invertebrate Response to Fuel Reduction Treatments in Dry Coniferous Forests of the Western United States: A Synthesis. USDA Forest Service/UNL Faculty Publications. Paper 63.

Pollock, M.; Beechie, T.; Imake, H.; 2012. Using reference conditions in ecosystem restoration: an example for riparian conifer forests in the Pacific Northwest. ESA journal volume 3(11) article 98.

Pollock, M.; Beechie, T.; Liermann, M.; and Bigley, R. 2009. Stream temperature relationships to forest harvest in Western Washington. Journal of the American Water Resources Association 45(1):141-156.

Pollock, M. and Beechie, T. 2014. Does Riparian Forest Thinning Enhance Forest Biodiversity? The Ecological Importance of Downed Wood. Journal of American Waters Resource Association (JAWRA) 50(3): 543-559. DOI: 10.1111/jawr.12206.

Poole, G.; and Berman, C. 2001. An ecological perspective on in-stream temperature: Natural heat dynamics and mechanisms of human-caused thermal degradation. Environmental Management 27(6):787–802.

Poole, G.; O'Daniel, S.; Jones, K.; Woessner, W.; Bernhardt, E.; Helton, A.; Stanford, J.; Boer, B.; and Beechie, T. 2008. Hydrologic spiraling: The role of multiple interactive flow paths in stream ecosystems. River Research and Applications 24(7):1018-1031.

Public Lands Initiative (Trout Unlimited), 2004. Where the Wild Lands are: Oregon; the Importance of Roadless Areas to Oregon's Fish, Wildlife, Hunting and Angling.

Quigley, T.; Haynes, R.; Graham, R. 1996. Integrated Scientific Assessment for ecosystem management in the interior Colubia Basin and portions of the Klamath and Great Basins. PNW-GTR-382. USDA, Forest Service, PNW Research Station.

Quigley, T. and Arbelbide, S. 1997; An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins. PNW-GTR-405.

Radeloff, V.; Mockrin, M.; Helmers, D.; Carlson, A.; Hawbaker, T.; Martinuzzi, S.; Schut, F.; Alexandre, P.; Kramer, H.; Pidgeon, A. 2023. Rising wildfire risk to houses in the United States, especially in grasslands and shrublands. Science, 9 Nov. 2023, Vol. 382, Issue 6677, pp. 702-707. DOI: 10.1126/science.ade9223

Ralph et al. 1994.

Reid, L.; Dewey, N.; Lisle, T.; and Hilton, S. 2010. The incidence and role of gullies after logging in a coastal redwood forest. Geomorphology 117:155-169.

Reisner, M.D., Grace, J.B., Pyke, D.A., Doescher, P.S., 2013. Conditions favoring Bromus tectorum dom- inance of endangered sagebrush steppe ecosystems. Journal of Applied Ecology 50, 1039–1049. https://doi. org/10.1111/1365-2664.12097

Rhodes, J.J., McCullough, D.A., and Espinosa Jr., F.A., 1994. A Coarse Screening Process for Evaluation of the Effects of Land Management Activities on Salmon Spawning and Rearing Habitat in ESA Consultations. CRITFC Tech. Rept. 94-4, Portland, Or.

Rhodes 2007. The watershed impacts of forest treatments to reduce fuels and modify fire behavior. Pacific River Council.

Rhodes, Jonathan & Baker, William. (2008). Fire Probability, Fuel Treatment Effectiveness and Ecological Tradeoffs in Western U.S. Public Forests. The Open Forest Science Journal. 1. 10.2174/1874398600801010001.

Richardson, J.S. and Béraud, S. (2014), Effects of riparian forest harvest on streams: a meta-analysis. J Appl Ecol, 51: 1712-1721. https://doi.org/10.1111/1365-2664.12332

Rieman, B.; Clayton, J.; 1997. Wildfire and Native Fish: Issues of Forest Health and Conservation of Sensitive Species. Forest Service, Rocky Mountain Research Station.

Rieman, B.; Lee, D.; Thurow, R.; 2000. Toward an Integrated Classification of Ecosystems: Defining Opportunities for Managing Fish and Forest Health. Environmental Management Vol. 25, No. 4, pp. 425– 444. Accessed at: http://andrewsforest.oregonstate.edu/pubs/pdf/pub3225.pdf

Ripley, T., Scrimgeour, G., and Boyce, M. 2005. Bull trout *(Salvelinus confluentus)* occurrence and abundance influenced by cumulative industrial developments in a Canadian boreal forest watershed. Can. J. Fish. Aquat. Sci. 62:2431–2442.

Robertson, B.; Hutto, R.; 2007. Is Selectively harvested forest an ecological trap for olive-sided flycatchers? The Condor 109-109-121.

Rose, C.; Marcot, B.; Mellen, T.; Ohmann, J.; Waddell, K.; Lindley, D.; Schreiber, B. 2001. Decaying wood in the PNW forests: Concepts and tools for habitat management.

Rosenberg, K.; Dokter, A.; Blancher, P.; Sauer, J.; Smith, A.; Smith, P.; Stanton, J.; Panjabi, A.; Helft, L.; Parr, M.; Marra, P. 2020. Decilne of North American Avifauna.

Sallabanks, Rex, et al. "Wildlife of eastside (interior) forests and woodlands." Wildlife-habitat relationships in Oregon and Washington. Oregon State University Press, Corvallis (2001): 213-238.

Six, D. L., C. Vergobbi, and M. Cutter. 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 doi:10.3389/fpls.2018.00993

Semlisch, R. and Bodie, R. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. Conservation Biology, pgs. 1219-1228. Vol. 17, No.5, October 2003.

Spence, B.; Lomnicky, G.; Hughes, R.; Novitzki R. 1996. An Ecosystem Approach to Salmonid Conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp.

Spies, T.; Pollock, M.; Reeves, G.; and Beechie, T. 2013. Effects of riparian thinning on wood recruitment: A scientific synthesis. Science Review Team, Northwest Fisheries Science Center.

Steele, A. and Beckman, B. 2014. Stream Temperature Variability: Why It Matters To Salmon. USDA, Pacific Northwest Research Station.

Stephens, S. L. and J. J. Moghaddas. 2005. Silvicultural and reserve impacts on potential fire behavior and forest conservation: Twenty-five years of experience from Sierra Nevada mixed conifer forests 125:369-379.

Sweeney, B.; and Newbold, J.2014. Streamside Forest Buffer Width Needed to Protect Stream Water Quality, Habitat, and Organisms: A Literature Review. Journal of the American Water Resources Association 50(3): 560-584.

Tague, C. and Band, L. 2001. Simulating the Impact of Road Construction and Forest Harvesting on Hydrologic Response. Earth Surface Processes and Landforms Earth Surf. Process. Landforms 26, 135–151 (2001).

Thomas, J. (1979) Wildlife Habitats in Managed Forests: The Blue Mountains of Oregon and Washington. Agricultural Handbook 553, USDA Forest Service.

Thurow, R.; Lee, D.; Rieman, B. 2001. Distribution and Status of Seven Native Salmonids in the Interior Columbia River Basin and Portions of the Klamath River and Great Basins. North American Journal of Fisheries Management, 17:4,1094-1110. United States Fish and Wildlife

Trombulak, S.C. and Frissell, C.A. (2000), Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology, 14: 18-30. https://doi.org/10.1046/j.1523-1739.2000.99084.x

United States Environmental Protection Agency (USEPA), 2006, SABS Framework for Developing Suspended and Bedded Sediments (SABS) Water Quality Criteria

United States Fish and Wildlife Service (USFWS) 2008. Bull trout (*Salvelinus confluentus*) 5-Year Review: Summary and Evaluation. Accessed online at: https://ecos.fws.gov/docs/five_year_review/doc1907.pdf

United States Fish and Wildlife Service (USFWS) 2010. “USFWS Bull Trout Final Rule”. 50 CFR Part 17 Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for Bull Trout in the Coterminous United States; Final Rule**.**

United States Fish and Wildlife Service (USFWS) 2010. Bull Trout Final Habitat Justification: Rational for Why Habitat is Essential, and Documentation of Occupancy. Accessed online at: http://www.fws.gov/pacific/bulltrout/pdf/JustificationDocs/BTFinalJustifyfulldoc.pdf.

United States Fish and Wildlife Service (USFWS) 2021. 2021 Bull Trout Monitoring in the Wallowa Mountains. Report done by Nez Perce Tribe, Rumelhart et al. 2021. Accessed online at: https://www.fws.gov/sites/default/files/documents/NPT%202021%20Bull%20Trout%20Monitoring%20Report%20%281%29.pdf

United States Forest Service 1994. The Decision Notice for the Continuation of Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales United States Forest Service Region 6 Colville, Deschutes, Fremont, Malheur, Ochoco, Okanogan, Umatilla, Wallowa-Whitman and Winema National Forests in Oregon and Washington.

United States Forest Service. The Environmental Assessment for the Continuation of Interim Management Direction Establishing Riparian, Ecosystem, and Wildlife Standards for Timber Sales.

United States Forest Service (USFS) 2000. Forest Roads: A Synthesis of Scientific Information. United States Department of Agriculture, General Technical Report, Pacific Northwest Research Station.

United States Forest Service (USFS) 2010. Wallowa-Whitman National Forest Wild and Scenic River Inventory Documentation Last Updated 03/25/2010. Accessed online at: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5260388.pdf

United States Forest Service (USFS) 2010. National Report on Sustainable Forests. https://www.fs.usda.gov/research/docs/sustain/docs/national-reports/2010/2010-sustainability-report.pdf

United States Forest Service (USFS) 2014. Draft Environmental Impact Statement for the Blue Mountains National Forests Proposed Revised Land Management Plan.

United States Forest Service 2015. Eastside Screens Enclosure; Recent Science Findings and Practical Experience: Implications for the Eastside Screens September 2015. Provided to BMBP in response to our Freedom of Information Act Request.

United States Forest Service (USFS) 2015. Malheur National Forest—Roads Analysis—Executive Summary.

United States Forest Service (USFS) 2020. Camp Lick Aquatics Report, Malheur National Forest.

United States Forest Service (USFS) 2018. Final Environmental Impact Statement for the Proposed Revised Land Management Plans for the Malheur, Umatilla, and Wallowa-Whitman National Forests.

United States Forest Service (USFS) 2020. Upper Touchet Vegetation Management Project Final Environmental Assessment.

United States Forest Service (USFS) 2020. Upper Touchet Vegetation Management Project Draft Environmental Assessment.

United States Forest Service (USFS) 2020. Upper Touchet Vegetation Management Project Hydrology Report.

United States Forest Service (USFS) 2023. Scoping Notice for the Tiger-Mill project, Umatilla National Forest.

United States Forest Service (USFS) 2023. Mill Creek Draft Environmental Assessment, Ochoco National Forest.

United States Geological Survey (USGS) North American Breeding Bird Survey Results and Analysis 1966-2017. Accessed online 9/2020 at: https://www.mbr-pwrc.usgs.gov/

Van Pelt, R. 2008. Identifying Old Trees and Forests in Eastern Washington.

Wemple, B.; Jones, J.; and Grant, G.; 1996. Channel network extension by logging roads in two basins, western Cascades, Oregon. Water Resources Bulletin 32(6).

Wemple, B.; Swanson, F.; Jones, J.; 2001. Forest roads and geomorphic process interactions, Cascade Range, Oregon. Earth Surface Landforms and Processes, vol. 26 pp. 191-204

Wemple, B.; and Jones, J. 2003. Runoff production on forest roads in a steep, mountain catchment. Water Resources Research 39(8):1220.

Western Native Trout Campaign, 2001. Imperiled Western Trout and the Importance of Roadless Areas. Published by the Center for Biological Diversity, Pacific Rivers Council, and Biodiversity Associates.

Wigington, P.; Ebersole, J.; Colvin, M.; Leibowitz, S.; Miller, B.; Hansen, B.; Lavigne, H.; White, D.; Baker, J.; Church, M.; Brooks, J.; Cairns, M.; and Compton, J. 2006. Coho salmon dependence on intermittent streams. Frontiers in Ecology and the Environment 4(10) pp. 514-519.

Williams, M. A. and W. L. Baker. 2012. Spatially extensive reconstructions show variable-severity fire and heterogeneous structure in historical western United States dry forests. Global Ecology and Biogeography 21: 1042-1052.

Williams, M. and Baker, W. 2014. High-severity fire corroborated in historical dry forests of the western United States: response to Fulé et al. Global Ecology and Biogeography, (Global Ecol. Biogeogr.) (2014) 23, 831–835.

Windom, M. and Bates, L. 2008. Snag density varies with intensity of timber harvest and human access. Forest Ecology and Management 255(7) pp. 2085-2093.

Wondzell, S. 2011. The role of the hyporheic zone across stream networks. Hydrologic Processes 25(22):3525-2532.

Wonn, H. T. and K. L. O'Hara. 2001. Height:Diameter ratios and stability relationships for four Northern Rocky Mountain tree species. Western Journal of Applied Forestry 16:87-94.

Wood, C. M., S. A. Whitmore, R. J. Gutiérrez , S. C. Sawyer, J. J. Keane, and M. Z. Peery. 2018. Using metapopulation models to assess species conservation-ecosystem restoration tradeoffs. Biological Conservation 224:248-257.

Wood, P. and Armitage, P. 1997. Biological Effects of Fine Sediment in the Lotic Environment. Environmental Management Vol. 21, No. 2, pp. 203-217.

Wuerthner 2019. Personal Communication from George Wuerthner, Dated October 25, 2019, To explain the Johnston fire-history results.

Zhang, Y.; Richardson, J.; and Pinto, X. 2009. Catchment-scale effects of forestry practices on benthic invertebrate communities in Pacific coastal streams. Journal of Applied Ecology 46,1292-1303.