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November 7, 2023

Joseph Rausch, District Ranger
c/o Rachel Wirt Co-Project Lead
Cle Elum Ranger District
803 W. 2nd Street
Cle Elum, WA 98922

Dear Rachel:

On behalf of the American Forest Resource Council (AFRC) and its members, thank you for the opportunity to comment on the Upper Swauk Restoration Project.

AFRC is a regional trade association whose purpose is to advocate for sustained yield timber harvests on public timberlands throughout the West to enhance forest health and resistance to fire, insects, and disease. We do this by promoting active management to attain productive public forests, protect adjoining private forests, and assure community stability. We work to improve federal and state laws, regulations, policies, and decisions regarding access to and management of public forest lands and protection of all forest lands. Many of our members have their operations in communities within and adjacent to the Okanogan-Wenatchee National Forest and management on these lands ultimately dictates not only the viability of their businesses, but also the economic health of the communities themselves.

The Upper Swauk Project area is a combination of older projects that were being planned in and around the community of Liberty and along Highway 97 North of Ellensburg. Older projects that are now encompassed in Upper Swauk include the Wild Blew, Swauk Pine Restoration, Liberty Fuels, Iron Restoration, and Fawn thin. The Upper Swauk Pine Project encompasses 35,765 acres.

There is an overabundance of young dense multi-story forest stands departed from historical and future reference conditions (>55% of project area) and lack the structural diversity associated with intact ecosystem processes. The departure from more resilient landscape conditions makes these forest types vulnerable to the effects of a changing climate including drought stress, high risk of crown fire, and insect and disease occurrence. Nearly all the Upper Swauk project area is

within the Swauk Late-Successional Reserve (LSR).

AFRC has visited the project area on several occasions, and provided scoping comments for the Swauk Pine Project on April 6, 2016. AFRC staff and purchasers also met with the Forest Service to look at the developing Upper Swauk in October 2022.

AFRC strongly supports the Project and the Purpose and Need for Action which includes:

1. Reduce the risk of forest loss to severe wildfire by making forests more resilient to disturbance and restore historic disturbance regimes altered by past management and a changing climate.
2. Restore habitats to contribute to the recovery of threatened and endangered wildlife species and the viability of LSOF associated species.
3. Integrate aquatic and terrestrial restoration to restore watershed functions, restore native plant diversity, and build more resilient and sustainable ecosystems.
4. Improve riparian, stream, and upland processes influencing stream and watershed functioning and resiliency to contribute to the recovery of listed fish species and their critical habitats.

While AFRC supports the Project and the Purpose and Need, we offer the following suggestions that we feel will strengthen the planning document.

1. AFRC supports the District's decision to consolidate and streamline the public comment period due to the prolonged timeline of the Project. The Forest Service is combining scoping with the legal notice and opportunity to comment, as described in 36 CFR §218.24. This Project is part of the Central Washington Initiative which was one of the first 10 high risk wildfire areas designated nationwide. Treatments in these fire prone areas need to be conducted quickly.
2. While AFRC is glad to see the Cle Elum Ranger District proposing vegetation management on their LSR lands that will likely provide useful timber products to our membership, we are disappointed that providing wood for the local infrastructure was not one of your Purpose and Needs. Our members depend on a predictable and economical supply of timber products off Forest Service land to run their businesses and to provide useful wood products to the American public. This supply is important for present day needs but also important for needs in the future. This future need for timber products hinges on the types of treatments implemented by the Forest Service today. Of particular importance is how those treatments affect the long-term sustainability of the timber resources on Forest Service managed land. AFRC has voiced our concerns many times regarding the long-term sustainability of the timber supply on Forest Service land and how the current management paradigm is affecting this supply. While the treatments on the Upper Swauk Project are unlikely to directly address this long-term sustainability concern, they will likely provide short-term products for the local industry, and we want to ensure that this provision is an important consideration for the decision maker as the project progresses. As we will discuss later in this letter the importance of our members' ability to harvest and remove these timber products from the timber sales generated by

this project is paramount. We would like the Forest Service to recognize this importance by **adding economic viability and support to the local infrastructure to the purpose and need** of the Upper Swauk Project. Supporting local industry and providing useful raw materials to maintain a robust manufacturing sector should be a principal objective to any project proposed on Forest Service land, even those lands designated as LSR. As the Forest Service surely knows, the “restoration” treatments that are desired on these public lands cannot be implemented without a healthy forest products industry in place, both to complete the necessary work and to provide payments for the wood products generated to permit the service work to be completed. Furthermore, studies have shown that for each one million board feet of timber harvested 2-15 jobs are created.

3. AFRC is pleased to see that the District will implement commercial thinning on 9,023 acres and would help shift current dense homogenous stands and stands with insect or disease damage towards conditions that are more representative of historical forest spatial patterns. Other treatments include 4,459 acres of non-commercial maintenance thinning and 3,420 acres of preliminary non-commercial thinning. Additionally, there will be 8,584 acres treated outside of thinning units with prescribed fire. AFRC is pleased to see such a large footprint of active management, but the non-commercial work will be very costly and AFRC hopes the District will factor this in with an economic evaluation. One factor that could help the economics and that AFRC supports would be to harvest down to the lowest basal area allowed and in some cases that is 40 sq.ft. per acre.

AFRC and its members have previously discussed the need to bring extra funds to the Project above and beyond what could be generated by the value of the timber stumpage. The cost of the non-commercial fuels and thinning treatments will likely outweigh the value of the timber proposed for harvest. In such a scenario, AFRC would support the use of Integrated Resource Service Contracts (IRSC's) to maximize proposed non-commercial treatments. Also, the possibility of helicopter logging is noted in the Proposed Action. AFRC and our members support the idea of the Forest Service hiring a helicopter company under a service contract to yard and deck the timber to be followed by a sort sale of the decks.

4. Over a quarter century of monitoring has indicated that the implementation of the Northwest Forest Plan for the protection of the spotted owl has been a failure.¹ This latest report indicates that approximately 474,000 acres of suitable NSO habitat were destroyed by wildfire (that number has grown significantly following the 2020 Labor Day fires in western Oregon). The habitat for white-headed woodpecker has improved with all of the dead material falling and creating openings. Under the heading of Wildlife (function and pattern for recovery of listed species) the scoping notice states: *“There is a need to contribute to NSO recovery in support of the NSO Revised Recovery Plan (2011). The WDNR’s landscape evaluation identifies restoration opportunities to move landscape conditions towards historical and future reference conditions, which will make habitats more resistant and resilient to the ongoing and anticipated effects of a changing climate being magnified by more than a century of fire suppression.”*

¹ [pnw_gtr929.pdf \(usda.gov\)](https://www.pnw_gtr929.pdf)

From these needs, wildlife habitat restoration activities were designed to meet the following objectives:

- Promote NSO habitat in more sustainable locations and compartmentalize higher quality NSO habitat in less sustainable locations.
- Restore amount and patch size of open-canopy old forest habitat for white-headed woodpecker.

It is clear that the status quo level of management coupled with increasing populations of the barred owl is contributing to the decline of the spotted owl. What habitat remains is typically at high risk of high intensity wildfire. In some project areas such as the Upper Wenatchee Pilot Project on the westside of the Forest there are 16 historic owl sites. Recent inventory indicates that there now may be only one or two owl sites remaining in that area. Catastrophic wildfire, insects and disease and the lack of management have all contributed to the reduced numbers.

To supplement our concerns, the scoping notice states on pg. 64: *“An ecological catastrophe is unfolding in the dry forests of the Northwest Forest Plan area, and remaining green forests require swift and comprehensive action (Johnson, Franklin, and Reeves 2023, 366). The Upper Swauk Project Area quantitative risk rating for large wildfire is among the highest in the Pacific Northwest (Gilbertson-Day et al. 2018, 62).”*

5. Since almost all of the area in Upper Swauk is designated as LSR, treatments must be designed to accelerate the development of late-seral forest conditions or to protect existing late-seral forests from loss due to wildfire or insect & disease. To accomplish these outcomes, there is a need to remove trees over 80 years of age across the entire landscape of the Project. Further, the goal is to promote the development of ponderosa pine and western larch and shift dense stands to more open stands, which will require heavy removal in some cases of the dense understory of grand fir, Douglas-fir, lodgepole, and spruce. AFRC recommends thinning these stands to the lowest basal area permitted in the LSR. The photographs below of the area highlight the need for fuels reduction. Note the heavy understory fuels that need to be removed to protect the older fire-resistant species. AFRC was pleased to read in the document that: *“The proposed action meets land management direction for LSR, including previous guidance from the REO, and implements restoration actions identified in the Landscape Evaluation and Restoration Strategy. Habitat restoration and risk reduction identified in the Swauk LSRA would greatly enhance the sustainability and resiliency of LSR in the long-term.”*



6. There are a number of activities listed to improve watershed process, functions and recovery including the need to improve riparian, stream, and upland processes influencing stream and watershed function and resiliency. We are pleased that the District is looking at managing in the riparian areas. Criteria for management includes:
 - Outside no harvest buffers, thinning would occur, designed to retain $\geq 60\%$ average canopy cover, except on the uphill side of valley bottom roads in WUI, where canopy cover would be $\geq 40\%$. Equipment would be permitted to operate on the uphill side of the road in RRs, including inside and outside of WUI, where slopes are $< 35\%$.
 - In riparian treatment areas, retention of trees with diameters at breast height (DBH) of 25" or greater and all deciduous trees and shrubs is desired. All snags and logs greater than 20" DBH would be protected from disturbance during harvest operations, to the extent practicable. Retention clumps may be designated around snags to address safety concerns.

AFRC would like to point out that it has been well documented that thinning in riparian areas accelerates the stand's trajectory to produce large conifer trees and has minimal effect on stream temperature with adequate buffers. Removal of suppressed trees has an insignificant short-term effect on down wood, and ultimately a positive effect on long-term creation of large down woody debris and large in stream wood, which is what provides the real benefit to wildlife and stream health. We encourage the Forest Service to focus their riparian reserve treatments on a variety of native habitats. The ACS describes the need for treatments that meet the need of multiple habitat types and we encourage the Cle Elum District to look for ways to incorporate treatments that meet those needs. Utilization of gap cuts to promote early seral habitat in the reserves, treatments to diversify all areas of the reserve, and prescriptions that account for the full range of objectives that the ACS mandates should be considered.

The tradeoffs that the Forest Service will likely be considering through the ensuing environmental analysis will be between achieving these forest health benefits and potentially having adverse impacts to streams. These impacts to streams typically include stream temperature, wood recruitment, and sedimentation associated with active management. We would like the Forest Service to review the literature cited below and incorporate its findings into your environmental analysis that will shape the level of management permitted to occur in riparian reserves.

Stream temperature

Janisch, Jack E, Wondzell, Steven M., Ehinger, William J. 2012. Headwater stream temperature: Interpreting response after logging, with and without riparian buffers, Washington, USA. *Forest Ecology and Management*, 270, 302-313.

Key points of the Janisch paper include:

- The amount of canopy cover retained in the riparian buffer was not a strong explanatory variable to stream temperature.
- Very small headwater streams may be fundamentally different than many larger streams because factors other than shade from the overstory tree canopy can have sufficient influence on stream temperature.

Anderson P.D., Larson D.J., Chan, S.S. 2007 Riparian Buffer and Density Management Influences on Microclimate of Young Headwater Forests of Western Oregon. *Forest Science*, 53(2):254-269.

Key points of the Anderson paper include:

- With no-harvest buffers of 15 meters (49 feet), maximum air temperature above stream centers was less than one-degree Celsius greater than for unthinned stands.

Riparian reserve gaps

Warren, Dana R., Keeton, William S., Bechtold, Heather A., Rosi-Marshall, Emma J. 2013. Comparing streambed light availability and canopy cover in streams with old-growth versus early-mature riparian forests in western Oregon. *Aquatic Sciences* 75:547-558.

Key points of the Warren paper include:

- Canopy gaps were particularly important in creating variable light within and between reaches.
- Reaches with complex old growth riparian forests had frequent canopy gaps which led to greater stream light availability compared to adjacent reaches with simpler second-growth riparian forests.

Wood Recruitment

Burton, Julia I., Olson, Deanna H., and Puettmann, Klaus J. 2016. Effects of riparian buffer width on wood loading in headwater streams after repeated forest thinning. *Forest Ecology and Management*. 372 (2016) 247-257.

Key points of the Burton paper include:

- Wood volume in early stages of decay was higher in stream reaches with a narrow 6-meter buffer than in stream reaches with larger 15- and 70-meter buffers and in unthinned reference units.
- 82% of sourced wood in early stages of decay originated from within 15 meters of streams.

Sedimentation

Rashin, E., C. Clishe, A. Loch and J. Bell. 2006. Effectiveness of timber harvest practices for controlling sediment related water quality impacts. *Journal of the American Water Resources Association*. Paper No. 01162

Key points of the Rashin paper include:

- Vegetated buffers that are greater than 33 feet in width have been shown to be effective at trapping and storing sediment.

Dry Forests

Messier, Michael S., Shatford, Jeff P.A., and Hibbs, David E. 2011. Fire Exclusion effects on riparian forest dynamics in southwestern Oregon. *Forest Ecology and Management*. 264 (2012) 60-71.

Key points of the Messier paper include:

- Fire exclusion has altered the structure, composition, and successional trajectory of riparian forests in fire-prone landscapes.
- Fire exclusion has been associated with increase in tree density and recruitment of shade-tolerant species that may replace large diameter, more decay-resistant Douglas-fir trees.
- A hands-off management regime for these riparian forests will have ecologically undesirable consequences.

Collectively, we believe that this literature suggests that there exists a declining rate of returns for “protective” measures such as no-cut buffers beyond 30-40 feet. Resource values such as thermal regulation and coarse wood recruitment begin to diminish in scale as no-cut buffers become much larger. We believe that the benefits in forest health achieved through density management will greatly outweigh the potential minor tradeoffs in stream temperature and wood recruitment, based on this scientific literature. We urge the Forest Service to establish no-cut buffers along streams no larger than 40 feet and maximize forest health outcomes beyond this buffer.

7. AFRC supports the District’s plan to establish 57 miles of shaded fuel breaks. The shaded fuel breaks would be established using commercial and non-commercial thinning in designated areas to modify and manage wildfire, assist fire suppression in strategic locations, and act as control features for prescribed fire. To create the fuel breaks, thinning of trees of any size class may occur; however, the focus will be on thinning small and medium-sized trees <20 inches DBH. Commercial thinning, non-commercial thinning, mastication, or a combination of treatment methods would be utilized. Key

elements of the shaded fuel break prescriptions include the breaks being 1,000 ft. wide, with preferential leave trees being larger ponderosa pine and western larch.

8. AFRC does not support the use of arbitrary diameter limits as a tool to attain desired end results. We understand that the Forest Service is prioritizing the retention of old trees, however, diameter is often not a reliable indicator for age, given the range of forest types across any given project area. We urge the Forest Service to defer the use of diameter limits for implementation of this project and instead rely on desired end results to drive project treatments.
9. Regarding logging criteria under the Soil spec. 2-- Machinery will not be operated on continuous slopes greater than 35 percent. Exceptions to this can be made on slopes greater than 35 percent and less than 300 feet long where slope breaks above and below the steeper slopes become gentler due to ground terracing. Tractor winching to designated skid trails will be utilized on continuous slopes greater than 35 percent and greater than 300 feet long. Exceptions to this can be made for special situations if a soil specialist agrees and the exception and its rationale are documented in the Project analysis file. **AFRC believes there is latitude in those directions.** The primary issues affecting the ability of our members to feasibly deliver logs to their mills are firm operating restrictions. As stated above, we understand that the Forest Service must take necessary precautions to protect their resources; however, we believe that in many cases there are conditions that exist on the ground that are not in step with many of the restrictions described in Forest Service EA's and contracts (i.e. dry conditions during wet season, wet conditions during dry season). We would like the Forest Service to shift their methods for protecting resources from that of firm prescriptive restrictions to one that focuses on descriptive end-results; in other words, describe what you would like the end result to be rather than prescribing how to get there. There are a variety of operators that work in the Cle Elum market area with a variety of skills and equipment. Developing an EA and contract that firmly describes how any given unit shall be logged may inherently limit the abilities of certain operators. For example, restricting certain types of ground-based equipment rather than describing what condition the soils should be at the end of the contract period unnecessarily limits the ability of certain operators to complete a sale in an appropriate manner with the proper and cautious use of their equipment. To address this issue, we would like to see flexibility in the EA and contract to allow a variety of equipment to the sale areas. We feel that there are several ways to properly harvest any piece of ground, and certain restrictive language can limit some potential operators. Though some of the proposal area is planned for cable harvest, there are opportunities to use certain ground equipment such as fellerbunchers and processors in the units to make cable yarding more efficient. Allowing the use of processors and fellerbunchers throughout these units can greatly increase its economic viability, and in some cases decrease disturbance by decreasing the amount of cable corridors, reduce damage to the residual stand and provide a more even distribution of woody debris following harvest.

The effectiveness of harvesting and yarding low volume per acre on steep slopes is a significant obstacle to implementation. Tethered-assist logging is becoming a more economical, safe, and available method of yarding on steep slopes throughout the region.

The weight displacement provided by tethering allows tracked equipment to operate on steep ground with limited soil displacement or compaction. Standard psi levels for that tracked equipment are transferred to the tethering uphill. Other Forests in the Region have permitted this equipment to be used on Forest Service thinning stands on slopes up to 70%. **We appreciate the District's consideration of this equipment type and urge the Cle Elum District to consider allowing this equipment to be used where appropriate on the Upper Swauk project to mitigate implementation obstacles.**

Green, P. Q., Chung, W., Leshchinsky, B., Belart, F., Sessions, J., Fitzgerald, S. A., Wimer, J. A., Cushing, T., Garland, J. J. (2019). Insight into the productivity, cost and soil impacts of cable-assisted harvester-forwarder thinning in western Oregon. *For. Sci.* 66(1):82–96

Key Point of the Green paper includes:

- The use of cable assistance can reduce track coverage and reduce shear displacement, and thus likely lessen potential soil impact caused by forestry machines.

Garland, J., F. Belart, R. Crawford, W. Chung, T. Cushing, S. Fitzgerald, P. Green, *et al.* 2019. Safety in steep slope logging operations. *J. Agromedicine* 24(2):138–145.

Key Point of the Garland paper includes:

- Use of new tethered-assist technology reduces exposure to hazards and reduces workers exposed to the most dangerous work in logging—felling and working on cable operations on steep slopes.

10. Since the District is planning on just analyzing an Action and No Action Alternative, AFRC would like to see the District accurately describe the impacts of the No Action Alternative. Your data shows that in general, wildfires have increased in size, duration, and severity over the past 20 years. Wildfire risk has also increased due to accumulating fuels, a warming climate, and expanding development in the wildland-urban interface. The risk has reached crisis proportions in the West, calling for decisive action to reduce risk to communities as well as improve forest health and resilience to future wildfire events. Further, increased tree density and tree succession has resulted in a higher susceptibility to insects, disease, and drought as trees compete for sunlight, water, and nutrients. Past and on-going tree mortality is evident, which subsequently has resulted in an increase of hazardous fuels and higher risk of wildfire.
11. The Project calls for an aggressive plan of Road Decommissioning. Roads to be decommissioned would be fully rehabilitated by de-compacting and seeding the road surface, removing culverts, and installing waterbars to restore hydrologic function. Roads would be blocked (most often with a berm) to restrict all motorized use. Decommissioned roads are removed from the National Forest road system. Temporary roads used for commercial thinning and log haul would be decommissioned after use. The IDT identified 18 miles of system road for decommissioning, with another 17 miles of non-system roads, for a total of 35 miles.

AFRC would like to remind the District that an intact road system is critical to the

management of Forest Service land, particularly for the provision of timber products. Without an adequate road system, the Forest Service will be unable to offer and sell timber products to the local industry in an economical manner. The road decommissioning proposed in the Upper Swauk scoping notice likely represents a **permanent** removal of these roads and likely the deferral of management of those forest stands that they provide access to. The land base covered in the Upper Swauk project area are to be managed for a variety of forest management objectives. Removal of adequate access to these lands compromises the agency's ability to achieve these objectives and is very concerning to us.

Recommendations provided in the Road Management Plan will likely be a starting point for the District to consider road infrastructure needs. We would like the District to carefully consider the following three factors when deciding to decommission any road in the project area:

1. Determination of any potential resource risk related to a road segment.
2. Determination of the access value provided by a road segment.
3. Determination of whether the resource risk outweighs the access value (for timber management and other resource needs).

We believe that only those road segments where resource risk outweighs access value should be considered for decommissioning.

AFRC believes that a significant factor contributing to increased fire activity in the region is the decreasing road access to our federal lands. This factor is often overshadowed by both climate change and fuels accumulation when the topic of wildfire is discussed in public forums. However, we believe that a deteriorating road infrastructure has also significantly contributed to recent spikes in wildfires. This deterioration has been a result of both reduced funding for road maintenance and the federal agency's subsequent direction to reduce their overall road networks to align with this reduced funding. The outcome is a forested landscape that is increasingly inaccessible to fire suppression agencies due to road decommissioning and/or road abandonment. This inaccessibility complicates and delays the ability of firefighters to attack nascent fires quickly and directly. On the other hand, an intact and well-maintained road system would facilitate a scenario where firefighters can rapidly access fires and initiate direct attack in a more safe and effective manner.

If the Forest Service proposes to decommission, abandon, or obliterate road segments from the Upper Swauk planning area we would like to see the analysis consider potential adverse impacts to fire suppression efforts due to the reduced access caused by the reduction in the road network. We believe that this road network reduction would decrease access to wildland areas and hamper opportunities for firefighters to quickly respond and suppress fires. On the other hand, additional and improved roads will enable firefighters to have quicker and safer access to suppress any fires that are ignited.

12. There are 27 references to climate or microclimate in the Upper Swauk scoping

document. However, there is no real analysis of how this Project will be impacting climate, improving carbon sequestration, and how preventing fires and managing the Forest could lower CO₂ emissions into the atmosphere. We raise this point because several projects on other Forests have been litigated due to inadequate carbon and climate analysis.

AFRC strongly recommends that you take this opportunity to outline the positive results that treating these stands would have on carbon and climate change. By reducing wildfire threats, removing dead, and dying trees, and improving the growth and vigor of residual trees, the project will radically improve carbon sequestration in the long-term.

AFRC encourages the Forest to conduct a detailed analysis on the Project's impacts to climate change, carbon sequestration, and greenhouse gas emissions. Interim CEQ regulations pertaining to the analysis of this resource have recently been updated and the Forest Service must conduct its analysis on this Project accordingly. Specifically, those regulations require that greenhouse gas emissions be analyzed for all federal actions. Those regulations also encourage federal agencies to consider the context of short-term emissions as a result of actions that will improve long term sequestration and storage. We strongly believe that the minor, short-term emissions associated with timber harvest and other associated treatments are dwarfed by the long-term benefits associated with such treatments.

We urge the District to clearly outline how the proposed treatments, while possibly emitting carbon in the near term, would ultimately benefit climate change mitigation goals by 1.) reducing the likelihood of carbon emissions through wildfire; 2.) increasing the rate of carbon sequestration by reducing competition to residual trees; and 3.) storing carbon in long lasting wood products that would otherwise be at risk of loss through wildfire. Carbon loss through high intensity wildfire has become a leading cause of our national forests transitioning from carbon sinks to carbon sources. Active management to reduce such a transition would not only reduce carbon loss but accelerate carbon sequestration. And ultimately, any timber products harvested to further these two objectives has been shown to have long lasting carbon storage potential.

AFRC would like the Forest to bolster your information by conducting a detailed analysis on the Project's impacts to climate change and carbon sequestration. Our comments below should help inform this analysis.

Please consider the points below from a technical report by the Climate Change Vulnerability Assessment and Adaptation Project (SWOAP) in Southwest Oregon.

- Wood harvested from the forest, especially timber used for durable structures, can be reservoirs of long-term carbon storage (Bergman et al. 2014).
- Forests and their products embody a closed-loop system in which emissions associated with harvests and product use are eventually recovered as forests regrow.
- Although products may be retired in solid waste disposal sites, they decompose

- quite slowly, causing carbon to continue to be stored for many decades.
- Products derived from the harvest of timber from national forests reduce carbon emissions by substituting for more energy-intensive materials including concrete, steel, and plastics.

There is scientific support for the practice of regular harvests at an age where tree growth begins to slow, storage of that tree carbon in long-lasting wood products, and proactive reforestation. A failure to do so would hamper that acre's ability to maximize carbon sequestration through the replacement of slow growing large trees with fast growing small trees and the storage of those large trees in long-lasting wood products. Not storing that carbon in wood products also poses the risk of losing the carbon in standing trees from high intensity wildfire, which is becoming increasingly prevalent on public lands in western states. A 2022 study estimated that wildfires in California in 2020 emitted 127 million metric tons of carbon into the atmosphere, making the greenhouse gas (GHG) emissions from wildfires the second most important source in the state, after transportation. For context, the U.S. Forest Service recently disclosed that the agency only "commercially harvests one tenth of one percent of acres within the National Forest System each year. Harvests are designed to improve stand health and resilience by reducing forest density or removing trees damaged by insects or disease that make up 86 percent of those acres. The remainder are final regeneration harvests that are designed to be followed by reforestation." There is an extraordinary opportunity to increase the practice of sustainable forest management on federal lands as an effective tool to sequester carbon.

Harvesting trees and transferring the stored carbon to wood products allows a land manager to "stack" the sequestration potential of that land. For example, assume an objective to maximize carbon sequestration on 100 acres over a 150-year period starting at year zero. Without active management and timber harvest, those trees would grow to 150 years and represent the only carbon sequestered on those 100 acres at the end of the 150-year cycle (assuming they don't burn in a wildfire). Alternatively, the trees could be harvested on a 50-year rotation and stored in wood products. After 150 years, there would be carbon stored in an existing 50-year-old stand, plus carbon stored in wood products from an additional two 50-year-old stands previously harvested. The figure below from the IPCC (2007) illustrates the concept of stacking. **Please consider adopting this graph into the Upper Swauk Project analysis.**

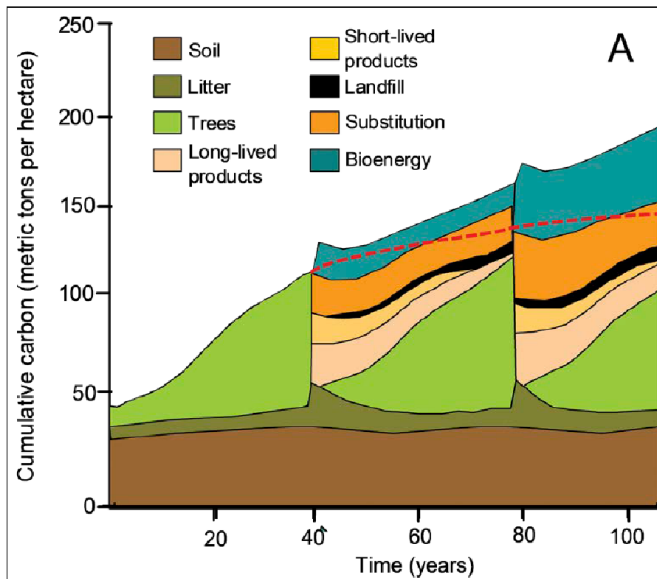


Figure 8.7—Carbon balance from a hypothetical forest management project in which the forest is harvested roughly every 40 years from land that started with low forest carbon stocks. This figure accounts for forest regrowth and carbon stored in wood products in use and landfills as well as the prevented release of fossil fuel carbon (also counted as stored carbon) via product substitution and biomass energy. It illustrates how forests can continue to accrue carbon over time with forest management. Figure is from McKinley et al. (2011) and adapted from IPCC (2007).

We believe that this graph encapsulates the forest management paradigm that would be most effective at maximizing carbon sequestration on a per-acre basis by “stacking” storage in wood products and regrowth of newly planted trees. A 2013 study from the *Journal of Sustainable Forestry* summarized these concepts well: *More CO₂ can be sequestered synergistically in the products or wood energy and landscape together than in the unharvested landscape. Harvesting sustainably at an optimum stand age will sequester more carbon in the combined products, wood energy, and forest than harvesting sustainably at other ages.*

We would like to encourage the Okanogan-Wenatchee National Forest to consider several additional documents related to carbon sequestration related to forest management.

McCauley, Lisa A., Robles, Marcos D., Wooley, Travis, Marshall, Robert M., Kretchun, Alec, Gori, David F. 2019. Large-scale forest restoration stabilizes carbon under climate change in Southwest United States. *Ecological Applications*, 0(0), 2019, e01979.

Key points of the McCauley paper include:

- Modeling scenarios showed early decreases in ecosystem carbon due to initial thinning/prescribed fire treatments, but total ecosystem carbon increased by 9–18% when compared to no harvest by the end of the simulation.
- This modeled scenario of increased carbon storage equated to the removal of carbon emissions from 55,000 to 110,000 passenger vehicles per year until the end of the century.
- Results demonstrated that large-scale forest restoration can increase the potential for carbon storage and stability and those benefits could increase as the pace of restoration accelerates.

We believe that this study supports the notion that timber harvest and fuels reduction practices collectively increase the overall carbon sequestration capability of any given

acre of forest land and, in the long term, generate net benefits toward climate change mitigation.

Gray, A. N., T. R. Whittier, and M. E. Harmon. 2016. Carbon stocks and accumulation rates in Pacific Northwest forests: role of stand age, plant community, and productivity. *Ecosphere* 7(1):e01224. 10.1002/ecs2.1224

Key points of the Gray paper include:

- Although large trees accumulated C at a faster rate than small trees on an individual basis, their contribution to C accumulation rates was smaller on an area basis, and their importance relative to small trees declined in older stands compared to younger stands.
- Old-growth and large trees are important C stocks, but they play a minor role in additional C accumulation.

We believe that this study supports the notion that, if the role of forests in the fight against climate change is to reduce global greenhouse gasses through maximizing the sequestration of carbon from atmospheric CO₂, then increasing the acreage of young, fast growing small trees is the most prudent management approach.

U.S. Department of Agriculture, Forest Service. 2023. Future of America's Forest and Rangelands: Forest Service 2020 Resources Planning Act Assessment. Gen. Tech. Rep. WO-102. Washington, DC. 348 p. <https://doi.org/10.2737/WO-GTR-102>.

To further support the concepts validated by Gray et al., the USDA recently published a Technical Report on the future of America's forests and rangelands.

Key points of the Report include:

- The projected decrease in young forests and increase in older forests will result in overall decreases in growth rates and carbon sequestration.
- The amount of carbon sequestered by forests is projected to decline between 2020 and 2070 under all scenarios, with the forest ecosystem projected to be a net source of carbon in 2070.
- Without active management, significant disturbance, and land use change, forests approach a steady state in terms of C stock change over time.
- Annual carbon sequestration is projected to decrease, indicating carbon saturation of U.S. forests, due in part to forest aging and senescence.

Gustavsson, L., Madlener, R., Hoen, H.-F., Jungmeier, G., Karjalainen, T., Klöhn, S., ... Spelter, H. (2006). The Role of Wood Material for Greenhouse Gas Mitigation. *Mitigation and Adaptation Strategies for Global Change*, 11(5–6), 1097–1127.

Lipke, B., Oneil, E., Harrison, R., Skog, K., Gustavsson, L., Sathre, R. 2011 Life cycle impacts of forest management and wood utilization on carbon mitigation: knowns and unknowns, *Carbon Management*, 2:3, 303-333.

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In the absence of commercial thinning, the forest where this proposed action would take place would thin naturally from mortality-inducing natural disturbances and other processes resulting in dead trees that would decay over time, emitting carbon to the atmosphere. Conversely, the wood and fiber removed from the forest in this proposed action would be transferred to the wood products sector for a variety of uses, each of which has different effects on carbon (Skog et al. 2014). Carbon can be stored in wood products for a variable length of time, depending on the commodity produced. It can also be burned to produce heat or electrical energy or converted to liquid transportation fuels and chemicals that would otherwise come from fossil fuels. In addition, a substitution effect occurs when wood products are used in place of other products that emit more GHGs in manufacturing, such as concrete and steel (Gustavasson et al. 2006, Lippke et al. 2011, and McKinley et al. 2011). In fact, removing carbon from forests for human use can result in a lower net contribution of GHGs to the atmosphere than if the forest were not managed (McKinley et al. 2011, Bergman et al. 2014, and Skog et al. 2014). The IPCC recognizes wood and fiber as a renewable resource that can provide lasting climate-related mitigation benefits that can increase over time with active management (IPCC 2000). Furthermore, by reducing stand density, the proposed action may also reduce the risk of more severe disturbances, such as insect and disease outbreak and severe wildfires, which may result in lower forest carbon stocks and greater GHG emissions.

In addition to this study, a recent report by the Forest Service titled: [USDA: Forests Converting to Carbon Emitters](#) finds American forests may convert from being carbon absorbers to significant carbon emitters. Researchers say the shift is due to the increasing destruction from natural disasters and the aging of forests, which is reducing their carbon-absorbing capabilities.

Our forests currently absorb 11 percent of U.S carbon emissions, or 150 million metric tons of carbon a year, equivalent to the combined emissions from 40 coal power plants. However, starting in 2025, their ability to hold carbon may start plummeting and could emit up to 100 million metric tons of carbon a year as their emissions from decaying trees exceed their carbon absorption.

Below are several links that show the value of managing the Forest for the benefit of carbon and sequestration of wood into forest products.

- Carbon Sequestration in Wood and Paper Products
Kenneth E. Skog, USDA Forest Service, Forest Products laboratory
[Sequestration of carbon in harvested wood products for the United States \(usda.gov\)](#)
- An Assessment of Carbon Pools, Storage, and wood Projects Market Substitution Using Life-cycle Analysis Results
John Perez Garcis, Bruce Lippke

- Investments in Fuel Removals to Avoid Forest Fires Result in Substantial Benefits
C. Larry Mason, Bruce R. Lippke, et. al
[Investments in Fuel Removals to Avoid Forest Fires Result in Substantial Benefits | Journal of Forestry | Oxford Academic \(oup.com\)](#)
- Using Wood Products to Reduce Greenhouse Gases
Jim Wilson, Corrim Inc.
[Using Wood Products to Reduce Global Warming \(corrim.org\)](#)
- To Manage or not to Manage: The Role of Silviculture in Sequestering Carbon in the Specter of Climate Change
Jianwei Zhang*, Robert F. Powers, and Carl N. Skinner
[Integrated management of carbon sequestration and biomass utilization opportunities in a changing climate: Proceedings of the 2009 National Silviculture Workshop; 2009 June 15-18; Boise, ID \(usda.gov\)](#)
- Managing Forests because Carbon Matters: Integrating Energy, Products, and Land Management Policy
Robert W. Malmshiemer, James L. Bowyer et. al.
[Managing forests because carbon matters: integrating energy, products, and land management policy | US Forest Service Research and Development \(usda.gov\)](#)
- Carbon, Fossil Fuel, and Biodiversity Mitigation With Wood and Forests
Chadwick Oliver, Brice R. Lippke et.al.
[Full article: Carbon, Fossil Fuel, and Biodiversity Mitigation With Wood and Forests \(tandfonline.com\)](#)
- Science Supporting Harvested Wood Products as a Carbon Negative Technology.
Dr. Arijit Sinha, et. al.
[CORRIM-scientists-letter-all-recipients-Dec-9-2020.pdf \(healthyforests.org\)](#)

Thank you for the opportunity to provide scoping comments for the Upper Swauk Restoration Project. We look forward to this Project moving quickly into the Objection phase.

Sincerely,



Tom Partin
AFRC Consultant
921 SW Cheltenham Street
Portland, Oregon 97239