VIA: https://www.fs.usda.gov/project/?project=63754

April 29, 2024

Madison Ranger District
Tobacco Roots Vegetation Management Project
Attn: Dale Olson
5 Forest Service Road
Ennis, MT 59729

Dear Dale:

On behalf of the American Forest Resource Council (AFRC) and its members, thank you for the opportunity to comment on the South Tobacco Roots Vegetation Management 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 Beaverhead-Deerlodge 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 South Tobacco Roots Project area encompasses about 31,354 acres in the southern Tobacco Roots Landscape, approximately 4.5 miles east of Sheridan, 5.5 miles west of McAllister, 6.7 miles northwest of Ennis, and 7.7 miles north of Virginia City, Montana. There are many factors driving the need to treat this landscape including heavy fuel loadings, insects and disease and the fact that the entire Project area is within the Madison County Community Wildfire Protection Plan that was developed in 2014. Also, portions of the project area meet the definition of Wildland Urban Interface (WUI) under 16 USC 6511(16)(b) based on proximity to at-risk communities and evacuation routes.

With this background, AFRC supports the Needs outlined for the Project which include:

- Need to reduce wildfire risk.

- Need to manage timber stands.
- Need to manage transportation.

AFRC understands the Forest's approach of publishing a Draft EA in the absence of a formal scoping period due to the extensive public outreach effort from the District. This includes letters sent to interested and affected stakeholders beginning in March 2023 followed by a field trip on July 27, 2023, which was attended by AFRC members.

While AFRC supports the Need for the Project and the efficient NEPA, we offer the following suggestions that we hope will improve and strengthen the document.

1. While the District lists the Need to manage timber stands, we believe that providing raw materials to the local infrastructure should be one of the needs as well. These forest health treatments can't be accomplished without a healthy and robust sawmilling infrastructure. In the past few years, we have lost sawmills in Townsend, Seeley Lake, and a panel facility in Missoula. The Forest should be aware of these losses and strive to keep the existing facilities intact.

   The timber products provided by the Forest Service are crucial to the health of our membership. Without the raw material sold by the Forest Service these mills would be unable to produce the amount of wood products that the citizens of this country demand. Specifically, studies in Montana have shown that 12-15 direct and indirect jobs are created for every one million board feet of timber harvested. Without this material, our members would also be unable to run their mills at capacities that keep their employees working, which is crucial to the health of the communities that they operate in. These benefits can only be realized if the Forest Service sells their timber products through sales that are economically viable. This viability is tied to both the volume and type of timber products sold and the way these products are permitted to be delivered from the forest to the mills.

   Additionally, Montana's forest products industry is one of the largest components of manufacturing in the state and employs roughly 7,000 workers earning about $300 million annually. Much of the industry is centered in western Montana, and this Project is crucial to the infrastructure located in and around the Beaverhead-Deerlodge National Forest. Harvesting 2,711 acres commercially will help to keep this infrastructure viable.

   Further, AFRC 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 future needs. This future need for timber products hinges on the types of treatments implemented by the Forest Service today. Of importance is how those treatments affect the long-term sustainability of the timber resources on Forest Service managed land. Not managing the maximum number of acres today will impact the ability to produce the timber needed in the future.

2. While AFRC appreciates the District commercially harvesting 2,711, we wonder if more acres might be treated to lessen the risk of wildfires. We would like the District to review and consider a new study published by Johnston et al that focuses on the benefits of mechanical thinning in regards to wildfire mitigation.

Johnston, James D., Olszewski, Julia H., Miller, Becky A., Schmidt, Micah R., Vernon, Michael J., Ellsworth, Lisa M. Mechanical thinning without prescribed fire moderates wildfire behavior in an Eastern Oregon, USA ponderosa pine forest. *Forestry and Ecology*. 501 (2021) 119674

Key points of the Johnston paper include:

- Mechanical thinning can moderate fire behavior in the absence of prescribed fire.
- Modeled crown fire potential declined immediately following thinning, undoubtedly due to significant reductions of ladder fuels that carry fire into the crown and crown density that facilitates spread between crowns.
- Increase in surface fuel and modeled fire behavior was offset by a steady decline in litter and a dramatic decline in duff over time
- Fuel loading in a dry ponderosa pine forest increased for a year or two after thinning and then declined.
- Woody fuel particles increased somewhat following thinning but litter and duff fuel loading declined dramatically as a result of thinning.

Furthermore, the following studies should also be incorporated to illustrate the scientifically proven benefits of thinning and density reduction treatments.

Van Mantgem, P.J., Falk, D.A., Williams, E.C., Das, A.J. and Stephenson, N.L. 2018. Pre-fire drought and competition mediate post-fire conifer mortality in western U.S. National Parks. Ecological Applications, 28(7), 1730-1739.

- Thinning treatments can improve forest resistance to wildfire.

Fettig, C.J., Klepzig, K.D., Billings, R.F., Munson, A.S., Nebeker, T.E., Negrón, J.F. and Nowak, J.T. 2007. The effectiveness of vegetation management practices for prevention and control of bark beetle infestations in coniferous forests of the western and southern United States. Forest Ecology and Management 238, 24-53.

- Factors involving tree density are consistently associated with the occurrence and severity of bark beetle infestations. Management to reduce stand or landscape-level susceptibility to bark beetles must address factors related to tree density.
- Thinning's effectiveness as a preventative measure to reduce the amount of bark beetle caused tree mortality is supported by the scientific literature.

Hood, S.E. 2017. Radial and stand-level thinning treatments; 15-year growth response of legacy ponderosa and Jeffrey pine trees. Restoration Ecology, 1-7.

- Shade-intolerant old trees can respond to density-reduction treatments. Stand thinning caused an immediate, sustained increase in BAI compared to radial thinning and unthinned stands in large, old ponderosa and Jeffrey pines.

- Thinning seemed to mitigate the effects of extreme drought conditions that occurred the year after treatment, such that growth reductions were much less than the control and radial thinning trees.

Bradford JB, Bell DM (2017) A window of opportunity for climate-change adaptation: easing tree mortality by reducing forest basal area. Frontiers in Ecology and the Environment 15:11–17

- Reducing forest basal area can decrease tree competition, which may reduce drought-induced tree mortality.

Latham, P. and Tappeiner, J. 2002. Response of old-growth conifers to reduction in stand density in western Oregon forests. Tree Physiology 22, 137-146.

- Cutting trees to reduce density in old-growth stands or to modify the amount and distribution of fuels can be beneficial to residual large old-growth trees.
- Reduction of stand density around individual trees with full crowns is likely to increase the basal area growth of a high proportion of the trees for several decades.

McDowell, N., Brooks, J. R., Fitzgerald, S. A. and Bond, B. J., 2003. Carbon isotope discrimination and growth response of old Pinus ponderosa trees to stand density reductions. Plant, Cell & Environment, 26: 631–644. doi: 10.1046/j.1365-3040.2003. 00999.x

- The growth and physiology of old ponderosa pine trees are responsive to stand density reductions and have the potential to increase growth dramatically after these reductions.

3. AFRC believes the District should strengthen the analysis of the No Action Alternative. For example, the document states that:

    a. *The no action alternative would have no measurable effect to project area streams analyzed from vegetation treatment, new road, or temporary road because these actions would not occur. Conifer encroachment in riparian areas would continue to degrade riparian conditions. Canopy cover would not change from timber harvest activities, there would be no effect to water yield from canopy cover.*
    b. *The no action alternative would trend vegetation conditions in the same direction as their current trajectory.*
    c. *No action would trend conditions to higher amounts of surface fuels, lower canopy base heights, and higher percent canopy cover; however, changes affecting fire behavior at a large scale would be minimal due to slow vegetative growth and associated impacts to fuel amount and arrangement.*

    With the catastrophic wildfire history and ongoing risk in the area, the District should consider the likely effects of fire impacts to the untreated stands in the No-Action alternative. The picture below is from the Trails Fire that was on the Beaverhead-Deerlodge National Forest near Wisdom that burned in 2021. The same catastrophic damage that occurred in this fire should be pointed out in all of your No Action Assessments.

The District needs to consider the impacts to riparian areas, vegetation, fuels, scenic, wildlife and other resources when fires like this burn across the untreated landscape.

4. The primary issue 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 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 Beaverhead-Deerlodge 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 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. Tethered-assist equipment is also becoming a more safe, viable, and available option for felling and yarding on steep slopes. This equipment has been shown to contribute little additional ground disturbance when compared to traditional cable systems. Please prepare your NEPA analysis documents in a manner that will facilitate this type of equipment.

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

A key point of the Green paper includes:

- The use of cable assistance can reduce track coverage and reduce shear displacement, and thus 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.

A 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.

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.

5. AFRC supports the District's plan to create seven openings larger than 40 acres totaling 424 acres. These larger openings are needed to address forest health problems. Lodgepole pine dwarf mistletoe is the primary reason for creating openings greater than 40 acres. AFRC also supports the Forest requesting approval from the Regional Forester for this work to take place.

6. As described above, the Project location is in proximity to at-risk communities and evacuation routes. AFRC believes that the District should plan shaded fuel breaks along all major evacuation routes. The shaded fuel breaks should be a minimum of 200 feet

wide on each side of the roads. Basal area in these fuel breaks should be reduced to 40 sq. ft. per acre.

7. AFRC is concerned that the carbon assessment in the EA is insufficient in meeting the interim CEQ regulations pertaining to the analysis of this resource. Specifically, those regulations require that greenhouse gas emissions be analyzed for all federal actions. These regulations specifically discourage federal agencies from downplaying potential greenhouse gas emissions by characterizing them as "minor" or "insignificant", which is an assertion made in the South Tobacco Roots EA. We urge the Forest Service to remove these references and develop a carbon assessment that is more aligned with the interim guidance. The Forest Service Washington Office distributed a document in October 2023 that provides guidance to the Forests on developing NEPA analysis for project-level activities specific to climate change and greenhouse gas emissions. Please consider that guidance as you finalize your carbon assessment in this EA.

   The CEQ 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.

   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 South Tobacco Roots project analysis.**

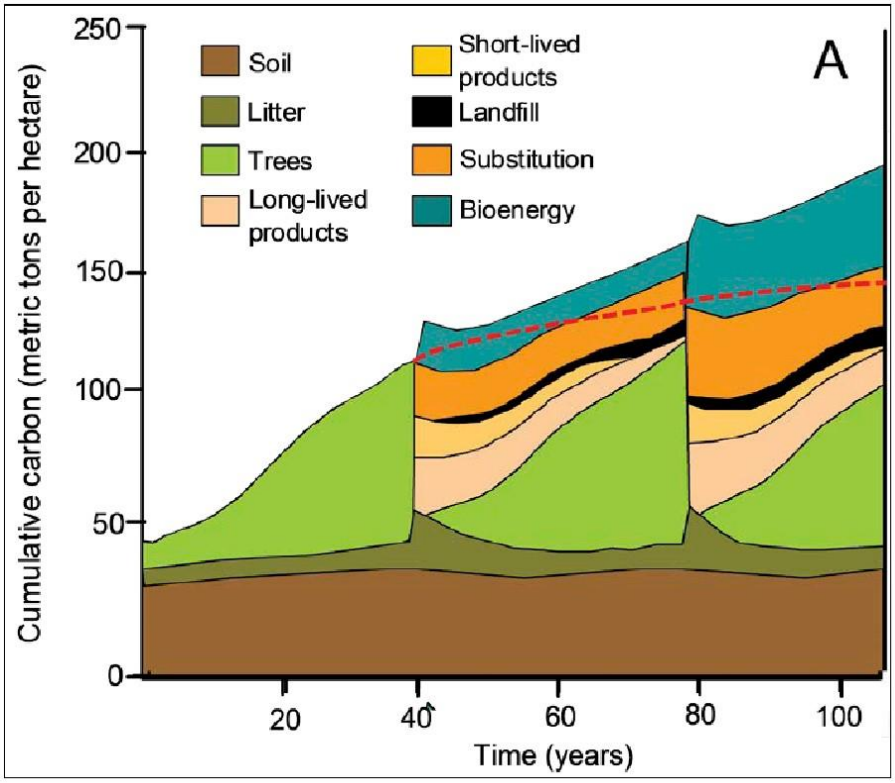

Figure 8.7—Carbon balance from a hypothetical forest management project in which the forest is harvested roughly every 40 years from land that started with low forest carbon stocks. This figure accounts for forest regrowth and carbon stored in wood products in use and landfills as well as the prevented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

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.

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.

8. AFRC is pleased to see that the District acknowledges that some management is needed in the riparian areas. *"One of the most significant historical impacts to vegetation composition on the landscape is due to fire suppression and project activities would improve aquatic conditions by addressing watershed vegetation composition and riparian health."* AFRC believes that managing in the riparian areas can help to achieve these goals. 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. There is a need for treatments that meet the need of multiple habitat types, and we encourage the 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.

A key point of the Anderson paper includes:

- 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

A key point of the Rashin paper includes:

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

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.

Thank you for the opportunity to provide Draft EA comments for the South Tobacco Roots Vegetation Management Project. We look forward to this Project being implemented soon.

Sincerely,

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