Data Submitted (UTC 11): 3/17/2025 4:00:00 AM
First name: Paula
Last name: Hood
Organization: Blue Mountains Biodiversity Project
Title: Co-Director
Comments: Please see the attached PDF for Blue Mountains Biodiversity Project's comments on the USFS's NWFP Amendment DEIS.

Blue Mountains Biodiversity Project Northwest Forest Plan Amendment DEIS Comments

TO: USDA Forest Service

1220 SW 3rd Ave, Ste G015 Portland, OR 97204

Submitted via Federal eRulemaking Portal https://cara.fs2c.usda.gov/Public//CommentInput?Project=64745

FROM: Blue Mountains Biodiversity Project www.bluemountainsbiodiversityproject.org

Karen Coulter, Director and Paula Hood, Co-Director 27803 Williams Lane, Fossil, OR 97830 (541) 385-9167

RE: Northwest Forest Plan Amendment #64745; Draft Environmental Impact Statement; Pacific Southwest and Pacific Northwest Regions; California, Oregon, and Washington; November 2024

These comments are in response to the US Forest Service[rsquo]s ([ldquo]USFS[rdquo]) Northwest Forest Plan Amendment #64745 Draft Environmental Impact Statement ([ldquo]DEIS[rdquo]); Pacific Southwest and Pacific Northwest Regions; California, Oregon, and Washington. Humanity has a very limited time to implement the bold changes that are needed to protect imperiled species in the face of the growing biodiversity and climate crises. Large trees and mature and old forests are a crucial component to any efforts to ameliorate and slow climate change, and logging is the primary threat to mature and old forests that species such as the Northern spotted owl ([ldquo]NSO[rdquo]) and other old-growth obligate species depend upon. Immediate action is needed to provide meaningful protections for large trees and mature and old forests, the species they support, and the crucial carbon storage they provide.

Table of contents:

1. Call for a paradigm shift to protect forest ecosystems, water quality, and the climate
2. Mature and old forests and Biden[rsquo]s 2022 Executive Order
3. Strengthen forest protections in the NWFP amendment
4. Streams, water quality, and aquatic species
5. Wildlife, NSO and related issues
6. Wildfire
7. Mitigating Climate Change
8. Inadequate Cumulative Effects Analysis
9. Tribal engagement

I. The current climate and biodiversity crises requires the Forest Service to make a true paradigm shift away from failed logging practices and towards stronger protections for forests.
Federal lands managers must immediately act to protect carbon storage, biodiversity, wildlife and fish habitats, connectivity, and unfragmented and un-roaded forests on National Forests. In developing and analyzing the NWFP Amendment, these decisionmakers should strive to:

*
* Protect all mature and old-growth forests and trees (80+) for carbon storage, wildlife habitat, and clean water;
* Expand the existing old-growth and conservation reserve network to address the joint climate and biodiversity crisis;
* Enhance and strengthen the NWFP reserve network by protecting all unroaded areas larger than 500 acres to provide for wildlife habitat needs. These areas are ecologically significant and rare on the landscape due to human activities that have degraded and fragmented the landscape; and
* Have clear and enforceable standards in the reserve network that exclude logging and road building. The reserve network needs to remain spatially connected to facilitate dispersal of spotted owls and other wildlife, and must remain redundant to accommodate natural disturbance regimes.

Commercial logging on National Forest lands should be halted, and forests on federal public lands preserved for ecosystem integrity, biodiversity, climate refugia, and carbon storage. At a minimum, in order to achieve the overarching purpose of the Northwest Forest Plan amendment to [ldquo]conserve mature and old-growth ecosystems and habitat[hellip],[rdquo] DEIS 1-5, commercial logging must end on mature and old forests in the PNW and across the nation. The NWFP must include full protections of matureand old forests from logging. Mature forests are essential components of future old-growth ecosystems, and must not be excluded from protections if the original intent of the Northwest Forest Plan to recruit future old growth is to be met.

Mature and old forests experiencing fire or other natural processes in recent years must be included in protections from logging, and current mature and old forests must be protected permanently, including when future natural processes, such as fire, occur.

Mature and old forests act as climate and wildlife refugia. When these forests experience natural disturbance processes, including patches of high-intensity fire, the resulting habitat provides essential wildlife habitat that supports rich biodiversity and irreplaceable carbon storage. The NWFP must commit to ensuring that natural processes are allowed to continue on the landscape, and that enduring protections are implemented regardless of natural processes. Natural processes[mdash]including fire, insects, and disease[mdash]have shaped forests in our region for millenia, and forest ecosystems require these natural processes to persist into the future. The NWFP must implement enduring protection of designated areas, irrespective of future natural processes like insect outbreak, wildfire, or wind storms.

Commercial logging degrades and reduces resilience and resistance to insects, disease, wildfire, and a rapidly changing climate. For example, logging can increase the intensity and spread of wildfire by removing more fire-resistant mature and large trees, stimulating in-growth of highly flammable dense small tree thickets and spreading fire in more continuous blocks; and dry out micro-climate conditions by reducing shade cover and removing current and future logs which function as moisture reserves, reducing water retention.

Given recent Forest Service management trends including a return to clearcutting or virtual clearcutting, this degradation and reduced forest resilience would be increased in intensity and scale. For example, commercial logging and [ldquo]fuels[rdquo] reduction removes biomass at the ground level and impairs soil integrity, fertility, and productivity through heavy equipment use. Ashy soil being displaced from commercial logging is now considered by Forest Service soil scientists as irreplaceable given that its replacement would require another massive volcanic eruption at the scale of Mount Mazama erupting and forming Crater Lake. Ash soil loss would be maximized by increased logging on steep slopes or clearcutting.

The Forest Service is long overdue for changing its perspective and management away from creating and maintaining structurally homogeneous forests that are less resilient and less fire-resistant than never-logged, more diverse and heterogeneous forest. Unfortunately, the agency uses the [ldquo]existing condition[rdquo] to justify more of the same management that resulted in the existing degradation. The Forest Service needs to stop repeating management mistakes. It has not done so in this DEIS. By subsuming past mismanagement into the [ldquo]existing condition,[rdquo] there is no in-depth cumulative effects analysis (as required by NEPA) that would lead to ecologically sound restoration such as leaving large areas alone to recover over time. In areas that have already been heavily impacted, the Forest Service must allow areas to recover from further intensive logging, roading, and livestock overgrazing.

Evidence that a major paradigm shift is necessary:

*
* The Forest Service as an institution is too strongly biased in favor of timber production rather than forest protection. This focus on logging[mdash]often at the expense of ecosystem health[mdash]ignores the importance of national forests in the PNW for recreation, clean water, wildlife and fish habitat, and climate change mitigation. This bias is inappropriate in national forests within the scope of the NWFP.
* The Forest Service needs to fully preserve the treaty rights and indigenous peoples[rsquo] cultural uses of their lands[mdash]lands that were stolen from them and converted into [ldquo]National Forests.[rdquo]
* The Forest Service has unfortunately continued to repeat past management mistakes based on outdated Forest Plans and a failure to consider the full range of best available science. The failure of the Forest Service to acknowledge and disclose scientific controversy that calls into question its management decisions exacerbates these issues.
* There is little or no consideration of the root causes of uncharacteristic disturbance regimes. The Forest SErvice cannot log itself out of increased severity wildfire and insect and disease outbreaks.

Blue Mountains Biodiversity Project[rsquo]s work focuses on protecting and restoring National Forests in eastern Oregon and southeastern Washington. Our geographic work area includes the Deschutes National Forest, including the area within the range of the Northern spotted owl covered by the Northwest Forest Plan.

While the proportion of territory covered by the NWFP east of the Cascade Crest in Oregon is relatively small, the biodiversity supported by this unique and ecologically important area cannot be overstated. The eastern Oregon Cascades provide crucial habitat for species such as American marten, silver-haired bat, Cascades frog, Flammulated owl, Northern goshawk, Black-backed woodpecker, Lewis[rsquo]s woodpecker, Clark[rsquo]s nutcracker, Mountain chickadee, Pygmy nuthatch, Cassin[rsquo]s finch, Red crossbill, Olive-sided flycatcher, Oregon slender Salamander, Cascade Golden-mantled ground squirrel, Sierra Nevada fox, Madron skipper, Vagrant shrew, Bull trout, Steelhead, other imperiled fish and aquatic species, and many others (Thomas 1979).

The biodiversity supported by eastside forests is driven, in part, by the complex mosaic of forest types. The complex mosaic of forest types are shaped, in turn, by the heterogeneous topography, geology, soils, weather patterns, and dynamic processes of the region. The distinct ecosystems of these eastern Cascades forests increases biodiversity and forest ecosystem resilience across the Pacific Northwest region. Mixed-conifer forests, including those dominated by fir[ndash] some of which are extremely moist[ndash] are native, widespread, and provide essential wildlife habitat. Unfortunately, the Forest Service has been increasingly targeting mixed-conifer forests, including mature and old forests, for logging[ndash] often converting them into homogenous Ponderosa pine plantations.

We are extremely concerned about the Forest Service[rsquo]s long-standing oversimplifications of [ldquo]dry[rdquo] eastside forests, and the agency[rsquo]s use of this oversimplification to justify widespread heavy logging. Eastside forests are often used as sacrifice zones, with agencies and timber industry targeting these forests for rampant logging in sensitive areas including streamside riparian zones, high elevation areas, steep slopes, mature and old forests, connectivity corridors, and important wildlife habitats.

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[ndash] 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.

A study from Bradley et al. (2016) challenges USFS assumptions about the fire risk associated with more protected areas[mdash]those areas 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:

[ldquo]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[mdash]both administrative and legislative[mdash]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[rdquo]

[ldquo]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[mdash]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.[rdquo]

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. [hellip] 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 [ldquo]recent[rdquo] 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)."
Fire scar analysis:
We are very concerned that the agency may be incorrectly concluding that frequent, low intensity fire regimes apply across eastside forests, and so affect NWFP assessments for forests east of the Cascades.

We want to highlight that fire scar analysis has important limitations that the Forest Service must consider. We are concerned that some of the ecologically significant implications regarding the limitations with fire scar analyses are being ignored by the FS[mdash]with potentially very unfortunate and negative ramifications. 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. These misinterpretations are being used as a justification by the agency to increase logging in forests east of the Cascade Crest.

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:

[ldquo]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.[rdquo]

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

[ldquo]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.[rdquo]

II. President Biden[rsquo]s 2022 Executive Order 14072 and the National Old Growth Amendment:

President Biden's 2022 Executive Order gave the USFS clear guidance that it should prioritize the protection and restoration of mature and old-growth forests (trees generally over 80 years old) across the nation as a natural carbon and climate solution. The NWFP governs the largest natural carbon reserves found in North America and the amendment must prioritize increasing carbon storage. Although the Forest Service began to act on E.O. 14072 with the development of the National Old Growth Amendment, this work has now been abandoned within the new administration. However, that does not mean that work must go to waste.

President Biden[rsquo]s E.O. 14072 called for sweeping nation-wide protections to [ldquo]conserve America[rsquo]s mature and old-growth forests on Federal lands[.][rdquo] Much effort was put into developing forest plan amendments under the direction of E.O. 14072 that would have created a nation-wide floor of protections for old-growth forests which individual forests and regions could then build upon as necessary to best conserve and protect what old-growth we have left in the United States. Under the direction of E.O.

14072, much work went into the development of the National Old Growth Amendment ([ldquo]NOGA[rdquo]), and that work should continue to be incorporated into the NWFP Amendment where appropriate. The goals of the NWFP Amendment to conserve and recruit mature and old growth forests align with the intent of E.O. 14072, and therefore, the Forest Service can and should strive to meet the original policy goals outlined in E.O. 14072 with this Amendment.

III. Strengthen protections for forests in the NWFP amendment

It is extremely concerning that the Forest Service seems to be using a rushed and abbreviated planning process for this amendment. National Forest lands and the public deserve a full and transparent process that adequately analyzes and considers any changes to the NWFP.

Where strong protections have been implemented and adhered to, the NWFP has begun to restore forests by allowing them some time to recover from the damage caused by past overlogging. The NWFP created guardrails to protect important wildlife and environmental values from destructive logging. These guardrails should be strengthened and expanded; there is no scientifically sound reason to remove such protections. As such, there is no sound scientific reason for redefining what is considered a mature tree, raising the age of allowed harvesting from 80 to 120 years in reserves.

When the original Northwest Forest Plan was being developed, there was pressure to allow foresters discretion to log mature and old-growth forest to accelerate forest development and improve upon natural processes. The scientists who authored the plan understood that logging is a poor substitute for natural processes. Logging does not mimic natural processes. They understood that forests 80 years or older have all the building blocks necessary for proper forest development through natural processes, like forest growth and natural mortality events that thin the forest, create valuable small canopy gaps, and recruits dead wood structure. They said that more science would be necessary to show that logging can improve upon those natural processes. There is no compelling science to show that the obvious trade-offs from logging older forests (most notably, reduced large tree abundance, reduced recruitment of dead wood, and degraded microclimate) are offset by ecological benefits that those species need more than large trees, dead wood, and dense canopy. The Forest Service is breaking a promise to make sure that management follows evidence from sound science.

As noted by Van Pelt, [ldquo]In order to identify mature and old forests, the great diversity of environments present in western Washington must be acknowledged.[rdquo] These diverse environments create diverse vegetation zones, with different dominant tree species, and different paths and times to achieve mature tree stands. Van Pelt (2007) describes several different maturity levels. The Forest Service supports this complexity with a description of a mature forest as in the 2024 report FS-1215a, page 5:

[ldquo]Mature forests vary widely in character with age, geographic location, climate, site productivity, relative sense of awe, characteristic disturbance regime, and the values people attribute to or receive from them. Dialogue with stakeholders and Tribal Nations and integration of local and Indigenous Knowledge with evolving scientific understanding are critical in effectively managing mature forests.[rdquo]

The Forest Service report FS-1215a, which is cited in the DEIS, over many pages describes the complex ecology of mature and old-growth forest stands. It is unreasonable for the DEIS to simply state that an LSR stand may be logged if younger than 120 years. In achieving the goal of recruiting additional and maintaining existing mature and old-growth stands, staying with the existing NWFP restriction on harvesting stands and trees 80 years old and older is appropriate. This is, after all, the original intent of the NWFP, to recruit more mature trees, and increasing the age is counter to that intent.

Page 2-16 of the DEIS, Table 2.1 regarding LSR in Moist forests, [ldquo][c]hanges authorization for forest management activities in stands less than 80 years old to 120 years old to account for 30 years of time passage since the 1994 NWFP decision.[rdquo] This rationalization of increasing the age of allowed harvesting is not the intent of the 1994 NWFP. This rationalization is purely a FS or timber industry effort to increase harvest. Similar rationalizing statements are made regarding raising the age to 150 years, or even 175 years, in dry forests. These increases provide no protection or recruitment for mature and old-growth forest stands.

It has been said that the 80-year threshold was [lsquo]arbitrary[rsquo]. However, in view of the extensive literature supporting the use of an 80-year threshold, there is no validity for such a statement. In fact, raising the age to 120 years is arbitrary and not based on science. And it certainly does nothing to meet the stated purpose and need to conserve mature and old-growth forests.

Cutting down 80-120-year-old trees, which are already late successional forests, requires new trees to be started or planted in the cut which over time will become new 80-year-old trees. Cutting down the original 80-120-year-old trees does not create [lsquo]opportunities to restore[rsquo] late-successional forest conditions but merely delays for 80 years the next mature forest transition to Mature and Old Growth.

Late-successional forest conditions would never be restored in this scenario. It is simply impossible, and the Forest Service[rsquo]s statement belies the truth. The Forest Service is setting up a perpetual harvest in LSR which will never restore the 80-120-year-old trees and stands, and never provide for transition to Mature and Old Growth.

As an aside, changing from 80 to 120-year threshold will render the results of the 25 Year monitoring report and other scientific literature which relied upon the 80-year threshold meaningless as those reports do not address consequences of reducing mature habitat which is known to be valuable for Critical Habitat, dispersal and transitioning, and for prey habitat, for threatened and endangered (T&E) Species dependent on Late Successional Old Growth habitat, and LSRs. As a result, much of the scientific literature relied upon by the FS for the DEIS as well as other purposes could no longer be relied upon for management.

This mandate to increase logging of mature and old growth trees is especially perplexing given that the NSO uses trees that have passed the 80 years of age threshold for foraging, and the Marbled Murrelet uses those trees that have passed the 80 years of age threshold for dispersal. Loss of those trees will impact the survivability of each of those species, as well as other species dependent on late succession and old growth ecosystems, threatening their existence despite their listing under the Endangered Species Act..

The FS should instead continue the focus of the 1994 NWFP to Steward and Enhance Old Growth ecosystems, including Mature Trees and Stands, rather than pursue and adopt the insufficient [ldquo]protections[rdquo] that allow for excess logging as set out in the DEIS. Any changes to the NWFP should set the stage for the landscape-scale preservation of natural areas and restoration of ecosystems necessary to address the dual climate and biodiversity crises and help meet national land and water conservation goals. With these standards in place, the Forest Service can focus on real restoration of watersheds to return salmon to their native streams, connect habitats for species that need to migrate to adapt to climate change, and enhance degraded habitat.

The reserve network should be greatly expanded, and the USFS should re-establish the scientific foundation of the reserve network (https://www.mdpi.com/1999-4907/6/9/3326). Instead, the Forest Service seems intent on flaunting science and increasing logging while reducing protections within the reserve network.

Mature and Old Forests: The usual stated purpose of [ldquo]capturing[rdquo] the economic value of timber excess to other resource needs[rdquo] is outdated, based on outdated Forest Plans that don[rsquo]t take into account the cumulative and now landscape scale loss of forest cover, loss of areas of higher canopy closure, and loss of mature and large tree structure from commercial logging. The National Forests can[rsquo]t withstand the completely unsustainable scale, intensity, and short rotations of current logging on top of past overlogging causing long-term degradation of the forest ecosystem.

There[rsquo]s really no [ldquo]timber[rdquo] that is [ldquo]excess to other resource needs[rdquo] due to a century of repeatedly logging the National Forests. There is very little forest left outside of Wilderness Areas and Inventoried Roadless Areas that have not been altered and degraded by commercial logging. The [ldquo]resource needs[rdquo] of multiple Forest values in National Forest Plans are no longer being met and no longer have [ldquo]excess[rdquo] capacity for mature and old forest timber extraction. Forest values that are no longer upheld sufficiently now include: diverse wildlife habitat; intact forest cover; higher canopy closure forest and higher density forest required by many wildlife species; and mature and large and old tree structure, including live trees, snags, and logs. Never-logged forest and forest refugia for avoiding human disturbance are now very limited on the landscape. These greatly reduced forest conditions are necessary to retain and increase wildlife and plant biodiversity and flourishing ecosystem processes and functions. Natural resiliency for intact functioning ecosystems is needed for wild species to survive the ongoing and increasingly alarming biodiversity crisis, which has been caused by human resource extraction and manipulation. Further, the effects of increasingly extreme climate change present unprecedented challenges to forest ecosystem functioning.

Resource conditions that are already degraded from past logging and which would suffer severe long-term impacts from further logging include: abundance and size of mature and large trees, as well as old growth trees, which are already at a deficit compared to historic conditions; soil integrity, fertility, and productivity; much needed long-term tree carbon sequestration and storage to reduce the effects of escalating climate change; forest habitat for wildlife species needing large blocks of security habitat, denser forest (especially east of the Cascades and within range of the Northern spotted owl), forest with abundant large and old trees, forest with abundant snags and logs, and moist mixed conifer forest with multi-layer tree canopy and higher canopy shading and water retention; as well as riparian areas already severely degraded from past logging, associated roads, and overgrazing by livestock.

This is not the time to [ldquo]capture the economic value of timber[rdquo], given the past and ongoing widespread and heavy logging across the region. Due to continued long-term over-logging and mismanagement, forests across the region face irreversible and fundamental changes to ecosystems. A true paradigm shift that focuses on doing everything possible to preserve ecosystem processes and functions and biodiversity is urgently needed. Such a shift would require the agency no longer focus on resource extraction and manipulation as a purpose or goal. The [ldquo]more extraction will result in restoration and resilience[rdquo] public relation messaging from the Forest Service uses to justify yet more huge timber sales will unfortunately just repeat the same mistakes and compound them. None of us can reasonably follow the same worn-out extraction script that has caused so much ecological degradation.

Continuous forest cover of mature and old forests (including large trees) needs to be greatly expanded, and include increased connectivity between these blocks of ecologically vital habitat.

Clearcutting, virtual clearcutting, and other logging removal of mature and large trees to low basal areas would further set back forest recovery from past logging and climate change stressors. It[rsquo]s important to allow the forest to respond to climate change by retaining mature and large trees, and allowing younger-mature trees to grow into mature and large trees to grow into future mature and large tree structure to replace the forest structure that was lost to a century of over-logging. This would allow for natural levels of mortality over time to create snags and logs for wildlife habitat and provide long-term carbon storage.

Allowing trees to grow into mature and old growth structure results in more resilient, healthy stands that thin themselves through mortality creating snags and logs. Older forest stands with larger trees open up the stands through shading out smaller trees and thinning through natural competition for sunlight, nutrients, and water. The Forest is capable of thinning itself; commercial-size logging is not necessary to thin the forest and create openings. Non-commercial thinning of small trees up to 9[rdquo] dbh, managed wildfires, and prescribed burning in dry forest types could be done where wildfire suppression continues to stimulate denser growth of small, young trees.

Further, commercial logging is not ecologically sustainable and is no longer cost effective due to most trees having been reduced in size and large trees having become no longer abundant and less accessible. This is particularly true in much of eastern Oregon, where the NWFP overlaps the eastern Cascades in the Deschutes National Forest.

While we oppose logging of old trees, we are also opposed to logging of any live large trees or large snags >/=21[rdquo]dbh, as the size of the tree, not the age, matters for wildlife use by most species associated with large tree structure and for maximizing retention of carbon sequestration and storage to reduce climate change effects.

There should be no more conversion of tree species composition or tree density to drier forest types, such as moist mixed conifer being converted to Ponderosa pine or Douglas fir plantations. There[rsquo]s already been far too much conversion of natural tree species diversity to timber industry preferred tree species[mdash]usually to Ponderosa pine, Western larch, or Douglas fir. Homogenous plantation stands or gradual conversion to just one or two tree species leads to greater susceptibility to defoliating insect epidemics and poor forest health due to tree species not adapted to local conditions, such as the moisture regime. Tree species diversity is important for not having whole stands wiped out by defoliating insects. Tree species diversity is also essential for retaining plant and wildlife biodiversity.

We strongly oppose any logging of the [ldquo]undeveloped lands[rdquo] as never logged and unroaded areas are rapidly diminishing due to timber sales. Undeveloped lands are important to preserve as such for: wildlife security habitat; carbon sequestration and storage; headwater water sources and water quality for drinking water, rivers, creeks, and streams; providing for primitive recreation with a sense of solitude and immersion in wild nature; and local reference conditions to guide adaptive management elsewhere and to study climate change effects in forest relatively unaltered by humans.

The agency is still trying to provide commercial logging economic return and to maximize output results despite current landscape scale virtual clearcutting (and now clearcutting)-- in some areas on an unsustainable timber sale rotation of 30 years or less. This amounts to forest liquidation, with little or no consideration of long-term cumulative negative impacts to multiple resources that are supposed to be protected under the existing Forest Plan. The Forest Service is evidently not considering current best available science that contradicts the existing outdated Forest Plan and the effects of the intensity, scale, and pace of current logging.

Most of the National Forest lands need to be allowed to naturally recover from past logging, drought, insect epidemics, and intense wildfire, so that we can learn from natural thinning mechanisms[mdash]especially from the natural process of recovery and rejuvenation from climate change effects. Insect infestations, prolonged drought, and wildfires are far more natural and beneficial than the use of heavy equipment, logging, and roading.

Snag retention: The Forest Service should retain more snags and logs, and mature trees that could soon become snags and logs. Current best available science and never logged areas testify to there being far more abundant and larger snags in natural conditions than the outdated Forest Plan requires. The Forest Service needs to allow for some trees to be suppressed by others and become snags or smaller old growth trees.

Retention of groves or clusters of trees: Logging to wide spacing of trees could be cutting off inter-tree community exchanges of carbon, nutrients, and chemical alerts to communicate the onset of insect infestations and trigger the trees[rsquo] use of chemical defenses. (See Suzanne Simard[rsquo]s peer reviewed research since the 1990[rsquo]s regarding these findings and her recent book, Finding the Mother Tree, Discovering the Wisdom of the Forest, that includes the relevant citations for her science articles.)

Wide spacing of trees through logging tends to reduce the stand[rsquo]s resiliency. The long-term detrimental soil impacts of logging with heavy equipment can disrupt or destroy mycorrhizal fungal communities supporting healthy trees. The mycorrhizal fungal communities assist trees in receiving and transferring nutrients and carbon to and from each other, as Simard[rsquo]s controlled experiments demonstrate through radioactive tracers showing the transfers from one tree to another[mdash]even across different tree species. Yet the Forest Service ignores the implications of the results of her decades of peer-reviewed controlled experiments.

Large tree retention: As we emphasize throughout these comments, it is the large tree size that is important for many wildlife species that are associated with large tree structure, not the age of the trees. What matters for maximizing forest carbon sequestration and storage is also the large size of the trees, not age.

Most Grand firs are old growth >/= 21[rdquo] dbh based on Van Pelt visual characteristic guidelines for old growth determination. The Van Pelt guideline authors cautioned that these morphological guidelines were less accurate for determining the age of firs[mdash]especially Grand fir. More significantly, based on coring of Grand fir by the Deschutes Forest Service on the Bend-Fort Rock District for the Ursus timber sale, Grand firs were statistically almost always at least 150 years old (defined as old growth) at 22[rdquo] dbh. The 22[rdquo] dbh finding is not much different from the East Side Screens 21[rdquo] dbh limit, that was based on

Ponderosa pine reaching 150 years old by that size. The Eastside Screens are based on sound science, and should not be ignored in the Northwest Forest Plan. .

There is considerable science refuting clearcutting. There is an increasing movement to stop all large and old tree logging and to stop most or all mature tree logging throughout the National Forests. As described above, the Biden administration is moving toward protecting old growth and establishing restrictions on logging in mature and old forests to protect these forests and increase their carbon stores. Logging removes far more carbon than wildfire, and produces far more carbon emissions than wildfire, exacerbating climate change. Further, wildlife and forest ecological processes evolved with fire, not with logging and roading. Wild fires[mdash]even stand replacement fires[mdash]provide new habitat niches to provide habitat for a diversity of wildlife and plant species. Logging tends to severely degrade most wildlife and plant habitat through unnatural interventions. Scientists have recently found that wildfire burned forest is about as biodiverse as old growth forest. The same can[rsquo]t be said for commercially logged forest, which often homogenizes the forest to even age, single or two tree species plantations, losing diverse wildlife habitat and wildlife diversity in the process. Logging, especially clearcutting, does not mimic wildfire, in that wildfires create more varied mosaics of green, lightly burned, and more severely burned stands, not logged stands.

We ask that the Forest Service adopt new [ldquo]purpose and need[rdquo] statements for management that prioritizes ecosystem integrity, wildlife, streams and water quality, and carbon storage, rather than commercial logging. Our suggested [ldquo]need[rdquo] statements should be used for formulation of new Forest Plan standards and goals such as the following:

The need to retain all large trees, all old trees, and all mature trees >/= 15[rdquo] dbh to replenish diminished large and old tree structure as well as mature forest cover in general, to support critically needed wildlife habitat for declining species, increase the fire and insect resistance of stands, and to maximize water retention and long-term tree-based carbon sequestration and storage.

The need to retain Forest moisture: Preserving and protecting forest moisture retention through intact forest canopy during extreme climate change is critical for: Threatened and Sensitive fish species, such as Threatened Bull trout, Threatened Mid-Columbia Steelhead trout, Sensitive Malheur sculpin, and Sensitive MIS Redband trout, and other aquatic organisms; headwater sources of water for streams and public drinking water, as well as farming and ranching irrigation; and for plant and wildlife biodiversity. Intact forest canopy and undergrowth plants and shrub layers are necessary to slow flooding and run-off and preserve high water table retention. Forest moisture retention also requires mature and large tree overstory shading, forest litter, and down wood accumulation. For retention of forest moisture it is also important to greatly reduce open roads, not re-open unmaintained closed roads, and not construct any [ldquo]temporary[rdquo] or system roads to reduce run-off and flooding.

The unsustainable short rotations of timber sales being implemented again in the same areas are preventing sufficient passive rest from commercial logging and associated road re-opening, construction, and use, preventing natural recovery over time. Long-term impairment of ecological processes and functions include loss of moisture retention from forest cover loss on a landscape scale; and loss of riparian processes and functions, such as reduced flood plains, reductions in pool abundance for cooling of the water for fish, widening of stream channels that increases stream temperatures, and loss of riparian hardwoods stabilizing streambanks and cooling streams through shading. All of the degradation of stream processes and functions are exacerbated or directly caused by past and current logging within Riparian Habitat Conservation Areas (RHCAs) and livestock overgrazing in RHCAs, but are also caused by the decimation of forest cover across watersheds.

IV. Streams, water quality, and aquatic species

Water quality, streams, and other riparian habitats continue to suffer from logging, roading, and other resource extraction and associated activities. Water quality violations and impairments, lack of monitoring, and artificial fish passage barriers are ubiquitous across the PNW, including within the range of the NWFP.

The NWFP must include strong, enforceable standards that protect water quality, fish and aquatic species, stream habitats, and riparian connectivity. It is essential to include measurable, quantitative objectives through well-monitored and strictly-enforced standards. More stringent protections are also required for often overlooked and under-protected habitats such as headwater streams, small wetland habitats, and groundwater dependent ecosystems.

Streams in National Forests provide clean drinking water to downstream communities. A recent Forest Service study revealed that 90% of people in the West are served by public drinking water systems rely on water from National Forests and grasslands. The study, titled Quantifying the Role of National Forest System and Other Forested Lands in Providing Surface Drinking Water Supply for the Conterminous United States (2022) noted:

[ldquo][a] century of research has demonstrated unequivocally that forested lands provide the cleanest and most stable water supply compared to other land types[rdquo].

Protecting forests is crucial for protecting drinking water.

Forested streams are part of complex and intricate ecosystems, ecosystems that[mdash]as a whole-- need protection in order to continue to supply clean, cold water for humans and other species. Streams and rivers in eastern Oregon also support important native trout and salmon populations, and renowned fishing opportunities. Fishing and other quiet recreation opportunities are a huge public use that must be protected. For example, according to the Forest Service, national trends suggest that 42% of visitors list quiet recreation such as wildlife viewing, hiking, and fishing as their primary reason for visiting National Forests. The Deschutes NF alone receives eight million visitors annually. BMBP[rsquo]s work in the Deschutes NF has been important for preserving quiet recreation opportunities and for protecting the streams that support fishing opportunities.

Cold-water dependent species such as Bull trout, wild summer steelhead, and spring Chinook are in increasing peril due to climate change. Swift and decisive protection from logging and roading are urgently needed to protect already shrinking cold-water habitats and human drinking water sources.

Strengthened protections for streams and Riparian Reserves should include, for example, standards that protect habitats and processes such as standards for stream temperature, shade, sediment embeddedness, downed wood in streams, pool depth, and pool-to-riffle ratios. Current PACFISH/INFISH standards on eastside forests are a good starting-place model for comprehensive quantitative standards that could be strengthened and adapted into a NWFP framework.

Logging, grazing, and road-related activities are well-documented to alter watershed hydrology and negatively affect water quality parameters such as stream temperatures, increase fine sediment, alter peak flows, and lower water tables. Despite this, the DEIS calls for increased logging of trees over 80 years in LSRs, riparian reserves, and all dry forests. The DEIS fails to adequately disclose the aquatic impacts of removing large trees from watersheds and riparian reserves. Large trees are already highly functional habitat and will only get better if left in the forest to grow and provide shade and eventually recruit as dead wood. Logging captures mortality and causes a long-term reduction in recruitment of wood to streams and to adjacent uplands that were expected to provide a host of benefits to aquatic and terrestrial wildlife that thrive in the presence of abundant wood. Logging will also reduce canopy cover and reduce valuable microclimate refugia in streamside settings. Spotted owls use riparian reserves disproportionately compared to random forest locations, and logging will deprive them of nesting, roosting, foraging, and dispersal opportunities. Increased logging in riparian reserves may also require additional road construction and/or perpetuation of the existing road system which is already causing unacceptable cumulative effects on watershed functions and habitat connectivity.

We generally support the Aquatic Conservation Strategy and its goals and objectives. However, strong and enforceable standards are needed for long-term future and recovery of riparian ecosystems and the species that depend upon them. ESA-listed and sensitive riparian and aquatic species in particular require stronger, quantifiable standards. Without those standards, these species will likely face continuing downward population trends, extirpation, and extinction.

True restoration strategies urgently needed include road decommissioning and removal, culvert replacement and repair, placing wood in streams, encouraging beaver to recolonize areas, livestock exclusions, retiring livestock grazing allotments,, and reconnecting streams with floodplains.

Swift and widespread reduction of road densities, problematic roads, and fish passage barriers should be a cornerstone of NWFP strategies for riparian restoration. This is particularly true in areas designated as important for at-risk or special-status aquatic species such as Bull trout. No new or [ldquo]temporary[rdquo] roads should be built, particularly in watersheds important to at-risk or special status species or where road densities are already putting soils, wildlife, and water quality at risk or where there are already high road densities. Strong mechanisms for enforcement must be in place to ensure that National Forests and BLM lands are in compliance with these more stringent standards and goals.

In many cases, data are completely lacking for water quality or habitat parameters for streams within timber sales or livestock grazing allotments. Other times, the Forest Service relies on data that are many years or even decades old. Sound decisions that incorporate adaptive management or aim for real restoration are impossible without current baseline data and an understanding of longer-term trends that have been established through adequate monitoring. Increased data collection and rigor are sorely needed, and should be a key component of the NWFP. If contracted, data collection should not be done by parties who have a conflict of interest.

Similarly, implementation and compliance with standards must be enforced not only for road densities but also for stream temperature and fine sediment standards, and other water quality and habitat-based standards.

The DEIS failed to analyze effects to streams and riparian ecosystems from increased upland logging. Similarly, the DEIS also failed to analyze the effects to streams and riparian ecosystems from the increased road-related activities that increased logging would necessitate. Logging, grazing, and road-related activities are well-documented to alter watershed hydrology and negatively affect water quality parameters such as stream temperatures, increase fine sediment, alter peak flows, and lower water tables. True restoration strategies urgently needed include road decommissioning and removal, culvert replacement and repair, placing wood in streams, encouraging beaver to recolonize areas, livestock exclusions, retiring livestock grazing allotments,, and reconnecting streams with floodplains.

For example, Guenther et al. (2012) 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. Logging can be associated with changes in macroinvertebrate community structure or metrics (Flaspohler et al. 2002, Kreutzweiser et al. 2005), increases in stream temperatures (Guenther et al. 2012) and alterations in nutrient cycling and leaf litter decomposition rates (Lecerf and Richardson 2010). Flaspohler et al. (2002) noted that changes to biota associated with selective logging were found decades after logging. The USFS[rsquo]s Draft Forest Plan Revision for the Blue Mountains (vol. 2 pg. 48) noted:

[ldquo]Timber harvest can influence aquatic ecological condition via such activities as removal of trees in the riparian zone, removal of upslope trees, and associated understory or slash burning (Hicks et al. 1991). These activities can affect wood recruitment, stream temperatures, erosion potential, stream flow regime, and nutrient runoff, among others (Hicks et al. 1991). Effects of harvest are likely to be different at different scales. Hemstad and Newman (2006) found few effects of harvest at the site or reach scale, but found that harvest five to eight years earlier resulted in losses of habitat quality and species diversity at the scale of a stream segment (larger than a reach) or at the subwatershed level. Those losses were revealed in terms of increases in bank instability and fine sediment throughout the watershed and increased water temperatures and sediment problems throughout the channel segment. The cumulative effects of widespread harvest within a single drainage in a short period of time resulted in deterioration of the aquatic and riparian habitats, but evidence of effects lagged harvest by several years and different evidence of deterioration showed up at different spatial scales within the watershed[rdquo].

The NWFP must include strong, enforceable standards that protect water quality, fish and aquatic species, stream habitats, and riparian connectivity. It is essential to include measurable, quantitative objectives through well-monitored and strictly-enforced standards. More stringent protections are also required for often overlooked and under-protected habitats such as headwater streams, small wetland habitats, and groundwater dependent ecosystems.

Cold-water dependent species such as Bull trout, wild summer steelhead, and spring Chinook are in increasing peril due to climate change. Swift and decisive protection from logging and roading are urgently needed to protect already shrinking cold-water habitats and human drinking water sources.

Strengthened protections for streams and Riparian Reserves should include, for example, standards that protect habitats and processes such as standards for stream temperature, shade, sediment embeddedness, downed wood in streams, pool depth, and pool-to-riffle ratios. Current PACFISH/INFISH standards on eastside forests are a good starting-place model for comprehensive quantitative standards that could be strengthened and adapted into a NWFP framework.

V. Wildlife, the NSO and related issues:

The NWFP amendment must ensure protections for the full complement of native species, and incorporate ongoing threats of climate change and habitat and biodiversity loss. In order to protect biodiversity and forest ecosystems throughout the region, the NWFP amendment should ensure that natural processes and dynamics are maintained[mdash]including disturbances such as fire and native insects and diseases.

The NWFP amendment DEIS fails to address many important aspects of the management and conservation of wildlife that exist within the plan amendment area. The DEIS fails to analyze the impacts of this amendment on the protections of the Northern spotted owl and other ESA-listed species that depend upon mature and old-growth forests (including all species listed in Tables 3.9 and 3.10 of the DEIS). The DEIS[rsquo] failures include, but are not limited to, not addressing the impact of any amendment on the persistence of Threatened and Endangered species as well as all other late successional and old growth dependent species, which was the focus of the 1993-1994 studies (Gang of 4, SAT 1 & SAT II, and FEMAT). And although [lsquo]Sensitive Species[rsquo] were addressed in the DEIS Appendix C, Draft Biological Evaluation, the lack of similar analysis for Threatened or Endangered Species is a failure that must be remedied in the Final EIS.

The DEIS also fails to adequately consider and analyze the increased threat to the viability of the NSO, which has more need for protection now than it did in 1994. In 2021, the USFW updated the 2012Critical Habitat rule to clarify that the NSO qualifies for a listing as endangered under the ESA. This update to the critical habitat for the NSO specified that [ldquo]recent scientific findings and our December 15, 2020, finding (and supporting species report) that the northern spotted owl warrants reclassification to endangered status emphasize the importance of maintaining habitat in light of competition with barred owls[rdquo] And yet, the Forest Service has failed to even amend forest plans in the region to require protections for critical habitat in the matrix to apply the recommendations of the 2011 Revised Recovery Plan, which informed the 2012 critical habitat designation.. Despite this alarmingly negligent context, the Forest Service continues to push for management authorization that would directly contribute to the continued decline of the NSO habitat in the NWFP amendment.

Protections for at-risk and imperiled species must be expanded and strengthened, including for species that are the cornerstones of the NWFP such as the NSO, Marbled murrelet, and native salmonids.

Habitat for Northern spotted owls must include expanded and strengthened protection for core and dispersal habitats, particularly from logging. For example, dispersal habitat should have enforceable standards that ensure such habitat cannot be degraded or destroyed by logging, including in timber sales termed as [ldquo]restoration[rdquo] or [ldquo]fuels reduction[rdquo] logging. [ldquo]Fuels reduction[rdquo] logging targets the very habitat that the owls rely on, such as mid-canopy and complex forest structure.

Logging in Northern spotted owl habitat is the primary threat to the owls, with the agencies often instead falsely blaming fires as the primary driver of risks or declines in NSO populations (Bond et al. 2022 https://www.mdpi.com/1999-4907/13/10/1730)

For instance, based on our timber sale monitoring and field surveying of proposed timber sales on the Deschutes National Forest since 2001, there is a persistent trend of the timber sales chipping away at Northern Spotted owl Nesting, Roosting, and Foraging habitat and Core Critical Habitat first, and then later targeting for Dispersal habitat for logging. In each case it was clear that the logged Spotted owl habitat would no longer be considered suitable habitat. In the Five Buttes timber sale, the EIS admitted that the Northern Spotted owl Nesting, Roosting, and Foraging habitat would not be suitable as NRF habitat for at least 50 years[ndash]although, given the structural complexity and old growth status of suitable NRF habitat, it would not become suitable for probably at least 100-150 years, given the Spotted owl[rsquo]s need for high overstory canopy closure and big old growth trees with complex structure. The Five Buttes timber sale was preceded by other timber sales that also logged suitable Spotted owl NRF habitat, including the Baja sale and other timber sales on the buttes in the Crescent Ranger District. The Five Buttes sale was also followed by the Ringo sale, which then targeted logging in the Spotted owl dispersal habitat. The EXF timber sale on the Bend-Fort Rock District also logged some suitable Spotted owl NRF habitat. The Ursus sale on the Bend-Fort Rock District also targeted Spotted owl dispersal habitat for logging. The Metolius timber sale also logged Northern Spotted owl habitat. In addition, the Green Ridge timber sale on the Sisters Ranger District is planned to commercially log suitable Spotted owl dispersal habitat to only about 30% canopy closure, when the Spotted owl requires canopy closure of at least 60% or higher. The Northern Spotted owl has continued to decline precipitously due to commercial logging on the National Forests that have, or had, Northern Spotted owl populations in flagrant violation of the Endangered Species Act. The revised Deschutes National Forest Plan revision must have enforceable standards that fully protect all existing suitable and future potential habitat for Northern Spotted owls so they can recover their populations.

The USFS has a long history of failing to account for the extremely confounding factor of post-fire ([ldquo]salvage[rdquo]) logging relevant to research investigating habitat use of Northern spotted owls studies. Post-fire logging is very often a part of the landscape of habitat use studies, yet this is either unacknowledged by the Forest Service despite the problem that in many cases research is unable to differentiate between post-fire logging and fire severity with regard to the negative impacts to Northern spotted owls. The USFS failure to adequately account for post-fire logging in their analyses and conclusions reflects clear bias towards logging, is extremely disingenuous, and demonstrates a lack of professional integrity.

Findings from Lee and Bond (2015) also suggest that high intensity fire risk to Northern spotted owls are overstated, and note that:

[ldquo]The amount of high-severity fire in the PAC [Protected Activity Centers] did not affect pair occupancy. Occupancy probability by at least a single bird was negatively correlated with the amount of high severity fire in the PAC but remained .0.89 in 100% high-severity burned PACs. These data add to observations that California Spotted Owls continue to use post-fire landscapes, even when the fires were large and where large areas burned at high severity, suggesting that owls are not generally negatively impacted by high-severity fire.[rdquo]

Lee (2020) found that:

* [ldquo]Fire-induced change in occupancy is not greater than annual changes in occupancy in unburned forest[rdquo]
* [ldquo]Given the known absence of consistent negative effects, and the significant positive effect of high-severity fire on spotted owls, I propose that the limited resources available for forest fire mitigation should be

prioritized for human community protection in the wildland[ndash]urban interface rather than in remote spotted owl territories. When all available data are examined objectively in meta-analysis, the larger pattern is revealed that high-severity fire patches from climate-changed wildfire events are used by spotted owls for foraging in proportion to their availability, and more high-severity fire significantly increases reproduction, but no strong consistent negative effects are apparent. This is exactly why meta-analyses such as Lee (2018) are so valuable, because they provide decision-makers with the broader consistent patterns found among all studies so that decisions need not be based on single studies or so-called [ldquo]biological intuition.[rdquo]

The Bond (2016) research found that productive nest sites that were unlogged were almost never abandoned if burned foraging habitat was not [ldquo]salvage[rdquo] logged.

Hanson et al. (2021) note:

* [ldquo]High-severity fire transforms Western U.S. conifer forests into a unique forest type known as [ldquo]snag forest habitat[rdquo], which Spotted Owls actively use to hunt for small mammal prey. This snag forest habitat is heavily targeted by post-fire logging projects. Studies have shown that post-fire logging significantly reduces Spotted Owl occupancy, but efforts have generally not been made to separate the effects of such logging from the influence of high-severity fire alone on Spotted Owls. We document that articles reporting negative effects of high-severity fire on Spotted Owls were pervasively confounded by post-fire logging. Our results indicate a need to approach analyses of high-severity fire and Spotted Owls differently in future research.[rdquo]

In the Phys Org new article by Hanson 2021, New analysis finds Spotted Owls harmed by post-fire logging, not fire, the authors from Hanson et al. 2021 discuss their research:

* "It turns out that the decline in Spotted Owl populations that sometimes occurs after forest fires is being driven by destructive post-fire logging practices, not by the fires themselves," said Dr. Chad Hanson, Research Ecologist with the John Muir Project.
* Interestingly, in the absence of post-fire logging, Spotted Owls benefit overall from large mixed-intensity forest fires, contrary to longstanding assumptions made by the U.S. Fish and Wildlife Service and the U.S. Forest Service.
* "Federal wildlife and public land agencies have a serious misunderstanding of the science regarding wildfires and Spotted Owls," noted Dr. Derek Lee, Associate Research Professor at Pennsylvania State University. "This leads them to mistakenly label forest fires as a threat to the Owls, and ignore the real threat: logging."
* "These patches of snag forest habitat have high levels of the small mammal prey that Spotted Owls need to survive and reproduce," observed Dr. Monica Bond, Principal Scientist with the Wild Nature Institute. "But post-fire logging destroys and eliminates snag forest habitat, and that harms Spotted Owls," she added.

Hanson et al. (2009) note that:

* [ldquo]The high-severity component of mixed-severity wildfires does reduce older forest, while it also creates early-successional postfire habitat and increases natural heterogeneity. This essential process is needed for long- term NSO viability and forest recruitment and likely poses little short-term risk because NSOs may benefit from severely burned forest for foraging. This habitat is currently generated at rates far below the rate of old-

forest recruitment. Natural heterogeneity from mixed-severity fires may also offer some insurance against unexpected disturbance or severe effects of climatic change.[rdquo][hellip].[ldquo]Moreover, patches of high-severity fire will not necessarily cause a decrease in Spotted Owls or their habitat.[rdquo]

Risk from Wildfire is overstated by the USFS, and the USFS consistently conflates artificial manipulation (prescribed fire) with natural disturbance processes (wildfire). In addition, in the presence of Barred owls, extinction was lowest in areas with abundant old forests. Dugger et al. (2011) found that

* [ldquo][O]ccupancy rates for Northern Spotted Owls were related to the amount and degree of fragmentation of older forest; occupancy increased when the proportion of old forest increased and/or the degree of fragmentation was decreased. In addition, occupancy rates decreased when Barred Owls were detected regardless of the habitat configuration of a territory. Extinction of Spotted Owl territories was lowest in areas where old forests were most abundant, and colonization was highest in less-fragmented forests.[rdquo]

If a wildfire occurs, unfragmented forest will produce high-quality burned habitat that will also be utilized by spotted owls and will benefit from natural disturbance. Odion et al. (2014) noted in relation to spotted owls that:

* "Over 40 years, habitat loss would be far greater than with no thinning because, under a [ldquo]best case[rdquo] scenario, thinning reduced 3.4 and 6.0 times more dense, late-successional forest than it prevented from burning in high-severity in the Klamath and dry Cascades, respectively"

Quotes below are excerpted from the Clark (2007) thesis in order to illustrate the central role of post-fire logging with regard to the his research (emphases added):

* [ldquo]My results indicate that pre-fire harvest and post-fire salvage coupled with high severity fire reduced the amount of suitable owl habitat, increased site extinction rates, and subsequently created declines in occupancy.[rdquo]
* [ldquo]Consequently, as the amount of unsuitable habitat increased due to previous land management activities, high severity fire, or salvage logging, survival rates likely declined and led to elevated extinction rates and subsequently declines in occupancy.[rdquo]
* [ldquo]I predicted that post-fire occupancy would decline because of elevated extinction rates due to habitat loss related to high severity fire and salvage logging. My results supported this prediction because elevated extinction rates were associated with increased amounts of unsuitable habitat (the combination of high severity fire, salvage logging and early seral forests prior to fire).[rdquo]
* [ldquo]These results likely indicated that habitat loss attributable to wildfire and subsequent salvage logging caused declines in occupancy following wildfire, not observed in unburned landscapes.[rdquo]
* [ldquo]Several owl territories occupied prior to the Timbered Rock Fire had large amounts of suitable habitat consumed by stand-replacing wildfire and subsequent salvage logging.[rdquo]
* [ldquo]Further research is needed to investigate the impacts of high severity wildfire and salvage logging on survival rates of spotted owls because I was unable to separate these factors.[rdquo]
* [ldquo]Wildfire and subsequent salvage logging on private timberlands were likely responsible for the elevated extinction rates following the Timbered Rock Fire, although I did not examine the impacts of wildfire and salvage separately in this analysis.[rdquo]
* [ldquo][hellip]I am unable to draw direct conclusions as to how different fire severities and subsequent salvage logging influenced survival individually.[rdquo]

* [ldquo]Wildfire and subsequent salvage logging increased the amount of unsuitable habitat and decreased the amount of older forest throughout the Biscuit, Quartz and Timbered Rock Fires. Consequently, I predicted this would cause declines in productivity when compared to productivity in unburned landscapes, but this was not the case in my study. My results suggested that wildfire likely had little impact on productivity, which was similar to the results of Jenness et al. (2004) where productivity rates of Mexican spotted owls in burned landscapes were marginally less than unburned landscapes. Furthermore, reproductive rates of spotted owls 1 year following wildfire did not appear to be different than pre-fire rates in northern California (Bond et al. 2002). In general, my results suggest that as long as a territory is capable of supporting a pair of spotted owls following wildfire, owl pairs in burned landscapes will produce young at a similar rate as unburned landscapes.[rdquo]

Bond et al (2016) summarized the subsequent peer-reviewed study that came out of Clark[rsquo]s research in southwestern Oregon.

* [ldquo]Clark et al. (2011) examined the monthly survival rates of northern spotted owls 3[ndash]4 years after fire and postfire logging in two fire areas in southwestern Oregon[hellip][hellip]Owls outside the burned and logged areas had the highest annual survival, but there was no evidence for an effect of fire severity on survival. The authors suggested past logging activities coupled with loss of habitat from severe fire followed by postfire logging contributed to the lower survival rates of owls in burned forests.
* [ldquo]Key Findings: Spotted owl survival rates 1-year postfire (before postfire logging) were similar to survival rates in long-unburned forests, whereas monthly survival rates of northern spotted owls in postfire logged landscapes were lower than in long-unburned forests[rdquo]
* [ldquo]The only study to investigate the occupancy dynamics of northern spotted owls in burned landscapes was conducted in three fire areas and an adjacent long-unburned demographic study area in mixed-conifer and mixed-evergreen forests in the southern Oregon Cascade Mountains (Clark et al., 2013). The three fires all burned within 1 year of each other. Modeled occupancy rates of 103 spotted owl sites in the long-unburned area were compared with 40 burned sites before fire and after postfire logging. This extensive study also investigated survival rates and movements of 23 radiomarked owls in and just outside two of the fires (see Survival, later). Postfire logging was prevalent on private lands in all the fire areas; thus, it was not possible to quantify the influence of fire alone on occupancy dynamics and survival, but this research provided important insights into the effects of postfire logging on a federally threatened species whose numbers are continuing to decline (Forsman et al., 2011). Extinction rates were greater after postfire logging in the burned area (Timbered Rock) than the long-unburned area (South Cascades; Fig. 6; Clark et al., 2013). Occupancy probability declined more steeply after postfire logging than in the unburned area (Fig. 6). The high rate of adult dispersal following postfire logging suggested that insufficient habitat remained at abandoned sites to support spotted owls. At all three fire areas, extinction probability of sites increased with greater amounts of combined area that was previously harvested, burned at high severity, or postfire logged.[rdquo]
* [ldquo]Key Findings: Typically, severe fire does not have significant adverse effects on breeding-site occupancy by spotted owls, especially in sites occupied by pairs of owls. However, large amounts of high-severity fire in a core area can reduce occupancy probability, and postfire logging further increases site extinction and decreases site colonization. Studies are needed to determine thresholds for high-severity fire for Mexican and northern spotted owls and for California spotted owls in the Sierra Nevada.[rdquo]

* [ldquo]Harvesting timber to lower risk of fire has adverse effects on spotted owls (eg, Tempel et al., 2014), whereas fire itself has both costs and benefits depending on many factors. It is important to critically weigh these costs and benefits, especially since spotted owls evolved in landscapes shaped by wildfires (Baker, 2015). Odion et al. (2014) simulated changes in northern spotted owl habitat over a 40-year period following fire and the type

of thinning typically proposed by federal land managers. The simulation showed that thinning over large landscapes would remove 3.4[ndash]6.0 times more late-successional forest over time in the Klamath and dry Cascades than forest fires would, even given a future increase in the amount of high-severity fire.[rdquo]

The FS[rsquo]s reliance on faulty assumptions about perceived risk to spotted owls from high intensity fires to further justify logging illustrates some of the faulty and insufficient analyses by the Forest Service on key issues. For example, the USFS relied on Spies 2009 critique of Hanson et al. (2009) in their proposal for Scott Mountain Prescribed fire in the Wilderness (2017): [ldquo]Spies et al (2009) note that the Hanson et al (2009) study a) did not address how past fire-suppression has increased fuel loads and increased the risk of large, high-intensity fires and b) did not consider climate change, increased moisture stress or increase stress from insect and disease outbreak in their assessment.[rdquo] However, in this example, the Forest Service failed to include the peer-reviewed, published defense by Hanson et al. of their 2009 work as critiqued by Spies. Hanson et al. (2010) demonstrated that the concerns brought forth by Spies et al. (2009) were minor, sometimes irrelevant to the issue or analysis, and did not change the outcome of their paper when considered. This is one of many examples where the USFS repeatedly shows their bias in failing to acknowledge or include the full range of scientific opinion, or adequately consider legitimate scientific controversy. Hanson et al. (2009) and Hanson et al. (2010), as well as other peer-reviewed studies, suggest that USFS assumptions and conclusions regarding fire risk to spotted owls are faulty.

Unfragmented, complex mature and old forest habitat with abundant snags and downed wood are required by species such as the Northern spotted owl. Further, preserving such habitats, especially in large blocks, helps give spotted owls the best chance at maintaining territory as barred owls expand their range. Logged forests decrease or destroy key habitats such as snags, and consistently have fewer snags than unlogged forests.

Preserving core habitats and connectivity across the region in order to support biodiversity must be a core principle of any forest plan revision. The Forest Service has a responsibility to the public trust to ensure that species such as Pacific fisher, red tree voles, wolves, goshawk, marten, vaux[rsquo]s swifts, and all other native species persist and thrive across the region.

We are concerned by ongoing degradation of Pileated woodpecker and marten suitable habitat. Pileated woodpeckers are no longer [ldquo]over-represented[rdquo] on the landscape due to -increased over-logging of their habitat. Logging removes mature and large trees in moist mixed conifer and reduces future mature and large trees, including reduction of large snags for nesting. Associated [ldquo]fuel[rdquo] reduction, hazard tree removal, and prescribed burning removes soft snags and logs used for foraging. Pileated woodpeckers also require a minimum of 40% canopy closure for foraging and a minimum of 60% canopy closure for nesting, neither of which would be retained in most of the commercial sale units that would be logged in current planned timber sales, based on extremely low live tree retention being planned.

Commercial [ldquo]thinning[rdquo] often only retains about 40 square feet of basal area per acre, which would leave less than 40% canopy closure. American marten are already ranked as [ldquo]Vulnerable[rdquo] in Oregon. They are rare and declining due to landscape scale and cumulative down wood reduction, forest overstory canopy removal, and loss of large snags used by Pileated woodpeckers for nesting, as marten use Pileated nest holes for denning. Both Pileated woodpecker and American marten are Management Indicator species on some of the National Forests, which means their population viability must be ensured under the National Forest Management Act. Management Indicator species habitat must be protected in proposed timber sale areas to ensure their population viability. The Forest Service must consider through detailed analysis the cumulative impacts to MIS suitable habitat across the entire National Forest to determine population viability, combined with the direct and indirect impacts to suitable habitat from the current timber sale being proposed.

The need to retain and provide moist mixed conifer habitat and denser forest habitat forassociated wildlife species and larger, more intact blocks of mature and old forest for wide-rangingwildlife species: This includes species sensitive to human disturbance or human-caused mortality such as shooting, hunting, and trapping. The species that require moist mixed conifer forest or denser forest habitat include many in decline, including Management Indicator species and Endangered, Threatened, and Sensitive-listed species. These include MIS Pileated woodpecker, MIS and Vulnerable-ranked American marten, Threatened Canada lynx, and Sensitive Pacific fisher. Wide-ranging species include Endangered Gray wolf, Threatened Canada lynx, MIS and Vulnerable American marten, and Threatened wolverine. Denser forest-dependent wildlife species include MIS Rocky Mountain elk, MIS Northern goshawk, MIS American marten, and multiple bird species of concern, including Northern pygmy owl and Neotropical migratory songbirds that rely on multilayered canopy forest, such as multiple warbler species and Western Tanager.

The need to protect old growth forest: Large trees >/=21[rdquo]dbh are statistically over 150 years old[mdash]the definition of old growth[mdash]for most tree species and most trees. The Forest Service is inevitably logging old growth trees by logging large trees >/=21[rdquo]dbh, which is contrary to the broad scientific consensus that old trees are critically important to protect from logging as these older trees survived many adverse conditions in the sites where they are found. Many wildlife and plant species are adapted to, and dependent on large tree structure and/or old growth characteristic structure, including large trunks and branches, complex structure, high big crowns, development of cavities for denning and roosting, and sufficient size to support large birds, including eagles, large hawks, large owls, and large woodpeckers, including MIS Pileated woodpecker, MIS Northern flicker, and Sensitive Lewis[rsquo] woodpecker. The high live crowns and thick bark of old growth trees makes them more resistant to fire. The Forest Service needs to stop planning to log large trees and old trees, and must instead fully protect them from logging.

The need to retain moist mixed conifer forest: Moist mixed conifer has been noted by scientists as not greatly deviating from natural or historic conditions regarding fire regimes. Scientists have made it clear that moist mixed conifer and high elevation moist or cold forest types are not priorities for fire risk reduction. Yet the Forest Service keeps targeting moist mixed conifer for logging based on its naturally denser, more productive forest. Yet moist mixed conifer is critical to retain and protect from logging to retain moisture retention (see the previous key issue) and to provide habitat for wildlife species migrating or being displaced due to the intensity of lower elevation dry forest extreme heat waves, prolonged droughts, and loss of forest cover to logging and increased insect defoliation. Wildlife and even trees and other plant species will need to be able to move to higher elevations or to the north to find suitable habitat with sufficient shading, cooler temperatures, and greater moisture retention.

Wildlife Connectivity Corridors: Intact wildlife connectivity corridors are now more important than ever because of the increasing loss of forest cover to high intensity logging (virtual clearcutting, and clearcutting) on a landscape scale. Logging impacts are now combined with extreme climate change effects forcing wildlife species and even tree species to migrate to cooler and moister higher elevation areas or north as suitable habitat conditions disappear due to extreme heat waves, prolonged drought, and/or more intense wildfires. This situation calls for no more commercial size logging of identified wildlife connectivity corridors and only limited non-commercial thinning and/or prescribed burning[mdash]only where these are really necessary for the viability of the stands. Many wildlife connectivity corridors also overlap riparian corridors, which also should not be logged. Forest cover is needed for moisture retention and provision of fresh water flows for wildlife, trees, and plants. The need to fully protect wildlife connectivity corridors from logging is also imperative due to the ongoing biodiversity crisis of wildlife species from many human-caused impacts, including logging.

The Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin and Portions of the Klamath and Great Basin (Quigley et al. 1996) includes summaries of their finding. The [ldquo]Highlighted Findings[rdquo] note that there has been a 27 percent decline in multi-story old forest structures (Chapter 8, Findings, pg. 181). Given the extensive portion of forests that have already been logged on the landscape, mature and old forests (and the trees, snags, and logs within them) often provide some of the last high-quality wildlife habitat and connectivity corridors in and adjacent to timber sale areas.

Young and mature fir are also needed for future recruitment of old and large fir. Bull et al. 1997 highlights the importance of large fir with cavities, as well as the importance and rarity of the multilayer stands that produce this habitat, notes: [ldquo][l]arge, hollow trees are uncommon in managed landscapes and typically are found only in late- and old-seral stands of grand fir and western redcedar. Although isolated hollow trees in young stands have significant value to wildlife, these young stands cannot reproduce this type of structure for at least 150 to 200 years. The late-seral, multilayer stands that produce hollow trees comprise less than 3 percent of the forested landscape in the interior Columbia River basin.[rdquo]

The Forest Service Region 6[rsquo]s Response to Blue Mountains Biodiversity Project[rsquo]s Freedom of Information Act request (2016-FS-R6-001106-F) included the [ldquo]Eastside Screens Enclosure; Recent Science Findings and Practical Experience: Implications for the Eastside Screens September 2015[rdquo]. This Enclosure also recognizes the importance and rarity of large hollow firs. The Enclosure noted (emphases added): [ldquo]Implementation of the Screens has substantial species management implications. For example, the white-headed woodpecker, Lewis[rsquo]s woodpecker and several species of bats are Regional Forester[rsquo]s Sensitive Species that rely on large snags and defective trees for part of their life history. Large, defective grand fir trees and snags provide critical roosting and denning habitat for black bears, Vaux[rsquo]s swifts, pileated woodpeckers, American marten, and bats (Bull et al., 1997). These legacy trees, especially large, hollow grand fir, are rare on the landscape and have declined from historical conditions on the eastside of Oregon and Washington[rdquo]. The enclosure also states: [ldquo]These findings reinforce the importance of retaining and recruiting large, old trees in dry, mesic and moist mixed conifer forests on the eastside of the Region. It is critical that silvicultural prescriptions provide for large snags and defective trees in adequate numbers through time[hellip].large, hollow grand firs take 150 to 200 years to develop (Bull et al. 1997): adequate numbers of smaller trees need to be left to allow for the processes that create replacement hollow trees.[rdquo]

In recent years, numerous studies have raised alarms regarding habitat loss, climate change, and decline of fauna and biodiversity across the planet. Warnings have been sounded by scientists regarding the declining bird populations we are seeing, and the projections of far greater losses to come. For example, the Rosenberg et al. (2019) study Decline of the North American Avifauna reported a [ldquo]staggering decline of bird populations, and found [ldquo]wide-spread population declines of birds over the past half-century, resulting in the cumulative loss of billions of breeding individuals across a wide range of species and habitats. They show that declines are not restricted to rare and threatened species[mdash]those once considered common and wide-spread are also diminished. These results have major implications for ecosystem integrity, the conservation of wildlife more broadly, and policies associated with the protection of birds and native ecosystems on which they depend.[rdquo]

The August 2017 [ldquo]Science Findings[rdquo] from the PNW Research Station discussed the importance of snags and wildfire based on the research of Lorenz and her colleagues, 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 [ldquo]Science Findings[rdquo] 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. [ldquo]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,[rdquo] 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. [ldquo]I think humans find low-severity fires a more palatable idea. Unfortunately or fortunately, these birds are all attracted to high-severity burns,[rdquo] Lorenz says. [ldquo]The devastating fires that we sometimes have in the West almost always attract these species of birds in relatively large numbers.[rdquo]
* 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.

* Currently, the best solution we can recommend is to provide large numbers of snags for the birds, which can be difficult without fire. According to the researchers[rsquo] calculations, if one of every 20 snags (approximately 4 percent) has suitable wood, and there are five to seven species of woodpeckers nesting in a given patch, approximately 100 snags may be needed each year for nesting sites alone. This does not account for other nuances, like the fact that most species are territorial and will not tolerate close neighbors while nesting, or the fact that species like the black-backed woodpecker need more foraging options. Overall, more snags are needed than other studies have previously recommended.

VI. Wildfire:

Logging to suppress fire is an outdated, misguided strategy. Logging in the backcountry does not keep communities safe. The most effective way to keep homes and people safe is not to focus on thinning and logging, but rather to work directly adjacent to homes.

Alarmingly, despite a stated purpose and need to improve the wildfire resistance and resilience of the national forests under the NWFP, the many mandates to increase logging, including changing the authorization to log in [ldquo]stands less than 80 years old to 120 years old[rdquo] in moist forests, DEIS 2-16, Table 2.1, will only serve to make these forests less resistant and resilient to wildfire. Old growth forest stands are already among the most fire resistant and resilient forest stands. Targeting these large, fire-resilient trees for logging is antithetical to this purpose and need.

Further, the NWFP amendment proposal to log at least one third of dry forest stands across LSR and matrix lands over the next fifteen years will not only inevitably jeopardize the few remaining intact ecosystems left among these dry forests, but will also exacerbate conditions that drive severe wildfires. Protecting forests from logging and human development does not lead to increased risk of fire. In fact, logging large trees makes forests more flammable. Increased forest protection does not lead to increased severity of wildfires. Although often associated with the highest levels of biomass and fuel loading, protected forests generally burn at lower severity levels than unprotected forests (Bradley et al. 2016).

Zald and Dunn (2018) found that intensively managed forests tended to increase fire severity in plantation stands in climate-driven severe fire events. In their study in California, Levine et al. (2022) found that the odds of high-severity fires on private industrial lands were approximately 1.8 times greater compared to public lands.

The DEIS fails to accurately describe the adverse effects on thinning on old forest characteristics such as large tree abundance, long-term recruitment of snags and dead wood, closed canopies that serve as microclimate refugia during climate extremes, carbon storage, etc. Importantly, the DEIS makes repeated unsupported claims that any adverse effects of logging for fuel reduction will be short-term and offset by long-term benefits from improved old forest characteristics and from reducing the adverse effects of high severity fire. Neither of these assertions is accurate. Fuel reduction logging has very well documented adverse effects, yet those effects may never be offset by any benefits from fire risk reduction. The location, timing, and severity of wildfires cannot be predicted in advance, so fuel treatments must be widespread across the landscape to increase the chances that treatments will interact with wildfire, but most of the acres treated will never interact with wildfire during the brief period before fuels regrow. The benefits of fuel reduction logging are therefore highly speculative and may only accrue to a small fraction of the acres degraded by fuel-reduction logging. The DEIS cannot claim that these trade-offs are unknowable, and Forest Service cannot approve such logging without

The short-term and temporary nature of the perceived fuels reduction benefits from most projects are not likely to result in meaningful changes to fire intensity, size, or severity. Furthermore, re-entering forests to repeatedly and heavily log and then burn them requires a huge road infrastructure, which is damaging to water quality and wildlife. In addition, areas with more roads are more likely to experience human-caused fire ignitions. Human-caused fire starts are the majority of fire starts in many areas.

The cumulative impacts of such large scale, repeated logging would cause untold degradation or destruction of wildlife and stream habitats, water quality, old and mature forests, carbon storage, and more. It would also create unnaturally open, dry, and hot conditions in many forests[ndash] very likely exacerbating fire risk rather than lessening it.

We want to emphasize that the Forest Service[rsquo]s strategy to increase logging in the backcountry will not keep homes and communities safe. 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[mdash] 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 [ldquo]fuels reduction treatments[rdquo] are no longer effective. Forests often grow back more densely and homogeneously than before they were logged, creating an even more flammable situation. Heavy, industrial-scale logging increases fire risk.

There is a very short window of time that [ldquo]treatments[rdquo] will be effective, usually ~10-15 years. [ldquo]Treated[rdquo] (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 [ldquo]manage[rdquo] 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 [ldquo]management[rdquo] is impractical, expensive, ineffective, and would have catastrophic consequences for fish, wildlife, and water quality.

The FS fails to acknowledge that logging and [ldquo]fuel reduction[rdquo] does little to nothing to stop climate change related wildfires, which are overwhelmingly driven by drought, heat, and wind. Logging in the backcountry will not make communities safer[mdash]working near communities, home hardening, and emergency preparedness are far more effective in keeping people safe. (Calkin et al. 2023; Cohen 2000; Gibbons et al. 2012; Syphard et al. 2014).

The Forest Service[rsquo]s characterization of logging as a way to keep communities safe from fire ignores that the primary threat to homes comes from grassfires, not forest 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:[ldquo]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.[rdquo][hellip] [ldquo]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.[rdquo]

In addition, recent research concluded that fast-moving wildfires comprise less than 3% of all

U.S. fire events but account for 89% of all structures damaged or destroyed, and that fires move fastest in ecosystems that have [ldquo]low wind friction[rdquo] due to sparse or absent tree cover which is associated with a dominance of grasses. Firefighters quickly become [ldquo]overwhelmed[rdquo] by fast-moving fires (Balch et al. 2024).

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 a study by Downing et al. 2022:[ldquo]The study area covered almost 141 million acres across 11 states and included 74 national forests[rdquo][hellip] [ldquo]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.[rdquo]

Increasing logging will further exacerbate global climate change, thereby worsening fires as well as exacerbating the synergistic negative effects to ecosystems from climate change. Forests are important for carbon storage and for carbon sinks[mdash]they store carbon in both the soils and the vegetation, and are important for mitigating the impacts of climate change. Harvesting wood [ldquo]represents the majority of [carbon] losses from US forests [rdquo] (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). [ldquo]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.[rdquo] (Law et al., 2018). The FS omits an honest carbon accounting of the carbon outputs of the DEIS. Increased logging as proposed under the NWFP Amendment would increase carbon emissions, decrease carbon storage, and worsen climate-driven wildfires.

In considering fire, it[rsquo]s important to note:

* Large intense wildfires are climate-driven. Wind, drought, and heat are the primary drivers of fire severity and behavior in climate-driven fires[mdash]not previous [ldquo]fuels reduction[rdquo].
* Protected forests do not burn at greater severity compared to managed forests.
* Native mature and old forests with complex structures are the most resilient to fire. Forests that have been degraded by decades of clearcutting are more prone to severe fires.
* Closed canopy forests with large trees tend to burn at lower severities compared to more open forests.
* Logged forests may burn more severely due to increased solar radiation and wind, drying out of the more-open logged forests, and changes to complex structure and microclimates that occur as a result of logging.
* Most fire ignitions in the US are human-caused, particularly in areas of increased access and high road densities. Thus, it would be far more effective to close and decommission roads than to log in the backcountry.
* Fires that destroyed the most human structures in cross-boundary ignitions originated from private lands, not public National Forest lands. Fire activity peaked with dense road networks and moderate human population densities.

* There is a statistically small probability that a [ldquo]treated[rdquo] (logged) area will encounter a wildfire within the window of time that the [ldquo]treatment[rdquo] is considered effective (e.g., [ldquo]fuels treatments[rdquo] are only effective within a ~20-year timeframe, before shrubs and saplings grows back[ndash] often in more dense and brushy forests than before logging occurred). For example, Rhodes and Baker (2008) found that: [ldquo][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.[rdquo]

* We support returning fire on the landscape as a natural disturbance regime, including by managing wildfire rather than suppressing it, whenever possible. We support prescribed burning as a more natural method of thinning where there has been significant wildfire suppression and consequent excess small tree density[mdash]but only for dry forest types. Historic mixed conifer areas tend to have more infrequent fire regimes than dry forest types, not frequent, low severity fire that prescribed burning is intended to mimic.
* Often large fires are described as if everything within the perimeter of the fire burned at high severity, when in fact the majority of the fire area consists of mostly unburned and lightly or moderately burned forest. This lack of nuance contributes to inaccurate use of the science, by not considering the factors influencing the intensity of potential wildfires. These include ambient humidity levels, precipitation, wind speeds, and the timing of burning, as with nocturnal low intensity burning versus diurnal burning higher intensity burning. Climate change-driven factors of humidity, wind speeds, and precipitation are much more significant in determining fire intensity and spread than biomass [ldquo]fuels[rdquo]. Emphasizing biomass over other dominant influences serves to rationalize heavy logging as reducing fire risk, misleading the public. Usually it is precipitation that stops wildfires, not the fire [ldquo]fighting[rdquo]. Wildlife and plant species are adapted to various types of fire, including species that evolved with infrequent, high severity fires.
* We also support prescribed burning[mdash]but only for dry forest types, not historic mixed conifer that includes Grand fir, Douglas fir dominance, and/or other more moisture-dependent tree species such as evidence of historic Engelmann spruce or Western larch. We advocate for no prescribed burning in moist mixed conifer forest that naturally has less frequent fire, more water retention, and/or suitable habitat for Pileated woodpecker habitat or American marten. Prescribed burning eliminates Pileated woodpecker and marten habitat suitability by reducing or eliminating abundant logs for marten foraging, large snags for Pileated nesting and marten denning, and soft snags and logs for Pileated foraging.
* We are also opposed to prescribed burning in the spring reproductive season due to associated harms to water retention for the dry season, Sensitive plants, fledgling and nesting birds, and small mammals and reptiles using burrows.
* It[rsquo]s particularly useless to do fire risk reduction management in the backcountry. Instead residential communities (not just private property boundaries) should be prioritized for fire risk reduction.

Rather than focus on ineffective thinning and logging projects in the name of fire safety, BMBP strongly encourages the Forest Service to analyze and enact NWFP amendment components that focus on home hardening in and around communities. Such home hardening and defensible space efforts are far more effective as keeping people and communities safe. Work around homes and communities includes efforts such as building and retrofitting homes with fire resistant materials and design features, pruning trees and clearing brush immediately adjacent to homes, and not building homes in the Wildlands Urban Interface and areas in and adjacent to fire-prone forests. For example, rather than creating ecologically destructive and often ineffective fuel breaks in Wilderness areas, we should be creating defensible space immediately adjacent to homes. Focusing on the community out, rather than the backcountry in, also protects firefighters from unnecessary risk in areas where wildfires could be allowed to burn. For more on how to protect communities from wildfires, see this short report by Jack Cohen.1

Large trees and mature and old forests should be protected, not logged. Large trees and mature and old forests are more resilient to fire. In addition, heavily managed forests such as plantations and those that have experienced industrial logging practices tend to burn at higher severity.

For too long, the Forest Service has touted logging as restoration. It[rsquo]s time for the Forest Service to distinguish rhetoric from reality: logging is not restoration. Amid the push from the timber industry and the Forest Service to increase logging, particularly logging of large trees and in mature and old forests, it is important to recognize the discrepancy between what the Forest Service is calling restoration and what is actually happening on the ground. Repeatedly, BMBP and others have found very concerning and heavy logging in sales that were presented to the public as necessary for restoration and safety. You can see example photos of the Forest Service's widespread heavy logging here.2

These timber sales were called [ldquo]commercial thinning,[rdquo] [ldquo]restoration,[rdquo] and other euphemisms, when the outcomes were outdated clearcuts[mdash]forest liquidation, not forest resiliency. As can be seen in the photographs linked above, the intensive use of heavy equipment and the landscape scale removal of forest causes loss of ecological functions and ecosystem integrity. Such widespread removal of forest and plants reduce wildlife habitat for declining species, water retention, soil productivity, carbon sequestration and storage, and cultural uses of the forest.

We have grave concerns about the proposed allowance of post-fire, so-called [ldquo]salvage[rdquo] logging in moist LSRs under a number of justifications, including [ldquo]along existing system roads.[rdquo] Even fewer restrictions would be placed on salvage logging in dry LSRs, and no real restrictions would exist in matrix.

Salvage logging post-fire landscapes is like ripping a scab off a wound and converts burned areas into sterile tree farms. The expansion of Salvage across both moist and dry LUAs is not ecologically justified. The Forest Service does not provide any justification for removing dead and dying trees from the disturbed areas, nor does the DEIS present and analyze the negative impacts of mechanical removal on soils and remaining live trees and snags. Compacted soils are much harder to regenerate and contribute to erosion and runoff, causing further harm to streams and aquatic species by excess sediment. In addition, the creation of roads to access dead and dying trees, whether formal roads or merely roads created by usage, contributes to runoff and erosion issues.

We are aware of, and believe the Forest Service should be aware of, the well-founded, peer reviewed science that documents the many negative aspects of salvage logging, such as Leverkus et al. (2021) and Thorn et al. (2020). These negative effects include not only soil compaction and increased

----

1https://static1.squarespace.com/static/61ef51b68cfef85e3fed8d43/t/6340520e899c747a294725bf/1665159696338/D

r.+Jack+Cohen+Wildland+Urban+Fire+Primer+for+Elemental+Viewers.pdf

2 https://www.forestclimatealliance.org/logging-photo-gallery

----

erosion, but the loss of organic matter (trees) for rebuilding soil, the loss of habitat for decomposing fungi and insects which are near the bottom of the food chain, and the loss of habitat for woodpeckers and other species that utilize both standing and downed dead timber. Naturally created standing snags have been proved more beneficial to wildlife than any snags created by Forest Service silvicultural practices. Fire has been a part of the healthy forest ecosystem for eons, allowing regeneration and resiliency, and providing necessary gaps that increase the diversity of vegetation and wildlife.

Rather than promoting timber harvest activities that have contributed, over the past century or more, to the current climate and biodiversity crises that we currently find ourselves in, forest management in dry forests should consider the need to reverse decades of fire exclusion through the ecologically-appropriate managed use of fire and protecting fire resistant mature and old-growth trees. It is well past time for the Forest Service to stop logging under the guise of human and community safety. In order to best protect the safety of communities and firefighters, the Forest Service must move beyond its mandate to log in perpetuity and instead focus its efforts on defensible spaces near communities and home hardening. This approach has the added benefit of advancing other goals of the NWFP amendment such as the protection of natural habitats, increasing the ability of these forests to mitigate the effects of climate change, and improving the conservation and recruitment of mature and old growth forest conditions..

VII. Mitigating Climate Change:

The NWFP amendment does not adequately consider and give weight to the ability of our national forests to The Forest Service has a responsibility to do all it can to mitigate climate change, and work to restore forests from ongoing degradation caused by activities such as commercial logging and roading. To do so, a NWFP amendment must:

*

* Protect and expand the number of large trees and mature and old forests. Large trees and mature and old forests are important for sequestering and storing carbon in soils, and both biomass, and in the complexity of organisms in these biodiverse and complex systems.
* Include explicit direction to protect (meaning not log, commercially or otherwise) previously unlogged forests and forests with little or no previous logging. The NWFP should also require an analysis of carbon that identifies the net loss of carbon due to logging, including outputs from transportation, milling, and waste.
* Incorporate provisions that require and encourage recruitment of large trees, mature and old forests, snags and downed wood, and complex canopy structure across the landscape
* The Forest Service needs to transition away from resource extraction. Forests are more economically important as carbon sinks and providers of ecosystem services than as providers of extractive resources.
* Maintain and protect microclimates and other refugia, as well as connectivity corridors, as these places will provide important habitat as climate change drives species to move north and to higher elevations, changing the range maps of many species.

Climate change is projected to warm streams, lower baseflows, and shrink ranges for already imperiled fish. Leaving forests standing, reducing fragmentation, and protecting forests from logging and roading will help protect streams and aquatic species. Protecting large trees and mature and old forests is crucially important for providing clean drinking water to communities, particularly as the climate warms and issues such as low streamflows and algal blooms become more frequent and severe.

Halting logging of forests, especially mature and old forests, is crucial for storing carbon across our region and at a global scale. Large wildfires consume less than 2% of tree carbon (Harmon et al. 2022 https://www.mdpi.com/1999-4907/13/3/391). Logging, including thinning, releases far more carbon over an equivalent area (Bartowitz et al. 2022 https://www.frontiersin.org/articles/10.3389/ffgc.2022.867112/full). Despite these scientific conclusions, the NWFP amendment DEIS proposes to authorizes several mandates to increase logging:

*
*

* Objective (FORSTW-MTX-MOI-OBJ), page A1-21:

* [ldquo]treat at least one tenth (65,000 to 81,000 acres per decade) of young stands (established after 1905) in moist forest Matrix[rdquo]

* Objective (FORSTW-ALL-DRY-OBJ), page A1-22,

* [ldquo]Within 15 years of amendment approval, implement treatments that contribute to ecological resilience on at least one-third of dry forests (527,000 to 643,000 acres per decade or 790,000 to 964,000 acres per 15 years across the Northwest Forest Plan area, not including any additional acres of salvage treatments may occur, while also conserving and retaining older trees and promoting the development of future functional old-growth forest ecosystems appropriate for dry forests.[rdquo]

* Alternative B would include the following specific actions designed to increase fire resistance and ecosystem resilience within the NWFP area:

* Treat 150,000 additional acres per decade within community protection areas in addition to the current/historic fuels management of 2,500,000 acres, for a total of 2,650,000 acres per decade across all LUAs. Treatment would include:

* 1,750,000 acres per decade treated with wildland fire (including prescribed burns, unplanned ignitions, and cultural burning).
* 900,000 acres per decade treated by mechanical means.

There was no [lsquo]Mandate to cut[rsquo] in the 1994 NWFP; and there were no acreage targets in the 1994 NWFP other than the PSQ board footage, which was not a [lsquo]mandate.[rsquo] Language in the DEIS[mdash]such as the [ldquo]Objective[rdquo] excerpts above[mdash]appears to drive a significant program to cut trees, without qualifications for consideration of ecological justification and the continuance of ESA listed species dependent on large trees. In fact, since implementation of the original NWFP, the guardrails and protections have aided in forest recovery. Under the NWFP, the region shifted from a source of carbon emissions to instead providing an important carbon sink (Krankina et al. 2012). As a result, the region now supports some of the most carbon dense multi-functional mature and old forests on the planet (Krankina et al. 2014; Brandt et al. 2014). In the era of climate change, the agency needs to expand the reserve system, and put in place more stringent protections so that carbon storage is further increased.

Some of the reasons why commercial logging degrades forest resilience to climate change and reduces resistance to climate change include the following: timber sale loss of significant stores of carbon from the removal of mature and large[mdash]or future large trees, increasing the harmful effects of extreme climate change; removing shading and down wood, thus reducing badly needed water retention for headwater streams and downstream flows to support fish and other aquatic wildlife species and riparian-associated plants and wildlife and their habitat; loss of high quality drinking water for people; and greater loss of wildlife and plant biodiversity during the human-caused loss of biodiversity and climate change.

Retaining a mature and old canopy and forest cover retains more moisture is critical to retain under current and future climate change scenarios. As discussed above, logging tends to open up the forest canopy, allowing increased solar radiation to penetrate to the forest floor, which in turn increases surface-level aridity and leads to potentially increased wildfire severity. Fitzgerald and Bennet (2014). Such logging also thins out forest stands, allowing wind to blow through the stand and increase the speed at which wildfires spread. Id.

The Forest Service[rsquo]s continued use of HRV as a management goal for forested vegetation structural stages is inappropriate in the face of a rapidly changing climate. The goal of the DEIS to manage toward forests that are [ldquo]reflective of historic range of variability,[rdquo] DEIS at 3-29, does not demonstrate the use of the best available science which shows how climate is driving changes to forest vegetation and how to best manage for future conditions. The guideline for focusing dry forest treatments on vegetation [ldquo]departed from historical conditions,[rdquo] DEIS at A1-22, is an improper criteria for such efforts.

HRV is a 30-year old concept that is generally considered inapplicable for use as a management goal by present-day researchers. For example, USFS Pacific Southwest Research Station ecologist Constance Millar described HRV-based prescriptions and management targets in ecosystem reclamation projects as [ldquo]inappropriate.[rdquo] Millar 2014. Instead of pursuing past conditions that are not necessarily well adapted to current climatic conditions, the Forest Service must look forward to projected climatic changes in order to understand and allow ecosystems to unfold that will dominate the conditions we will see in the next 100 years.

The use of HRV for FS management decisions was first promoted in the 1990[rsquo]s. In 2009, Keane et al. pointed out weaknesses and pitfalls in using HRV while still holding it as a possible aid, with limitations. The authors state (p. 1034):

[ldquo]To use HRV in an operational context, it must be assumed that the record of historical conditions more or less reflects the range of possible conditions for future landscapes; an assumption that we now know is overly simplistic because of documented climate change, exotic introductions, and human land use.[rdquo]

And (p. 1035):

[ldquo]If expected biotic responses to climate change come true, tomorrow[rsquo]s landscapes will be so altered by human actions that current management philosophies and policies of managing for healthy ecosystems, wilderness conditions, or historical analogs will no longer be feasible because these objectives will be impossible to achieve in the future.[rdquo]

We note that the Forest Service does not have a legal mandate to manage forests for historical range of variability (HRV) for tree species composition and structure. They are, however, responsible for ensuring the viability of the full complement 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[rsquo]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.).

Further, 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:

[ldquo]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 [ldquo]low-severity[rdquo] model is that dry forests were relatively uniform, low in tree density, and dominated by low- to moderate-severity fires; the [ldquo]mixed-severity[rdquo] 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[rsquo]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, [ge]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.[rdquo]

HRV as a management goal also fails to address the forest ecosystem processes that are all important to forest resilience. Resilience is very dependent upon biodiversity and the interactions of a multitude of plants and animals. Other natural processes to consider are natural plant succession and the interactions of flora and fauna, as influenced by the geologic conditions of each site and microsite.

Accurate management and control of nature is unlikely. Anthropogenic climate change has resulted in a different range of future possibilities relative to the past. The historic range of variability may be a useful point of reference, but it is an unattainable and illogical goal to strive for today. We suggest that the agency needs to tolerate more dense stands, as occurs in natural plant succession, while allowing for enough variability so that disturbances are limited by discontinuities on the landscape. The

post-disturbance landscapes must be allowed to recover their complexity. Further human intervention and manipulation to mimic forest structures under a past climate regime[mdash]one that no longer exists and will not exist in any near future[mdash]is ill advised.

As informed by recent studies, it is absolutely critical to preserve mature forest cover and all large/old trees to provide as much forest habitat and moisture retention as possible, and to fully maximize forest carbon sequestration and storage. Mildrexler et al. (2023). Continuing to log off the forests perpetuates reduction of moisture retention, extensive and long-term soil damage, loss of plant and wildlife diversity, and exacerbation of heat waves, droughts, fires, and insect epidemics.

Logging to control insects, fire, and disease is an ineffective, and ecologically destructive strategy. Many of the insects and diseases the Forest Service seeks to control are native to the region, and have evolved with ecosystems for millennia. Native insects and diseases have crucial roles in these ecosystems, and often have complex relationships that forests and species depend upon to maintain biodiversity and ecological integrity.

In addition, evidence suggests that logging fails to control beetles and other insects and diseases. For example, in the study Management for Mountain Pine Beetle Outbreak Suppression: Does Relevant Science Support Current Policy?, Six et al. (2014) conducted an extensive literature review on Bark beetle research. Her research, as well as several studies discussed in the literature review shows legitimate scientific controversy that warrants more in-depth analysis. Among other findings, Six[rsquo]s work discusses research showing that thinning forests may decrease the large tree structure that remains in post-bark beetle outbreak forests. These findings suggest that thinning may harm rather than help forest ecological integrity, resiliency, and wildlife species that depend on large tree structure.

Quotes from Six[rsquo]s study follow (emphasis are added):

* [ldquo][I]n a retrospective study investigating the effects of management on spruce beetle, researchers found that post-infestation, untreated stands had more live spruce trees and greater basal areas. When comparing only residual large spruce, final densities in both stand types were similar [126]. Six [124] found higher numbers of mature living trees remained in control stands of ponderosa pine than in thinned stands post-mountain pine beetle outbreak. In a study in Canada focusing on stocking density of living lodgepole pine post-outbreak, the authors found that, even in hard hit stands, stocking density in post-outbreak unmanaged stands was sufficient to maintain desired levels of productivity [127].[rdquo]
* [ldquo]Studies conducted during outbreaks indicate that thinning can fail to protect stands. In Colorado, thinning treatments in lodgepole pine implemented in response to the outbreak that began in the 90s often only slowed the spread. Klenner and Arsenault [122] reported high levels of mortality due to the mountain pine beetle across a wide range of stands densities in lodgepole pine in British Columbia during the same outbreak. They noted that silvicultural treatments were largely ineffective in reducing damage to the beetle. Preisler and Mitchell [123] found that once beetles invaded a thinned stand the probability of trees being killed there can be greater than in unthinned stands and that larger spacings between trees in thinned stands did not reduce the likelihood of more trees being attacked.[rdquo]
* [ldquo]Unfortunately, long-term replicated studies monitoring beetle responses to thinned forests from non-outbreak to outbreak to post-outbreak phase are virtually non-existent. One large fully- replicated long-term study was initiated in 1999 under non-outbreak conditions and continues to track beetle activity [113]. In this study, mountain pine beetle was low in all treatments in the period leading up to the outbreak, but increased in some controls and burn treatment replicates as the outbreak developed. Although more trees were killed overall in control units during the outbreak, all controls still retained a greater number of residual mature trees than did thinned stands as they entered the post-outbreak phase [124].[rdquo]

* [ldquo]The manner in which policy makers have accepted beetle timber harvest treatments as a panacea for responding to bark beetle outbreaks in North American forests raises a number of red flags. As ecosystems and places that have economic, social, and cultural value to human communities are altered by climate change, there is a risk that people will overreact because of a need to [ldquo]do something[rdquo] to respond to change, and to give themselves some sense of control over broader forces that appear to be out of control. That pressure, to [ldquo]do something[rdquo], might also interact with the uncertainty about which choices are effective and appropriate (as with beetle timber harvest treatments) to create an opportunity for political pressures to force the adoption of particular choices that benefit specific interest groups [143]. It is perhaps no accident that the beetle treatments that have been most aggressively pushed for in the political landscape allow for logging activities that might provide revenue and jobs for the commercial timber industry. The result is that the push to [ldquo]do something,[rdquo] uncertainty, and political pressures might lead us to act to respond to climate change before we understand the consequences of what we are doing, in the end producing more harm than good.[rdquo]
* [ldquo]Many studies assessing the efficacy of thinning have been conducted under non- outbreak conditions. Their results do not reflect how stands perform during an outbreak. Additionally, failures are often not reported, dismissed as a result of poor management [lsquo]next door[rsquo] or targeted for management without evaluation. This is unfortunate because thinned stands that fail may have particular characteristics that could inform a better understanding and application of this approach.[rdquo]

Portions of the Six et al. (2014) article also point to how thinning may lessen the overall, long- term adaptability and resiliency of forests to beetle outbreaks:

* [ldquo][T]he beetle exercises selectivity in the trees it kills. While extremely high numbers may override this selectivity, evidence is accumulating that, even under outbreak conditions, beetles choose trees that have particular qualities. Beetles commonly select trees for attack that exhibit lower growth rates, defenses, and higher water stress [58,74,77]. While these factors can be influenced both locally and regionally by site conditions and climate, much of the variation in these properties within individual stands that affect bark beetle choice likely has a genetic basis. Outbreaks can result in strong natural selection against trees with phenotypes (and likely genotypes) favorable for the beetle and for those that possess unfavorable qualities [58,77]. However, when humans thin forests, trees are removed according to size, species, and density, without consideration of genetics. Thus, trees best adapted to surviving beetle outbreaks are as likely to be removed as those that are not.[rdquo]

In the Mother Jones article by Oatman (2015) about Diana Six[rsquo]s research, Six expresses her skepticism that current logging practices are the correct approach to managing Bark beetles. She also describes evidence of how beetle-attacks in the past may have helped forests to better survive drought.

* [ldquo][C]utting trees [lsquo]quite often removes more trees than the beetles would[rsquo][mdash]effectively outbeetling the beetles. But more importantly, intriguing evidence suggests that the bugs might be on the forest's side. Six and other scientists are beginning to wonder: What if the insects that have wrought this devastation actually know more than we do about adapting to a changing climate?[rdquo]

* [ldquo]When beetle populations exploded in the 1980s, this second group mounted a much more successful battle against the bugs. After surviving the epidemic, this group of trees "ratcheted forward rapidly," Millar explains. When an outbreak flared up in the mid- 2000s, the bugs failed to infiltrate any of the survivor trees in the stand. The beetles had helped pare down the trees that had adapted to the Little Ice Age, leaving behind the ones better suited to hotter weather. Millar found similar patterns in whitebark pines and thinks it's possible that this type of beetle- assisted natural selection is going on in different types of trees all over the country.[rdquo][rdquo]

Also in the Mother Jones article by Oatman (2015) about Diana Six[rsquo]s research, Six describes one of the instances of failure of other researchers to report outcomes showing the ineffectiveness of thinning to lessen tree mortality due to Bark beetles. This account is indicative of the controversy surrounding this issue:

* [ldquo]Six points to a stand of lodgepoles in the University of Montana's Lubrecht Experimental Forest. In the early 2000s, school foresters preened the trees, spacing them out at even distances, and hung signs to note how this would prevent beetle outbreaks. This "prethinned" block was "the pride and joy of the experimental forest," Six remembers. But that stand was the first to get hit by encroaching pine beetles, which took out every last tree. She approached the university forest managers. "I said, 'Boy, you need to document that,'" Six says. "They didn't. They just cut it down. Now there's just a field of stumps."

Six is not the only researcher to publish peer-reviewed findings that run contrary to the assumptions used by the USFS to justify logging in relation to Bark beetles in the Marsh project. Other researchers have also found evidence that thinning beetle-infected trees may actually interfere with long-term forest resilience to Bark beetles.

For example, Ferrenberg et al. (2014) discusses that some trees exhibit resistance to bark beetles based on inherited genetic traits for certain resin duct characteristics such as the number of resin ducts and productivity and flow of resin. This suggests that logging without consideration of individual tree characteristics may remove the trees with this genetic adaptation, thus lowering the long-term chance for forests to adapt to bark beetle attack at both the local and landscape scales. Also, in their examination of density reduction as a way to control beetle outbreaks in spruce forests, Temperli et al. (2014) found that [ldquo]density reduction cannot be seen as a means to maintain high growing stocks of large spruce trees.[rdquo]

While this study focused on spruce, it and other studies listed here may have important implications for the USFS[rsquo]s misguided efforts to log as a means to maintain large trees in forests being affected by Bark-beetles. In addition, studies suggesting that logging in forests affected by Bark-beetles is misguided and ineffective should be taken into account by the USFS in relation to their assumption that logging is necessary to promote or protect large tree structure. These studies show that this assumption may be inaccurate, and therefore not a sound ecological justification for logging to protect large tree structure.

VIII. Inadequate Cumulative Effects Analysis

BMBP[rsquo]s area of focus is mostly[mdash]although certainly not wholly[ndash]-outside of the area directly managed under the NWFP. For this reason, we are particularly concerned by the lacking cumulative effects analysis available in the NWFP amendment DEIS. In particular, BMBP is concerned about the cumulative effects of management actions taken within the geographic scope of the NWFP that will inevitably have consequences that ripple across the greater Pacific Northwest, the country, and the globe.

Further, we are convinced that the DEIS is arbitrary and capricious due the lacking effects analysis of the proposed actions on the Northern Spotted Owl, the Marbled Murrelet and all other ESA-listed species. The likely take that would result from the proposed increased timber harvest and prescribed burning of a significant acreage of Designated Critical Habitat both on Moist Forest and on Dry Forest requires such an analysis as a significant environmental impact.

In addition, the DEIS is arbitrary and capricious due to its lacking effects analysis[mdash]including cumulative effects[mdash]of the proposed action on the ecosystems in the NWFP Region. The proposed increase in timber harvest and the implementation of widespread prescribed fire is likely to result in increased aridity, erosion, and impacts to watersheds and water sources for wildlife, natural ecosystem processes, and humans.

While the economic impacts analyzed in this DEIS extend beyond the boundaries of the NWFP to include the socioeconomic areas adjacent, as discussed in Section 3.8.1, any discussion of the environmental and biological impacts stop at the borders of the National Forests or the NWFP area. It is well known that environmental effects of forest management extend well beyond the borders of any actions (treatments), as evidenced by natural processes such as wildlife migration, the flow of water into and out of a project area, seed dispersal, and even the effect of evapotranspiration on rainfall in areas downwind. This selective scoping of analysis areas is arbitrary and capricious.

The migration of wildlife over vast areas that extend through and beyond the NWFP Region is well documented in papers and reports such as that by Hausheer (2023). The impact of improper management of forests and landscape in the NWFP Region are therefore of concern to groups whose main focus may be outside of that region, such as ours.

The impact of forests on climate and the water cycle also extends well beyond the NWFP Region.

As described in reports such as that by Pearce (2018), while looking at deforestation that the NWFP Amendment does not propose outright, trees and forests are important to the water cycle and affect rains and moisture in lands well beyond the extent of any treatment. The important biotic pump of atmospheric moisture as described by Makarieva and Gorshkov (2007) shows how tree harvests proposed by the NWFP Amendment affect the drought conditions in eastern Oregon and Washington and beyond. Such information has been poorly integrated in Forest Service research and elsewhere, as described by Ellison, et al (2017). In this DEIS it must be included in the cumulative effects analysis.

IV. Tribal Engagement:

The 17 national forests managed under the NWFP represent vast and significant portions of the ancestral homelands of over 80 federally recognized Tribes and several other Indigenous communities. Since time immemorial, Indigenous communities stewarded these landscapes in such a way that not only provided the Tribes ample resources, but provided for a resilient forest and rich, biodiverse ecosystem as well. The development of the original NWFP failed to properly consider and include Indigenous voices and knowledge. With this amendment, the Forest Service has an opportunity to right this past failure to include Tribal representatives, knowledge, perspectives, and values. Although the impending dissolutionof the FACA committee[mdash]a decision indicating complete disregard for informed decisionmaking and democratic principles[mdash]severely hampers the Forest Service[rsquo]s ability to do so, BMBP implores the Service to push for full inclusion of Tribal representatives and Indigenous perspectives. BMBP believes consideration and inclusion of Tribal knowledge and values is vitally necessary to the successful management of all issues analyzed within the scope of the NWFP amendment. BMBP strongly supports the centering of all Tribal inclusion components considered in the action alternatives of this DEIS and encourages the Forest Service to continue to analyze such plan components in its Final EIS.

Submitted on behalf of Blue Mountains Biodiversity Project,

[]

Blue Mountains Biodiversity Project

[], Co-Director

Blue Mountains Biodiversity Project

Citations

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

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

Baker, William L., Chad T. Hanson, Mark A. Williams, and Dominick A. DellaSala. 2023. "Countering Omitted Evidence of Variable Historical Forests and Fire Regime in Western USA Dry Forests: The Low-Severity-Fire Model Rejected" Fire 6, no. 4: 146. https://doi.org/10.3390/fire6040146.

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

Balch, J.K., et al. 2024. The fastest-growing and most destructive fires in the U.S. (2001-2020). Science 386: 425-431.

Bond, M. L., D. E. Lee, R. B. Siegel, and J. P. Ward. 2009. Habitat use and selection by California spotted owls in a postfire landscape. J. Wildlife Management 73:1116-1124.

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- n49.

Bond, M. 2016. The Heat Is On: Spotted Owls and Wildfire. Reference Module in Earth Systems and Environmental Sciences.

Bradley, C. M., Hanson, C. T., and DellaSala, D. A.. 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

Brandt, P., Abson, D.J., Dellasala. D.A., Feller, R. Multifuncionality and biodiversity: Ecosystem services in temperate rainforests of the Pacific Northwest. January 2014. Biological Conservation 169:362-371 DOI:10.1016/j.biocon.2013.12.003

Bull, Evelyn L.; Parks, Catherine G.; Torgersen, Torolf R. 1997. Trees and logs important to wildlife in the interior Columbia River basin. Gen. Tech. Rep. PNW-GTR-391. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 55 p

Burnett, J.D., P.D. Anderson. 2019. Using generalized additive models for interpolating microclimate in dry-site ponderosa pine forests. Agricultural & Forest Meteorology 279: https://doi.org/10.1016/j.agrformet.2019.107668

Calkin, D.E., Barrett, K., Cohen, J.D., Finney, M.A., Pyne, S.J., and Quarles, S.L. 2023. Wildland-urban fire disasters aren[rsquo]t actually a wildfire problem. Proceedings of the National Academy of Sciences of the United States of America. 120: e2315797120.

Campbell, J.L., D.C. Donato, D.A. Azuma, B.E. Law. 2007. Pyrogenic carbon emission from a large wildfire in Oregon, USA. Journal of Geophysical Research 112(G4), G04014. https://doi.org/10.1029/2007JG00045

Clark. D. A. 2007. Demography and habitat selection of northern spotted owls in postfire landscapes of southwestern Oregon. M. S. Thesis. Oregon State University, Corvallis, Oregon.Cohen, J.D. (U.S. Forest Service). 2000. Preventing disaster: home ignitability in the wildland-urban interface. Journal of Forestry 98: 15-

21.

Cohen, Jack. A More Effective Approach for Preventing Wildland-Urban Fire Disasters. Jack Cohen, PhD; Research Physical Scientist; US Forest Service, retired.

DellaSala, Dominick A., and Chad T. Hanson. 2019. Are Wildland Fires Increasing Large Patches of Complex Early Seral Forest Habitat? Diversity 11, no. 9: 157. https://doi.org/10.3390/d11090157

DellaSala, Dominick A., Mackey Brendan, Norman Patrick, Campbell Carly, Comer Patrick J., Kormos Cyril F., Keith Heather, Rogers Brendan. 2022. Mature and old-growth forests contribute to large-scale conservation targets in the conterminous United States. Frontiers in Forests and Global Change 5. 10.3389/ffgc.2022.979528

Downing, W.M., Dunn, C.J., Thompson, M.P. et al. 2022. 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

Dugger, K.; Anthony, R.; Andrews, L.; 2011. Transient dynamics of invasive competition: Barred Owls, Spotted Owls, habitat, and the demons of competition present. Ecological Applications, 21(7), 2011, pp. 2459[ndash]2468 2011.

Ebersole, Joseph.; 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[ndash]124.

Ellison, David, Cindy E. Morris, Bruno Locatelli, Douglas Sheil, Jane Cohen, Daniel Murdiyarso, Victoria Gutierrez, et al. 2017. [ldquo]Trees, Forests and Water: Cool Insights for a Hot World.[rdquo] Global Environmental Change 43 (March):51[ndash]61. https://doi.org/10.1016/j.gloenvcha.2017.01.002.

Ferrenberg, S.; Kane, J.; Mitton, J. 2014. Resin duct characteristics associated with tree resistance to bark beetles across lodgepole and limber pines. Oecologia. 2014 Apr;174(4):1283-92. doi: 10.1007/s00442-013-2841-2. Epub 2013 Dec 5. PMID: 24305863.

Fitzgerald, S., Bennet, M. 2013. A Land Manager[rsquo]s Guide for Creating Fire-Resistant Forests. Oregon State University, Northwest Fire Science Consortium, available at http://www.nwfirescience.org/sites/default/files/publications/A%20Land%20Managers%20Guide%20for%20Creating%20Fire-resistant%20Forests%20.pdf

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[ndash] 349.

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.

Gibbons P, van Bommel L, Gill MA, Cary GJ, Driscoll DA, Bradstock RA, Knight E, Moritz MA, Stephens SL, Lindenmayer DB. 2012. Land management practices associated with house loss in wildfires. PLoS ONE 7: Article e29212.

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.

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[ndash]1249.

Hanson, C.T. , D.C. Odion, D.A. DellaSala, and W.L. Baker. 2009. Overestimation of fire risk in the Northern Spotted Owl Recovery Plan. Conservation Biology 23:1314[ndash]1319.

Hanson, C.T., D.C. Odion, D.A. DellaSala, and W.L. Baker. 2010. More-comprehensive recovery actions for Northern Spotted Owls in dry forests: Reply to Spies et al. Conservation Biology 24:334[ndash]337.

Hanson, C.; Lee, D.; Bond, M. 2021. Disentangling Post-Fire Logging and High-Severity Fire Effects for Spotted Owls. Birds 2021, 2, 147-157. https://doi.org/10.3390/birds2020011

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

Hanson, C. 2021. Article in Phys Org New analysis finds Spotted Owls harmed by post-fire logging, not fire. Accessed online at: https://phys.org/news/2021-04-analysis-owls-post-fire.html

Hausheer, Justine E. 2023. [ldquo]Migration in Motion: Visualizing Species Movements Due to Climate Change.[rdquo] February 6, 2023. https://blog.nature.org/2016/08/19/migration-in-motion-visualizing-species-movements-due-to-climate-ch ange/.

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[ndash]32

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.

Hudiburg, Tara W., B.E. Law, W.R. Moomaw, M.E. Harmon, J.E. Stenzel.Meeting GHG reduction targets requires accounting for all forest sector emissions. 2019 Environ. Res. Lett. 14 095005 10.1088/1748-9326/ab28bb

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[ndash]313.

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

Keane, Robert E., Paul F. Hessburg, Peter B. Landres, Fred J. Swanson. The use of historical range and variability (HRV) in landscape management. Forest Ecology and Management, j.foreco.2009.05.035, May 2009. https://www.fs.usda.gov/research/treesearch/33776

Krankina O.N., Harmon M.E., Schnekenburger F., Sierra, C.A. Carbon balance on federal forest lands of Western Oregon and Washington: The impact of the Northwest Forest Plan. Forest Ecol. and Mgmt. Volume 286, 2012, Pages 171-182, ISSN 0378-1127, https://doi.org/10.1016/j.foreco.2012.08.028.

Krankina O.N., DellaSala D.A., Leonard J., Yatskov M. High-biomass forests of the Pacific Northwest: who manages them and how much is protected? Environ Manage. 2014 Jul;54(1):112-21. doi: 10.1007/s00267-014-0283-1. Epub 2014 Jun 4. PMID: 24894007.

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.

Lee, D. E. 2020. Spotted Owls and forest fire: Reply. Ecosphere 11(12):e03310. 10.1002/ecs2.3310

Lee, D.E., and M.L. Bond. 2015. Occupancy of California spotted owl sites following a large fire in the Sierra Nevada, California. The Condor, Vol. 117, 2015, pp. 228[ndash]236.

Law, B.E., A. Cescatti, D.D. Baldocchi. 2001. Leaf area distribution and radiative transfer in open-canopy forests: Implications to mass and energy exchange. Tree Physiology 21:777-787. https://doi.org/10.1093/treephys/21.12-13.777

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. Nature Commun Earth Environ 2:254 (2021). https://doi.org/10.1038/s43247-021-00326-0

Law, B.E., T.W. Hudiburg, L.T. Berner, J.J. Kent, P.C. Buotte, and M. Harmon. 2018. Land use strategies to mitigate climate change in carbon dense temperate forests. Proceedings of the National Academy of Sciences. 115(14):3663-3668. https://doi.org/10.1073/pnas.1720064115

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.

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[ndash] 2443.

Leverkus, A.B., Buma, B., Wagenbrenner, J., et al. [ldquo]Tamm review: Does salvage logging mitigate subsequent forest disturbances?[rdquo] (2021) Forest Ecology and Management. Volume 481, 1 Feb. 2021, 118721. https://doi.org/10.1016/j.foreco.2020.118721

Levine, Jacob I., B.M. Collins, Z.L. Steel, P. de Valpine, S.L. Stephens. 2022 Higher incidence of high-severity fire in and near industrially managed forests. Front Ecol Environ 2022; 20(7): 397[ndash] 404, doi:10.1002/fee.2499.

Lundeberg, S. 2022. OSU Newsroom: OSU research suggests Forest Service lands not the main source of wildfires affecting communities. Accessed at: https://news.oregonstate.edu/news/osu-research-suggests-forest-service-lands-not-main-source-wildfires-affecting-communities#:~:text=The%20study%20area%20covered%20almost,28%25%20ignited%20on%20national%20forests.

Makarieva, A. M., and V. G. Gorshkov. 2007. [ldquo]Biotic Pump of Atmospheric Moisture as Driver of the Hydrological Cycle on Land.[rdquo] Hydrology and Earth System Sciences 11 (2): 1013[ndash]33. https://doi.org/10.5194/hess-11-1013-2007.

Ma, S., A. Concilo, B. Oakley, M. North. 2010. Spatial variability in microclimate in a mixed-conifer forest before and after thinning and burning treatments. Forest Ecology & Management 259:904-915. https://doi.org/10.1016/j.foreco.2009.11.030

Mildrexler, D., L.T. Berner, B.E. Law, R.A. Birdsey, W.R. Moomaw. 2020. Large trees dominate carbon storage east of the Cascade crest in the U.S. Pacific Northwest. Frontiers in Forests & Climate Change. https://doi.org/10.3389/ffgc.2020.594274

Mildrexler, D., L.T. Berner, B.E. Law, R.A. Birdsey, W.R. Moomaw. 2023. Protect large trees for climate mitigation, biodiversity, and forest resilience. Conservation Science and Practice. 5. 10.1111/csp2.12944.

Millar, Constance I. Historic Variability: Informing Restoration Strategies, Not Prescribing Targets. Journal of Sustainable Forestry, 33:S28-S42, 2014. https://srs.fs.usda.gov/pubs/47361

Moomaw, W.R., S.A. Masino, E.K. Faison. 2019. Intact forests in the United States: Proforestation mitigates climate change and serves the greatest good. Frontiers in Forests and Global Change. 10.3389/ffgc.2019.00027.

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[ndash]2164 https://doi.org/10.1007/s10980-022-01478-w.

Oatman, M. 2015. Bark beetles are decimating our forests. That might actually be a good thing. Mother Jones Magazine. Accessed at: http://www.motherjones.com/environment/2015/03/bark-pine-beetles-climate-change-diana-six.

Odion D.C., Hanson C.T., Arsenault A., Baker W.L., DellaSala D.A., Hutto R.L., Klenner W., Moritz 40M.A., Sherriff R.L., Veblen T.T., Williams M.A., 2014. Examining historical and current mixed- severity fire regimes in ponderosa pine and mixed-conifer forests of western North America. PLoS ONE 9: e87852.

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 Woodpecker woes: the right tree can be hard to find. https://www.fs.usda.gov/pnw/sciencef/scifi199.pdf

Pearce, Fred. 2018. [ldquo]Rivers in the Sky: How Deforestation Is Affecting Global Water Cycles.[rdquo] Yale E360. July 24, 2018. https://e360.yale.edu/features/how-deforestation-affecting-global-water-cycles-climate-change.

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

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.

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.

Six, D.; Beiber, E.; Long, E., 2014. Management for Mountain Pine Beetle Outbreak Suppression: Does Relevant Science Support Current Policy? Forests (5) 103-133.

Syphard, A.D., T.J. Brennan, and J.E. Keeley. 2014. The role of defensible space for residential structure protection during wildfires. Intl. J. Wildland Fire 23: 1165-1175.

Temperli, C.; Hart, S; Veblen, T.; Kulakowski D.; Hicks J.; Andrus, R. 2014. Are density reduction treatments effective at managing for resistance or resilience to spruce beetle disturbance in the southern Rocky Mountains? Forest Ecology and Management 334 (2014) 53-63

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

Thorn S., Chao, A., Georgiev, K.B. et al. 2020 [ldquo]Estimating retention benchmarks for salvage logging to protect biodiversity.[rdquo] 2020 Nature Communications, Vol. 11, 4762, 21 Sept. 2020 https://doi.org/10.1038/s41467-020-18612-4.

United States Forest Service FOIA RESPONSE NO. 2016-FS-R6-00106-F, Eastside Screens Enclosure; Recent Science Findings and Practical Experience: Implications for the Eastside Screens September 2015.

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 2022. Quantifying the Role of National Forest System and Other Forested Lands in Providing Surface Drinking Water Supply for the Conterminous United States.

USDA Forest Service and USDI BLM. 2024. Mature and Old-Growth Forests: Definition, Identification, and Initial Inventory on Lands Managed by the Forest Service and Bureau of Land Management in Fulfillment of Section 2(b) of Executive Order No. 14072. FS 1215a. April 2024 (revised). 82 pp.

Available online: https://www.fs.usda.gov/sites/default/files/fs_media/fs_document/Mature-and-OldGrowth-Forests.pdf

Van Pelt, Robert. 2007. [ldquo]Identifying Old Trees and Forests in Western Washington.[rdquo] Olympia, WA: Washington State Department of Natural Resources. https://www.dnr.wa.gov/programs-and-services/forest-resources/habitat-conservation/identifying-mature-and-old-forests.

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

Zerkel, E. 2024. CNN article: A plant that[rsquo]s everywhere is fueling a growing risk of wildfire disaster. Accessed at: https://www.cnn.com/2024/03/21/climate/wildfire-grass-risk-west-us/index.html#:~:text=Over%20the%2
0last%20three%20decades,racing%20through%20grass%20and%20shrubs.

Zald, H.S.J. and Dunn, C.J. (2018), Severe fire weather and intensive forest management increase fire severity in a multi-ownership landscape. Ecol Appl, 28: 1068-1080. https://doi.org/10.1002/eap.1710

ATTACHMENT-LETTER TEXT: BMBP NWFP DEIS comments.pdf; This is the same content that is coded in text box; it was originally included as an attachment