



**VIA Link: <https://cara.fs2c.usda.gov/Public/CommentInput?project=63933>**

May 13, 2023

Meg Trebon, Midnight Restoration Project Leader  
Methow Valley Ranger District  
24 West Chewuch Road  
Winthrop, WA 98862

Dear Meg:

On behalf of the American Forest Resource Council (AFRC) and its members, thank you for the opportunity to provide scoping comments for the Midnight 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.

AFRC staff and members have been closely tracking the development of the Midnight Restoration Project which was initially part of the 77,000-acre Twisp Restoration Project introduced in November 2019. The Twisp Project underwent extensive survey, analysis, public engagement, and modification prior to July 2021, when the Cedar Creek fire burned into portions of the project area. In fact, AFRC has participated in several field trips to the area and has subsequently sent in letters of support for the 24,000-acre scaled back Twisp Project which moved forward treating only matrix unburned lands following the Cedar Creek fire. The District determined that the subwatersheds affected by the Cedar Creek fire and related suppression actions needed to be reassessed to evaluate treatment needs and actions and dropped 53,009 acres from the original Twisp project which is now the Midnight Restoration Area.

A landscape evaluation of the area was completed by Resilient Forestry. The landscape evaluation found that the Project area is currently departed from conditions that would be resilient to disturbance and climate change. Landscape-level assessments show that current departures in forest structure, spatial patterns, and fuel loads favor larger, more severe disturbances relative to historical baselines and hinder adaptation to climate change. Restoration toward desired conditions would promote a resilient landscape, help protect key resources, and reduce risks to communities, forest visitors, and wildland firefighters, while also providing an opportunity to involve the community and increase local economic well-being.

The two pictures below show the dense stands of timber in the Midnight Project area ripe for catastrophic wildfire.



With this background, AFRC supports the Purpose and Needs for the Midnight Project moving forward which are:

- Move current vegetation structure, spatial patterns, and composition toward desired reference conditions.
- Protect and maintain wildlife habitat and complex forest in strategic places.
- Provide an affordable, safe, and efficient transportation system and reduce sedimentation from roads on National Forest System lands.
- Reduce fire risk to communities, reduce hazards along ingress/egress routes and improve firefighting effectiveness within and adjacent to Wildland/Urban Interface.

While AFRC supports the Purpose and Need for the Midnight Restoration Project, we offer the following information and comments that we hope will be incorporated into your plan to make it better.

1. AFRC is glad to see the Methow Valley Ranger District proposing vegetation management on their Matrix, Riparian Reserve, and Late Successional Reserve (LSR) lands that will likely provide useful timber products to our membership. 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. Lands designated as Matrix are the only lands where our members can depend on a sustainable supply of timber products, as timber outputs on lands designated as reserves are merely a “byproduct.” Therefore, we would like the Methow Valley District to recognize the importance of this supply by **including the provision of timber products into the Midnight Restoration Project’s Purpose & Need.** It is important to AFRC that this provision is recognized by the Forest Service as a valued objective on Matrix land, and not simply a byproduct as it is on LSR land. AFRC believes that the Forest Service should take pride in the fact that they provide a crucial renewable resource to the public that they serve. We understand that every treatment proposed on this project will likely be designed to meet numerous objectives, but why can’t one of those objectives, particularly on lands designated as Matrix, be the provision of timber products? Furthermore, while there is no milling infrastructure located in the immediate area, current interest in the Twisp and Mission timber sales on the District point out how important timber volume is from the Methow Valley District.

Technical reports from 2010 and 2012 completed for the Forest Service determined, among other things, that:

- The forest products sector helps sustain the social, economic, and ecological benefits of forestry in the United States.
- Product revenues sustain economic benefits that include jobs and income.

- Ecological and social benefits can be supported by timber revenue to landowners that help keep land in forests and by forest treatments that can help maintain ecological functions.
- Wood products fulfill fundamental needs per capita and have remained competitive with alternate means of meeting those needs.
- US lumber production and demand is expected to increase through 2040.

Furthermore, 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 off this project is paramount. We would like the Forest Service to recognize this importance by **adding economic viability & support to the local infrastructure to the purpose and need** of the Midnight Restoration 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, particularly those lands designated as Matrix. Studies have shown that for every 1 mmbf of timber harvested, about 12 direct and indirect jobs will be created. 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.

2. AFRC strongly supports the District seeking approval to do forest health treatments in the LSR stands over 80 years of age. As pointed out, large patches of dense forests have developed across the landscape and many of these stands are over 80 years of age but still of a small dbh size. To accomplish the goal of promoting larger fire-resistant trees and healthy forests for the future, these smaller trees over 80 years of age need to be thinned out.

Further pointing out the need for treating stands in LSR areas over 80 years is the fact that high-quality nesting and roosting habitat for the northern spotted owl is sparse within the project area, occurring almost exclusively in forests that are highly departed from sustainable conditions. To support the northern spotted owl, there is a need to retain the existing complex forest structure in these small but unsustainable areas. The only way to protect these areas from fire is by reducing fuels and creating resilient structure in the surrounding forest. Since almost all current high-quality habitat exists in locations that are not environmentally suitable for dense forest over the long term, there is also a need to maintain and create dense, complex forests as replacement habitat in locations that will continue to support it as the climate changes.

3. The 2012 Restoration Strategy document highlights the importance of managing forests in an adaptive manner. Page 73 states that "The OWNF should create a culture that enables an adaptive approach to ecosystem restoration." We agree with this approach and are concerned with several of the project design features that foster a non-adaptive approach to ecosystem restoration. In particular, we believe the numerous diameter limitations identified in the project proposal run counter to the spirit of adaptive management. Arbitrary diameter limits applied to such a vast area of diverse forest types completely diminish the Forest Service's ability to develop adaptive silvicultural prescriptions to meet the project's purpose and need. According to the project proposal,

diameter limitations of both 21 and 25 inches will be applied to all land allocations. Furthermore, the best available science does not support the use of diameter limits. The Forest Service's recent Plan Amendment EA for Eastern Oregon based its decision to remove the antiquated "21-inch standard" after review of 186 scientific documents related to dry forest management. **AFRC strongly requests that the Forest Service either remove these arbitrary diameter limits or develop an alternative free of these limitations.**

4. The 2021 Cedar Creek Fire and 2018 Crescent Creek Fire are only two of the many large landscape fires that have burned in the Methow Valley District. In fact, the Midnight Project area has been described as a green donut surrounded by landscapes impacted by stand replacement fires. Without restoration treatments more large fires are sure to occur threatening adjacent property and lives in the Wildland Urban Interface (WUI). With this in mind, AFRC encourages the District to treat as many acres as possible in the WUI and to thin trees to wide spacing in the WUI and leave only about 40 sq.ft. of basal area in the treatment areas. This will allow for adequate fire protection and will also increase the vigor of the remaining trees hence making them develop more rapidly into an overstory state.
5. The Plan highlights the need to reduce hazards along ingress/egress routes and improve firefighting effectiveness within and adjacent to Wildland/Urban Interface. As pointed out in the assessment, there are a large number of danger trees and unhealthy trees along most of the major routes within the area. AFRC strongly recommends performing shaded fuel breaks along these major roads to not only remove the danger trees but provide anchor points for containment fire lines should a large fire start. AFRC suggests treating 300 ft. on each side of the major ingress and egress roads into the project area for public safety. AFRC also would support shaded fuel breaks along major ridge lines as a precautionary move for slowing or stopping future wildfires.
6. The landscape evaluation found that there is a need to remove conifers to restore riparian forest overstory and understory composition and reduce fuel loads to mediate fire delivery to and behavior in riparian corridors. Treatments addressing these needs would help protect aquatic systems, maintain, and restore the species composition and structural diversity of plant communities in riparian areas, and maintain and restore habitat to support well-distributed populations of riparian-dependent species, consistent with the Aquatic Conservation Strategy (ACS) objectives in the NWFP.

With this in mind, 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 Methow Valley 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. We would like the District to recognize that one of the primary issues affecting the ability of our members to feasibly deliver logs to their mills is 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 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 Okanogan-Wenatchee market area with a variety of skills and equipment. Developing this EA 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. Please prepare your NEPA analysis documents in a manner that will facilitate flexibility in the use of various types of equipment. AFRC believes that with some of the lighter touch logging methods as mentioned above, the impacts could even be less than those analyzed.

We appreciate seeing the recognition of tethered-assist equipment in the project proposal. 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.

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 include:

- 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 include:

- 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.

Finally, AFRC would like the Forest to examine the days that operations and haul are shut down due to hunting seasons and other outdoor recreation. The logging community has limited operating time at best, and further reductions such as these only makes surviving in the logging business that much more difficult.

We appreciate the consideration for year-round harvest operations. However, we are a bit confused with the following design feature: *Overstory thinning in most Riparian Reserves may only occur in the winter months to protect soil resources unless the purchaser can provide a plan of operations that provides for the same level of soil protection as winter operations. If Forest Service staff approve such operating plans, harvest in designated Riparian Reserves may occur outside of winter months.*

Riparian areas are typically components of larger harvest units that include non-riparian areas. To reduce impacts to the ground and maintain economic viability, operators typically harvest entire units during a single entry. For example, it would be illogical to harvest  $\frac{3}{4}$  of a unit in January, move out of the unit, and then come back in July to harvest the remaining  $\frac{1}{4}$ . Therefore, the Forest Service should be aware that seasonal restrictions on riparian portions of those units essentially equate to seasonal restrictions on the entire unit.

8. AFRC supports the District in requesting a Forest Plan Amendment to treat old growth units. To accomplish this, two Forest-Wide Standards and Guidelines would need to be amended.

S&G 5-1: No scheduled or non-scheduled timber harvest or firewood collection shall be permitted in mixed conifer old growth stands [as defined in final Forest Plan EIS, Glossary];

S&G 19-8: Treatment of natural fuels shall be prohibited in identified old growth stands.

Support for the treatments is based on a review of new science since the 1989 Forest Plan finding that thinning by harvest and non-commercial prescriptions and treating natural fuels with prescribed fire helps reduce the potential for stand-replacing fires that would

otherwise cause long-term damage to FPOG. These amendments would allow understory commercial and non-commercial thinning and prescribed burning (including future maintenance burning) to reduce the likelihood of this type of fire behavior, thereby maintaining these key features in the project area.

9. AFRC supports a Forest Plan Amendment to allow treatments that would reduce deer winter range cover while promoting forage that is much needed for winter survival. Since the Forest Plan was written, new science has revealed that thermal cover is not as critical as forage quality and quantity for winter survival of deer; forage quality and quantity has declined in the project area as forested stands have become denser. In addition, areas of winter range cover in the project area historically contained fewer trees with less canopy closure than currently exists, with lower risk of uncharacteristic crown fire behavior and less vulnerability to insect outbreaks. Further research has determined that the amount of cover needed by deer in the winter is far less than currently specified in the Forest Plan. These amendments would allow treatments that reduce deer winter cover as defined in the Forest plan, promote more forage, and help restore vegetation composition and arrangement to patterns similar to the historic range of variability. These conditions would also help minimize wildfire hazard within and adjacent to the Wildland Urban Interface.
10. AFRC supports the Project being planned in part with condition based NEPA. This proposal includes pre-identified specific treatment locations in Riparian Reserves, LSR, Inventoried Roadless Area, Forest Plan Old Growth, and wherever fuel breaks are proposed. On about 25% of the project area outside of these locations, the proposed action includes a condition-based management approach to allow for responsiveness and flexibility between planning and implementation on a landscape that is subject to rapid environmental changes. AFRC believes this flexibility is needed for timeliness and accuracy of future treatments.
11. AFRC has mixed feelings about thinning up to 4,100 acres of small diameter stands within the Sawtooth Inventoried Roadless Area. This was a very controversial subject in the Twisp EA and there are groups that very strongly oppose this treatment. We also question investing the money into these thinnings when no merchantable material and value would ever be captured. Finally precommercially thinning this many acres will be very expensive and it's doubtful that money will come from timber receipts. If the Forest Service does move forward with these treatments, we urge you to develop thinning prescriptions that would maintain future commercial thinning opportunities. Currently, nearly all of the timber volume provided by the Forest Service is done through the thinning of mid-seral forests. Precommercial thinning treatments that remove too much density could forego those opportunities.
12. AFRC agrees with the District's assessment on climate change that points out areas most suitable for each forest type are shifting due to drought and disturbance associated with the changing climate. By 2055, over a third of dry forest in the Project area is expected to experience levels of drought stress that are currently seen only in habitats that are too dry to support forest. Similarly, three-quarters of the moist and transitional forest is expected to experience levels of drought that are currently characteristic of dry forest. When

environmental conditions change, a forest can experience low vigor, low resistance to disturbance, and increased mortality. There is a need to anticipate these forest type shifts and re-align vegetation with its environment to improve climate change resilience.

We would like the Forest to supplement their carbon analysis in the EA by considering 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.

Please see the graph below from the IPCC (2007) that captures the ability of forests to “stack” carbon sequestration and storage through continual harvests.

**Please consider adopting the graph below into the Midnight Restoration project analysis.**

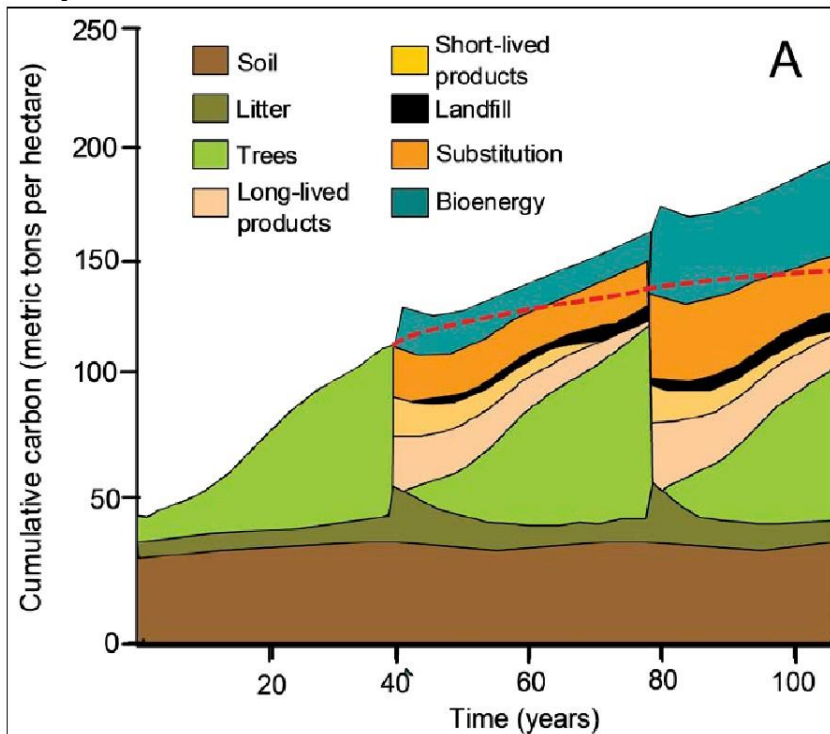


Figure 8.7—Carbon balance from a hypothetical forest management project in which the forest is harvested roughly every 40 years from land that started with low forest carbon stocks. This figure accounts for forest regrowth and carbon stored in wood products in use and landfills as well as the prevented 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.

We would like to encourage the District to consider several 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 CO<sub>2</sub>, then increasing the acreage of young, fast growing small trees is the most prudent management approach.

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.

Lippke, 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.

McKinley, D.C., Ryan, M.G., Birdsey, R.A., Giardina, C.P., Harmon, M.E., Heath, L.S., Houghton, R.A., Jackson, R.B., Morrison, J.F., Murray, B.C., Pataki, D.E., Skog, K.E. 2011. A synthesis of current knowledge on forests and carbon storage in the United States. Ecological Applications. 21(6): 1902-1924.

Skog, K.E., McKinley, D.C., Birdsey, R.A., Hines, S.J., Woodall, C.W., Reinhardt, E.D., Vose, J.M. 2014. Chapter 7: Managing Carbon. In: Climate Change and United States Forests, Advances in Global Change Research 57 2014; pp. 151-182.

AFRC believes that 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 (Gustavsson 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.

Thank you for the opportunity to provide scoping comments on the Midnight Restoration Project. We look forward to having some of our suggestions put into the Draft EA.

Sincerely,



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