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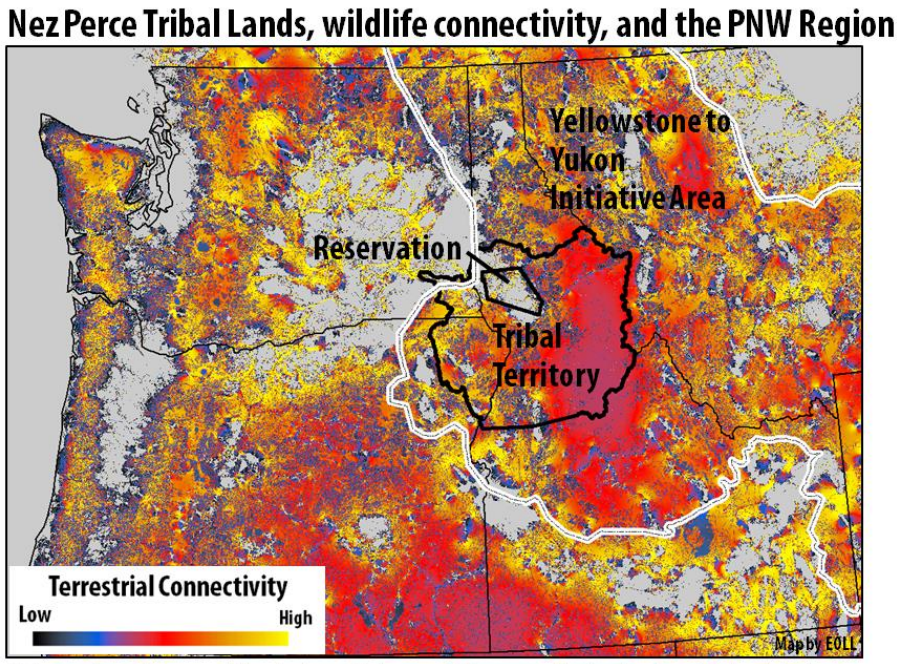
Please accept these comments on the Mogan Nesbit Forest Resiliency Project
Submitted via: https://cara.fs2c.usda.gov/Public//ReadingRoom?Project=58961

Dear Brian,

I am a resident of northeast Oregon with expertise in ecosystem science, global change biology, remote sensing, forest science, and a number of related fields. I work as Systems Ecologist with Eastern Oregon Legacy Lands (EOLL) located in Joseph, Oregon. EOLL is a scientific research and education organization helping rural communities better understand and manage the landscapes they call home.

As we consider the "natural resources" and proposed management actions within the Morgan Nesbit Project Area, first recognize that the project area is within the homeland of the Nez Perce Tribe. These ancestral lands are inseparable from the Nez Perce People and their culture.
I have the honor of working with the Tribe as part of the Blues to Bitterroots Coalition and Camas to Condors Partnership. Here is an important statement:

"What Nez Perce people are trying to do — I would even go so far as to say, what Indigenous people are trying to do — is we are trying to perpetuate a sensitive relationship with the land." — Josiah Blackeagle Pinkham, Nez Perce, C2C collaborator
https://tinyurl.com/3b3ry2y5



This map shows the current flow for terrestrial connectivity among all natural and semi-natural pixels within 50 km of one another, created using the OmniScape moving window algorithm (McRae et al. 2016). Available online at: http://nature.org/resilienceNW

Figure 1. The Blues to Bitterroots Coalition works on landscape-scale climate adaptation. One of our main focus areas is the protection and enhancement of large, intact landscapes and connectivity linking these areas across the Tribe's ancestral lands, and the PNW Region. Increasing connectivity is the highest ranked (most cited) climate-change adaptation strategy for biodiversity management (Heller and Zavaleta, 2009).

1. Ecological Connectivity

I suggest making the protection and enhancement of landscape connectivity the guiding principle for increasing forest resilience within the project area, rather than thinning and fuels reduction.

For years I have been educating people about the importance of the Blue Mountains as an ecoregion-wide wildlife corridor. Mildrexler et al. 2020 states:

"The Blue Mountains ecoregion functions ecologically and floristically as a transverse bridge between the Cascade Mountains to the west and the Rocky Mountains to the east (Kerns et al., 2017). This "mega-corridor" links together some of the most intact habitat remaining in the PNW region and is of great importance to regional-scale connectivity and carbon storage in response to a warming climate (McGuire et al., 2016; Buotte et al., 2020)."

The Morgan Nesbit (MN) Project Area overlaps one of the most crucial linkage areas for supporting this functionality in the Blue Mountains Ecoregion - the area between Hells Canyon, the deepest canyon in North America, and the Eagle Cap Wilderness, the largest Wilderness in Oregon. Multiple datasets confirm this area as a key wildlife corridor linking the Blue Mountains and Rocky Mountains (Figure 2).

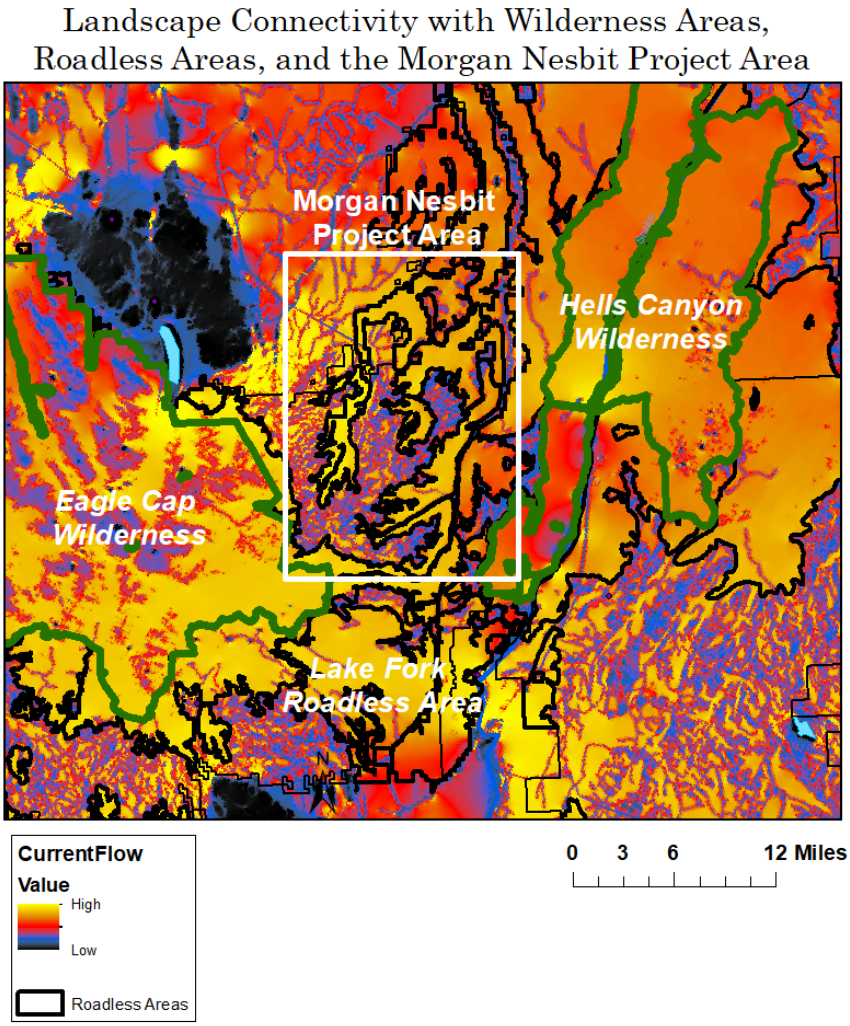


Figure 2. The Mogan Nesbit Project Area overlaps key connective corridors between the Eagle Cap and Hells Canyon Wilderness Areas. Landscape connectivity values are much higher in roadless and undeveloped lands compared with roaded areas.

It is imperative that management actions support connectivity and ecological integrity between the Hells Canyon and Eagle Cap Wilderness areas. Alone, the designated Wilderness areas are not capable of providing the habitat range requisite to support the long-term home range, genetic variation, and population viability of many species, particularly those with large home range requirements. Moreover, wildlife often has few other good options for movement and dispersal as major barriers are present across much of the landscape, such as areas with high road-densities, land-cover conversion, and development on private land. In the MN project area, Agency accountability rests in upholding the key corridors that currently exist on the landscape.

The Wallowa Mountains-Hells Canyon Ecosystem is a globally unique landscape. The elevation gradient is extreme, extending across a large diversity of ecosystems that are found in relative close proximity to each other resulting in complex species interactions and community patterns. Plant communities reflect influences from multiple provinces including the Great Basin, Columbia Plateau, Rocky Mountains, and Wallowa Mountains. In this large, diverse, and connected landscape with protected areas at its core, there is opportunity for wildlife and plants to move and respond to the changing climate (https://tinyurl.com/2xrr9c2f).

Climate will continue to warm in coming decades, creating a greater need for a connected landscape that can facilitate the dispersal of plants and animals responding to these rapidly changing conditions. Species are already on the move and mixing in ways that don't align with historical conditions in vegetation or climate. I am concerned that Morgan Nesbit is overly simplistic in its focus on restoration toward historical baselines, which could simplify stand structure and composition and degrade forests important for climate and biodiversity. The Morgan Nesbit Project Area is a crucial part of the *greater protected area* landscape (Figure 2).

In the MN Proposed Action I am concerned that vegetation restoration objectives proposed far from communities require the opening of closed roads and the building of temporary roads. These are areas where I don't think these impacts should be occurring. I am concerned about intensive commercial logging coupled with the fossil fuel costs of working and transporting material from this remote location. I am concerned that these actions are overall bad for climate and biodiversity. Aggressive commercial logging, building temporary roads, and opening closed roads are known management actions that would increase fragmentation in this critical corridor. They also lead to further problems such as loss of habitat security, increased motorized and recreational use, invasive weed spread, and fire risk associated with changes in human-use patterns (https://www.sciencedaily.com/releases/2021/02/210201113602.htm). I find these outcomes incongruent with the needs of this landscape and the ecological services it provides.

Consider the historic range of variability for roads in this landscape. Building more roads, temporary or not, drives the system away from the historic range of variability with regards to this key indicator of ecological integrity. Consider the historic range of variability for atmospheric carbon stocks and the role that forests play in natural climate solutions.

Interest is rapidly growing in management approaches that align biodiversity conservation and recovery with climate change mitigation and adaptation priorities. In addition to making connectivity the guiding principle for this project, the following are suggestions that aim to support the best possible decision-making and future outcomes in context of multiple trade-offs among known competing values.

2. Roadless Areas and Other Undeveloped Lands

Within undeveloped lands, apply only minimally intrusive fuels reduction treatments using foot crews and in dry forest areas where these actions are ecologically appropriate and do not compromise the wilderness/roadless characteristics of the area.

The Morgan Nesbit Project Area includes rugged areas with substantial undeveloped lands (Figure 2). These lands are closely associated with areas of high connectivity, high permeability, and high terrestrial resilience (Figure 3).

The FS has referred to these areas as “other undeveloped lands.” FS documentation refers to these as "isolated polygons," but in many places these undeveloped roadless blocks are directly adjacent to other undeveloped areas and/or inventoried roadless areas. Together these areas are critical to the integrity of the roadless domain. They provide connectivity and often include unique habitats that are not within Inventoried Roadless Areas, such as forest types at elevations that have otherwise been heavily roaded and logged.

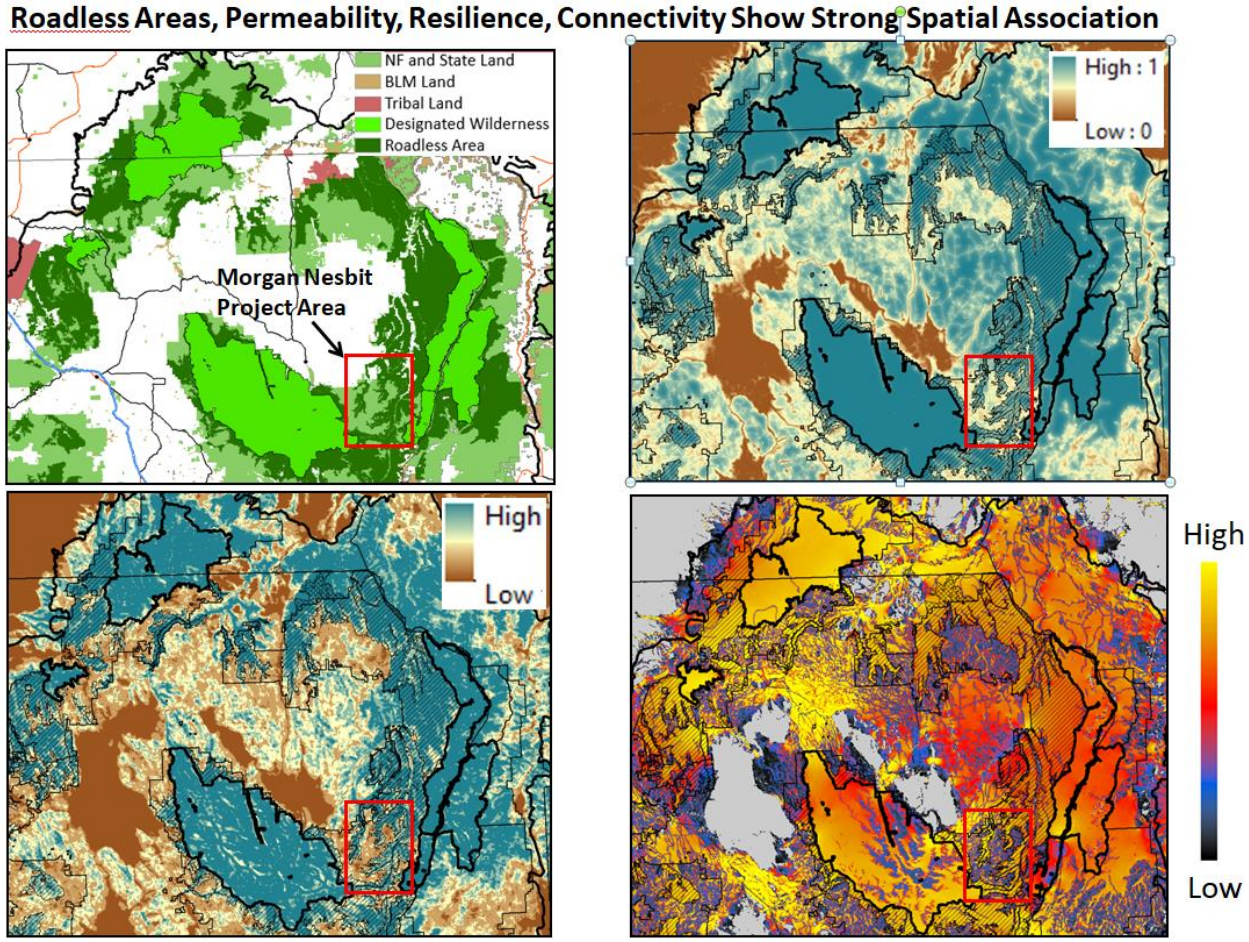


Figure 3. Roadless areas on Federal Lands (upper left), show strong spatial association with high permeability (upper right), high terrestrial resilience (lower left), and high connectivity values (lower right) in northeast Oregon. The Morgan Nesbit Project area is shown in the red box.

The Forest Service has noted the value of these lands in the Lower Joe Restoration Project NEPA documentation.

"Other undeveloped lands have intrinsic ecological and social values because they do not contain roads and evidence of past timber harvest."

"Other undeveloped lands include soils, water, fish and wildlife habitat that have not been impacted directly by past harvest and road building."

"Human influences have had limited impact to long-term ecological processes within the other undeveloped lands."

A "sensitive relationship with the land" is urgently needed to safeguard the integrity of these landscapes. These areas are ecologically irreplaceable, and rare globally. Management actions should preserve the character and integrity of these undeveloped lands.

I do not support commercial or ground-based mechanical treatments in roadless or in other undeveloped lands. These lands provide high quality habitat, watershed values and ecological baselines that should be preserved.

I request that the Oregon Roadless Citizen Inventory dataset be incorporated into the analysis. It is important that the public can clearly assess, both in the documentation and on the ground, which proposed units overlap previously undeveloped lands.

I suggest complementing the LIDAR analysis that was used to map old forest and wildlife corridors throughout the project area with additional datasets on wildlife connectivity. The LIDAR mapped corridors are good to have, and appear to generally coincide with riparian corridors. However, I'm not convinced that this single approach covers the range of species connectivity needs.

3. Temporary roads

Eliminate temporary road building from the project proposal. Temporary road building is a dubious and controversial practice, and numerous problematic components stem from temporary road building and its associated actions.

Mechanical fuels treatments (MFTs) aimed at reducing fire severity have much inherent uncertainty in their effectiveness and thus application should be limited and the most damaging activities such as temporary road building should be avoided (Crist et al. 2009, Noss et al. 2006, Rhodes et al. 2008). The following is an excerpt from "The Watershed Impacts of Forest Treatments to Reduce Fuels and Modify Fire Behavior" by Jonathan Rhodes, 2007.

> *Avoid practices that consistently cause severe and persistent watershed damage, including machine piling and burning and the construction of roads and landings, including "temporary" ones. The numerous negative effects of roads are one of the primary sources of aquatic and watershed damage on a continental scale. Additional road construction is inimical to reducing road effects. It also inexorably adds to the currently insurmountable backlog in needed, but deferred, road maintenance on existing*

roads (USFS et al., 1993; USFS, 2000b; Beschta et al., 2004). Even "temporary" roads and landings that are subsequently obliterated have impacts on forests and soils that last for decades. For these reasons, it is essential to ensure that MFT do not involve road or landing construction.

I am disappointed that the Proposed Action has "leaned into" temporary road building in this landscape. I attended the Open House Meeting in Enterprise and discussed the existing road system with Forest Service Staff whom told me with emphasis, "There are a lot of roads in this landscape." In fact it is well known that the National Forests of the Blue Mountains are heavily-roaded and a significant management burden for the Agency (https://tinyurl.com/y6mj3t7b). Yet an astounding 23 miles of temporary roads are proposed. No temporary roads should be built. I urge the Forest Service to work from the existing road network and allow natural disturbances to operate in unroaded areas. This is a landscape that should lean into a naturally functioning disturbance regime, rather than more roads.

Over the years I have reviewed dozens of FS projects in the Blue Mountains and the MN Proposed Action sets the record for most proposed miles of temporary roads. I fail to see how this is appropriate in the Hells Canyon National Recreation Area within this critical linkage area where plenty of roads exist already.

If temporary road building is proposed, I ask that the tradeoffs associated with each temporary road segment be analyzed and disclosed. Given that temporary road building runs counter to the science, the Forest Service has a responsibility to develop alternatives that disclose the trade-offs between vegetation management objectives, and damage to soils, impacts on water quality, spread of invasive weeds, fragmentation of habitat, increased potential for motorized and recreational incursions, and failure to achieve rehabilitation standards.

I request an alternative without any temporary road building. It is important to evaluate what these projects could be without this unnecessary ecological degradation.

4. Mature and Old Forests

Protect mature and old forests as they are one of the most important ecosystems to preserve on Earth for tacking the climate and biodiversity crisis.

It is essential to simultaneously reduce CO_2 emissions and increase carbon storage in land reservoirs, particularly forests, as they account for 92% of the global terrestrial biomass. The accumulation of carbon in forest ecosystems is crucial for mitigating ongoing climatic change, with large-diameter trees storing disproportionally massive amounts of carbon in forests worldwide. Globally, forests removed the equivalent of about 30% of fossil fuel emissions annually from 2009 to 2018 and while boreal and tropical forests have received a great deal of attention, 44% of the carbon removed by forests from 2009 to 2018 is attributed to temperate forests (Friedlingstein et al., 2019). Temperate forests of the U.S. consistently offset about 14% of the Nation's CO_2 emissions and are the largest category of land sinks in the country (EPA, 2020). Forest ecosystems in the U.S. have the potential to continue rapid atmospheric CO_2 removal rates in addition to the massive carbon stores they currently hold (Moomaw et al., 2019). Forest carbon accumulation is a central component of a natural climate solutions framework that is receiving substantial attention in the science and policy literature (Griscom et al., 2017; Fargione et al., 2018; Cook-Patton et al., 2020).

The atmospheric carbon stock is dangerously above the "historic range of variability." Humanity faces an emergency situation. **Accumulated carbon stocks in mature and old forests is the most effective forest-related climate mitigation strategy (https://tinyurl.com/7zrhtzy4).** These forests play a crucial role in keeping carbon out of the atmosphere now, irrespective of historical baselines in forest structure.

Law et al. (2021) assessed current forest preservation using spatial data on aboveground carbon, habitat for vertebrate species, and surface drinking water sources to address the IPBES-IPCC agreement on the importance of addressing both climate change and biodiversity for climate mitigation and adaptation. Preservation priority ranking for the highest carbon and habitat quality showed that the protected aboveground carbon stocks and accumulation would almost triple by 2050 to about 6 Pg and 1.4 Pg, respectively in the region. The highest priority forests are mostly federal lands. A subsequent analysis on Oregon's forests at 30-m resolution identified substantial forests in the MN project area where establishing strategic forest reserves at the highest levels of protection (USGS GAP 1 or 2) will help protect both forestland carbon and biodiversity for climate adaptation and mitigation (Figure 4; Law et al. 2022). Strategic forest protections can help safeguard water for our ecosystems and communities (https://tinyurl.com/3rz3hr99, https://tinyurl.com/mpc2h2j6).

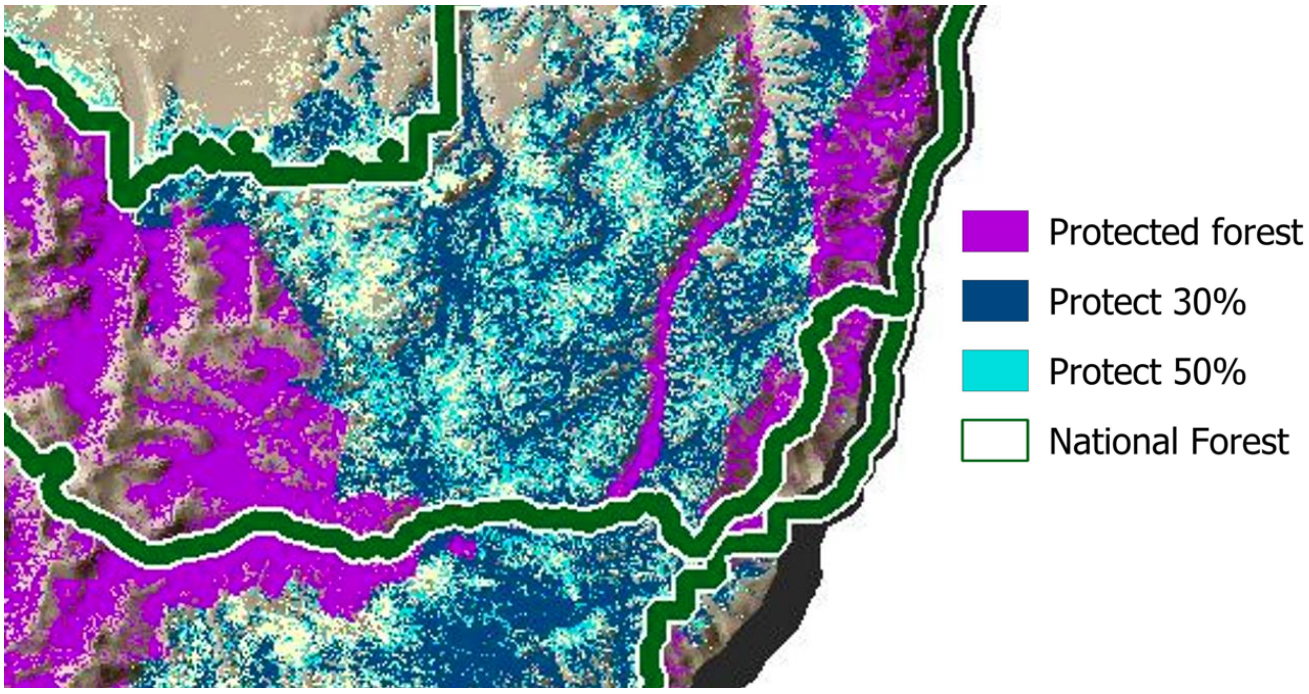


Figure 4. Strategic Forest Reserves for the Morgan Nesbit Project Area (from Law et al. 2022).

What's happening on the ground?

Forests on Table Mountain were also identified in the Law et al. (2022) study as high preservation priority and have since been logged in the Lower Joe Restoration Project.

I commented on the Lower Joe proposal, attended the field tours, and warned managers and proponents about the risks and potential damages of the Lower Joe project. Still, the large trees and intact forests on Table Mountain are falling.

Figure 5. Lower Joe Restoration Project has similarities with Morgan Nesbit. This is not a wildland urban interface area. This is the heart of a crucial wildlife canyon corridor situated between Hells Canyon and the Wenaha-Tucannon Wilderness areas. The Lower Joe Project has removed some small-diameter trees along roads and more broadly in dry forests. But the rest of the project is causing unnecessary damage to the habitat and integrity that Joseph Creek Watershed forests' hold.

On one tour I explained that the mature spruce-fir forests with their multi-layered canopies absorb the sun's rays, shielding the understory environment and keeping the soil underneath the canopy cool and moist. No one could provide a clear restoration objective for this area.

Now these climate mitigating forests are fractured with roads, skid trails, haul routes, landings, and overly-aggressive logging (Figure 6).

Figure 6. This intact previously unlogged moist forest was degraded by the Lower Joe Restoration Project.

Many leave-trees are badly damaged from heavy machinery that also rutted, displaced and compacted soils. Much of the forest biomass lies in massive piles to be burned and emitted to the atmosphere adding to already unsustainable levels of atmospheric carbon. Harvest-related emissions account for ~35% of Oregon's total carbon emissions each year, much more than from wildfire (~4%).

During a recent site inspection I found trees that survived hundreds of years of climatic variation dead on the forest floor, knocked over in a windstorm soon after the project stripped these ancient trees of their buffering community. Some of these rare giants took out what few other large trees remained leaving areas with no structure to shield the surface from the sun, and intensifying heat waves. In other words, after living for hundreds of years in a forest community, these old growth trees died immediately after the project cut the over story trees around them, leaving the terrain to dry out.

The result is a forest stand that will not provide a high-degree of functionality during the time period over which we need forests to be part of the solution, rather than part of the problem.

On a personal level, Table Mountain and the Lower Joe Project overlaps an area that is sacred to me and to many others in my community (Figure 7):
"The Joseph Creek watershed is a landscape of incredible conservation value. It contains some of the last biggest intact (but unprotected) wildlands in the Pacific Northwest." (https://storymaps.arcgis.com/stories/c24b52bf5e0f421188eeddb001dabe34).

Figure 7. Joseph Canyon from Table Mountain. Wallowa-Whitman National Forest (*D. Jensen*).

Specific suggestions for MN:

Old Forest Multi-Stratum

- Refrain from any commercial logging within the Moist Upland and Cold Upland Old Forest Multi-Stratum. Existing conditions for both of these types is well within a reasonable range given HRV analysis in Table 2.
    - Moist forest types provide the strongest biophysical regulation of extreme summer temperatures of all forest types in the Blue Mountains. These systems are buffering plants and animals against the effects of climate change. Many of these forest areas are characterized by soils with higher available water storage and are thus capable of supporting higher leaf areas. Microclimates in moist forests are strongly linked to their dense closed-canopy structure.
- In Dry Upland 1) Evaluate passive opportunities for introducing fire without any mechanical treatment. 2) Use the minimal amount of treatment needed to safely reintroduce fire. This will typically include trees mostly in the 3-8" DBH range and no larger than 12" DBH. Only hand crews should be permitted to enter existing old growth and previously unlogged forests.

Old Forest Single-Stratum

- Refrain from any commercial logging within these stands. Use the minimal amount of treatment needed to safely reintroduce fire. Only hand crews should be permitted to enter existing old growth and previously unlogged forests.

Understory Reinitiation

- Focus on these previously logged areas to enhance forest resilience. The large amount of existing forest in this condition is typical in the Blue Mountains because these areas are recovering from decades of widespread industrial logging.
- This approach provides the additional incentive of focusing resilience efforts on the substantially roaded portion of the landscape (Brown et al. 2004). This aligns areas with the greatest resilience needs with areas that are the least socially contentious to treat. Emphasis should be on modifying ecosystem composition, recovering large fire-resistant trees, encouraging the forest understory community, controlling invasive species, enhancement of soils and watershed values, and consideration of road removal and rehabilitation. Work that benefits the ecology of these managed lands would make very important contributions to overall landscape function (Franklin and Lindenmayer, 2009).

5. Large-diameter Trees and the 21-inch Rule

Large trees represent a small proportion of trees in the forest, but they play an exceptionally important role in the entire forest community.

In any forest, the largest trees relative to the rest of the stand contribute disproportionately to ecological function such as increasing drought-tolerance, reducing flooding from intense precipitation events, altering fire behavior, redistributing soil water, and acting as focal centers of mycorrhizal communication and resource sharing networks (Bull et al., 1997; Brooks et al., 2002; Brown et al., 2004; Luyssaert et al., 2008; Beiler et al., 2015; Lindenmayer et al., 2017).

Forests with large-diameter trees tend to have high tree species richness, and a high proportion of critical habitat for endangered vertebrate species, indicating a strong potential to support biodiversity into the future and promote ecosystem resilience to climate change (Lindenmayer et al., 2014; Buotte et al., 2020). Large-diameter trees play a crucial role in linking aboveground and belowground components of the forest ecosystem. In addition to peer-reviewed publications, these values have received widespread coverage in the media (https://tinyurl.com/2p8s5jy7, https://tinyurl.com/3944h3mu).

A recent study examining carbon storage across six National Forests in eastern Oregon demonstrated that although large-diameter trees (≥ 21 inches) only comprised 3% of the total stand, they accounted for 42% of the total aboveground carbon storage. The researchers highlight the importance of protecting large trees and strengthening existing forest management policies so that large trees can continue to sequester carbon and provide valuable ecosystem services as a cost-effective natural climate solution in worldwide forest ecosystems. This recognition has led to management recommendations to conserve existing forests with large-diameter trees (Lutz et al., 2018; Moomaw et al., 2019; Mildrexler et al., 2020).

It is crucial that the focus of MN be on protection of large-diameter trees, and the forest community in which these large trees live. I am opposed to cutting any large trees over 80 years of age (Birdsey et al., 2023).

It is an interesting exercise to consider the time period when large mature and old trees germinated in context of the recent Amendment to the Eastside Screens. A 150-year old tree germinated in 1873, four years prior to the Nez Perce Flight of 1877. These trees have been removing carbon from the atmosphere and enduring every climatic and environmental challenge since before the first automobile was invented. In other words, these trees were contributing to a climate solution before the problem had even manifested. A 125-year old tree germinated in 1898, the year that the Hawaiian islands were annexed into the USA. A 110-year old tree germinated prior to World War I. All of these trees have continuously removed carbon dioxide from the atmosphere every year and continue to hold much of that carbon in their living tissues today. In 2023, the argument that these large trees should be cut down in the name of forest resilience is simply wrong. In fact these trees are the living definition of resilience.

Alternatives that do not cut any large-diameter trees should be analyzed. If the MN Project proposes an alternative that cuts large-diameter trees it should include numerous sideboards.

Here are my suggestions:

- Specify that no trees over 80 years of age will be removed.
- Specify that no trees ≥21 inches will be removed from moist or cold forest types where large grand fir is essential to the ecology.
- Clarify that this is not a blanket removal of all large grand fir within one to two drip lengths of an early-seral tree. In other words there are situations where large grand fir growing next to large pine or larch should not be removed.
- Whenever possible, the proposed situational removals will be evaluated in the field with the public.

- Clarify the minimum dbh of an early-seral tree that warrants this type of action. Does the early-seral tree need to be >21 inches DBH?
- Clarify that contractors will not be marking the trees for removal.

6. Soils and Specific Concerns for Ground-based Operations

Ground based operations need to be tailored to fit site-specific needs. Especially season of activity and attention to leave tree conditions. Monitoring is important. Here are a list of my concerns.

- Weeds
- Soil compaction. Some areas in mixed conifer are really susceptible like ash soils.
- Soil disturbance and erosion. Some operations lead to erosion. Soil rutting and displacement.
- Logging on steep slopes
- Residual tree wounding, especially the butt of the tree: entry court for decays and increased susceptibility to bark beetles. Far too much of this in Lower Joe Project.
- Residual tree root wounding can lead to more root disease, attracts bark beetles.
- Massive slash piles burn too hot. Damage soils. Favor weeds. Visually terrible. Drive up carbon emissions.
- Some sites just don't need ground disturbance.
- Mechanical footprint. Don't expand it.

7. Droughty Soils Index

The droughty soils index is concerning to me given how homogenous it classifies the study area. I caution against relying on this model as truth. By visual assessment, this model fails to reflect within site variation at the project scale.

The droughty soils index is described as mapping out areas that "dry down in the summer." That isn't very informative because it constitutes the entire project area. We know firsthand that vegetation in this region reflects complex topographic, soil, and elevational gradients within context of a seasonally-dry environment.

Available water storage patterns are not homogenous for the project area. Transpirational demand changes with slope, aspect, and exposure to solar insolation. Ash soils have greater moisture holding capacity and should be mapped in the project area. The strategic forest reserves analysis has identified areas within the project area as valuable for carbon storage and biodiversity.

Questions about the Droughty Soils Index:
What are the assumptions and uncertainties in the droughty soils index model?
How has the model been validated?
How well does the model perform in areas of extreme topography and ecological mixing zones?
How does the model account local soil conditions such as multiple layers of soil types?
Is the ranking computed for the whole region together? In other words, is eastern Oregon essentially "downweighted" because of higher soil water capacity on the westside of Oregon?

8. Riparian Habitat Conservation Areas

I am concerned that proposed thinning in the outer half of the RHCA buffer will be overly aggressive. The language in the Proposed Action states that these areas will "more closely resemble upland thinning treatments." That statement opens the door to actions that are not sensitive to the RHCA.

I suggest hand crew treatments only in RHCA's. No heavy machinery.

In conclusion, let's be clear. Although thinning, fuels reduction, and restoration are claimed to be done to create resilient forests, there is no ecological justification for degrading remote, undeveloped, intact forestlands, building more roads, and causing the death of century old trees after cutting them to the point of becoming a rarity.

In these remote wild lands we need to safeguard the public domain by protecting these last crucial intact watersheds.

Thank you for reviewing these comments. Please contact me if you have any questions or would like to discuss further.

Respectfully submitted,

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