VIA Link: https://www.fs.usda.gov/project/?project=57341

September 13, 2023

Matt Anderson, Forest Supervisor
Bitterroot National Forest
1801 N. First Street
Hamilton, MT 5984

RE: Bitterroot Front Project

Dear Matt:

On behalf of the American Forest Resource Council (AFRC) and its members, thank you for the opportunity to provide comments on the Draft Environmental Assessment (EA) for the Bitterroot Front 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 Bitterroot 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 143,983 Bitterroot Front Project is located along the eastern face of the Bitterroot Range, from the Bitterroot National Forest boundary at the northern end of the Stevensville Ranger district to the southern end of the Darby Ranger District near Trapper Creek. AFRC and several of our members participated in a field trip to the project area in June 2021. We also toured the project area in May 2022 and looked at the stands to be treated and the damage from the 2016 Roaring Lion Fire that destroyed thousands of acres and the 2017 Lolo Peak Fire.

A large portion of the project area falls within the Community Wildfire Protection Zone (CPZ) and Wildland Urban Interface (WUI). The Bitterroot Front Project lies within an area that has

been identified as having 5 of the top 10 fire sheds facing the most wildfire risk in Montana. Further, the Bitterroot National Forest contains 5 of the 250 highest-risk fire sheds in the nation; 4 of these are in the Bitterroot Front Project area. This Project is being proposed to help assure that future wildfire suppression operations to protect critical infrastructure which occur in or adjacent to these treated landscapes are successful. On July 20, 2023, the Forest announced it received "Emergency Actions" approval from the Forest Service Chief to expedite implementation of the Bitterroot Front Project by using the Emergency Action Determination (EAD) as outlined by the Secretary of Agriculture. AFRC is very pleased that the EAD was issued.

AFRC supports the Project's purpose, which is to address the wildfire risk to nearby communities and promote forest restoration using a wide range of tools, including tree thinning, harvesting, and prescribed burning. Specifically, the Bitterroot Front Project aims to:

- Reduce fire behavior and intensity by reducing fuel quantity, modifying the arrangement of fuels, and reducing current and future wildfire risk to people, private lands, and resource values.
- Improve forest landscape health and resilience by reducing the risk or extent of, or increasing resilience to, insect and disease infestation.
- Reduce the risk to first responders and raise the probability of success during direct and indirect engagement on wildfires by treating fuels to modify fire behavior and increasing operational opportunities to protect values.

While we support the Project and its purpose, we offer the following comments that we believe will help with the final decision.

1. In the scoping, the Forest Service stated it had identified 55,133 acres as suitable for commercial harvest. AFRC supported that number. We are disappointed that the Project is only planning to commercially treat 27,477 acres, a reduction of over 50%. See Table 2, below:

Table 2. Summary of proposed action – vegetation treatments

Treatment Type	Proposed Treated Acres
Commercial intermediate harvest and prescribed burning	27,477
Noncommercial stand improvement and prescribed burning	3,163
Noncommercial whitebark pine restoration and prescribed burning	35,575
Prescribed burning only	54,046
Slashing and prescribed burning	18,019
Other treatments: tree planting, meadow restoration, aspen restoration, native vegetation revegetation, biological weed control, mastication, herbicide weed control, hazard tree removal, and chipping	No maximum set
Total treatment area	**138,280**

AFRC pointed out in our scoping comments that Montana's forest products industry is one of the largest components of manufacturing in the State and employs approximately 7,000 workers who earn about $300 million annually. Without the raw material sold by the Forest Service, DNRC, and private landowners, these mills would be unable to produce the amount of wood products that the citizens of this country demand. Without this material, the industry would also be unable to run their mills at capacities that keep their employees working, which is crucial to the health of the communities in which they operate. 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 to the manner in which these products are permitted to be delivered from the forest to the mills.

By only commercially treating 27,477 acres, this will be a big hit to the volume of timber removed from this area and the jobs created in the local communities and counties. AFRC would like the Forest Service to look at treating within older timber sales and regeneration units that are now nearly 40 years old. We think there are opportunities the Forest Service is bypassing in these areas.

The Environmental consequences of the Proposed Action regarding Economics in the Draft EA states: "*Under the proposed action, commercial timber harvesting would occur on about 27,477 acres, and noncommercial timber harvesting would occur on about 38,690 acres. This increase in harvesting directly impacts the local and regional economies, which could result in increased jobs, income, and economic output, compared with the no-action alternative. However, the increase in economic contributions from an increase in forest products would likely be small, given the current size of the timber and forestry industries, and the impact would be short term.*

Under the proposed action, the Forest Service would provide additional services for restoration and noncommercial vegetation and fuels treatments. These projects would not likely impact the amount of commercial timber harvesting; however, these projects would support service contracts, which would likely increase the number of jobs, labor income, and economic output through the expenditures on these contracts and restoration costs. Mechanical vegetation treatments would cost about $1,500 per acre, and hand thinning would cost about $300 per acre. These expenditures on restoration activities under the project would likely have large direct and indirect effects on the local economy."

2. Table 1, below, shows the fire regime data for the project area and how many years acres have gone without having fire across the landscape.

Table 1. Fire regime data for the project area.

Fire Regime Group (year interval range)	Total Acres by Fire Regime (Percent of Project Area)	Missed Fires (Average Fire Free Period)	Acres Burned 1889-2018	Percent of Acres Burned vs Historical Regime 1889-2018
I (0-35 years)	47,874 (33%)	6.8 (19 years)	13,878	4%
II (0-35 years)	5,575 (4%)	6.8 (19 years)	1,907	3%
III (35-100 years)	41,406 (29%)	4.6 (28 years)	11,007	8%
IV (35-200 years)	47,523 (33%)	3.9 (33 years)	16,996	9%
V (200+ years)	234 (0.2%)	3.9 (33 years)	59	7%

AFRC pointed out in our scoping comments that this data indicates the Forest has seen limited fires burning across the landscape within the Bitterroot Front project area, and we strongly believe that we are on borrowed time. Several thoughts come to mind: first, the District should treat all available acres project-wide for fuels reduction; second, the District should focus on lands adjacent to the WUI and CPZ with commercial treatments and reduce the basal area in those areas down to 40 sq.ft. per acre. Additionally, there has been an abundance of in-growth of shade tolerant tree species under the ponderosa pine. These trees create a fire risk because of the increased fuel loadings and because of the ladder effect of carrying fire up into the crowns of the more fire resilient ponderosa pine.

The picture below of the Bitterroot Front project area shows the uninterrupted fuel loadings, from deep in the Project's higher elevations to the lower WUI. This area should receive heavy treatment to reduce fuels and slow the spread of fire.

3. AFRC strongly believes that the acres identified for treatment using prescribed fire is unattainable (54,046 acres). These acres do not include where logging has already taken

place, it only identifies areas for prescribed fire treatments. Two factors lead us to believe this: first, the narrow windows of opportunity available for burning in the fall before heavy rain or snow, and in the spring before conditions get too dry; second, that the Missoula air shed is very limited on the days burning can take place. AFRC believes the Forest needs to reexamine this portion of prescribed treatments. We believe that adding more commercial thinning followed by burning is a more plausible option.

4. AFRC supports the Forest's use of condition base NEPA on this Project. The Forest does a good job of outlining how it will work: "*Condition-based management is a system of management practices that relies on specific design features to create desired outcomes on the ground. The proposed action describes a suite of activities available to manage the project area over a period of approximately 20 years. The types of treatments described in the proposed action are linked to a set of conditions on the landscape via the design features. The Forest Service designed the proposed action based on coarse-scale data sets and prior fieldwork that showed the range of likely conditions on the ground. The timing and location of treatments would depend on identification of specific conditions using fieldwork during implementation of the project. In this way, the condition-based approach would facilitate a resilient landscape via successive treatments that are responsive to changes in conditions as disturbances and stressors occur.*"

5. AFRC supports the Forest treating in old-growth units. These treatments, which will remove the understory trees and allow the larger mature trees to thrive, are needed to protect these old growth stands for the future. Treatments would not remove any stand from old-growth status. However, commercial, and non-commercial treatments would be proposed within old growth stands to increase the stands' resiliency to insects, disease, fire, and drought. Treatments would remove the smaller, intermediate competing crown classes and ladder fuels created by the ingrowth of other species. Once treatments create conditions to safely allow fire, low-intensity prescribed fire would be used to maintain the open crown conditions that historically aided in the development of these old-growth stands.

6. AFRC supports the Forest in asking for Forest Plan amendments on winter range and thermal cover, Elk habitat effectiveness, old growth, snags, and coarse wood debris. On September 7, 2023, the Forest completed the EA for the Programmatic Amendment for Elk Habitat, Old Growth, Snags and Coarse Woody Debris Objectives for the 1986 Bitterroot Forest Plan. This should roll in very nicely to address the needs for Forest Plan amendments to this Project.

7. The Forest has identified approximately 11,970 acres of high priority fire area within inventoried roadless areas (IRAs) that need treatment. AFRC supports treating these acres and acknowledges that no roads will be built to facilitate the thinning of small diameter timber and vegetation. Managing stands in the roadless areas to reduce fire risk through commercial density reduction is critical because several of these areas are in close proximity to the CPZ and/or WUI. Below is a photograph of one of the roadless areas—note the thick vegetation and heavy fuels. On our field trip, we saw several large old wildfire footprints. Historically, many fires originate in wilderness or roadless areas

at higher elevations and then expand down slopes by strong west winds. The intent of active management in the IRA's is fuels reduction to assist in containment of fires originating in the IRA and prevent them from burning into the lower landscapes where communities are located. AFRC believes that this is much needed.

8. AFRC believes the Forest should be more aggressive in outlining the true impacts of the No Action Alternative. AFRC supports what has been outlined, including:

    - *Under the no-action alternative, the forest in the project area would continue to be highly susceptible to disturbance from wildfires, disease, and insects, despite existing small-scale vegetation treatments. This could result in indirect adverse effects on recreation from an increase in dead trees, which would also pose a threat to visitor safety and potentially block access to roads and trails. However, the presence of abundant deadwood would increase opportunities for firewood collection.*
    - *The indirect impacts from a potential uncharacteristically severe wildfire that could occur due to the limited effectiveness of previous and ongoing fuels reduction treatments under the no-action alternative could cumulatively affect the recreational opportunities and development in the project area. Additionally, increased visitation may result in a higher risk of human-caused fires in the project area. The indirect impacts due to existing fuels management in and around designated areas would also result in cumulative changes in characteristics necessary for designation, as* described above.

    However, AFRC believes the Forest should do more modeling on the chances of stands replacing fires in the Bitterroot Front Project and the damage they could cause. AFRC believes that the Forest has only skimmed the surface on this issue. Below are two pictures of the Roaring Lion Fire that show complete devastation and what more

of the Forest could look like without treatment. More of these hard-hitting facts should be documented in the Final Decision.


9. The Draft EA outlines "opportunity areas" that are being identified to improve other resources such as livestock and big game forage production, elk winter range, retention of visual qualities, enhancement of recreational opportunities, and providing for semi-primitive recreation.

   The two pictures below show how thinning dense stands in the area can create the "opportunity areas" desired by the District. Both were taken in the project area. The picture on the left shows a dense stand of trees with little forage, and the picture on the right shows an open stand that is fireproofed and provides good grazing opportunities.


10. We suggested the use of Designation by Prescription for the Project while on our field trip. Also, at a recent purchasers meeting, Forest Service personnel asked if industry favors the use of designation by prescription (DxP) and the answer was overwhelmingly positive. This would be an excellent project for using DxP, especially when using thinnings and improvement cuts.

11. AFRC supports the concept of shaded fuel breaks along strategic roads within the project area. These fuel breaks should be wide enough to stop or slow down a fast-moving wildfire. At a minimum, these breaks should be 300 feet wide on either side of those

roads. The stands within those fuel breaks should be thinned to a wide spacing and low basal area to reduce the threat of a crown fire going through the area. We suggest a basal area of 40 sq. ft./acres. The purpose of the fuel breaks is to get the fire to lay down on the ground for suppression purposes. With so much of the area within the CPZ and WUI, it is important that ingress and egress roads are adequately thinned to allow traffic during a fire and to provide fire breaks. The Forest has also recently planned for fuel breaks on several roads on the Forest. This could be added to the Project by using additional shaded fuel breaks.

12. We would like to remind the District that there are many ways to design a timber sale that allows a purchaser the ability to deliver logs to their mill in an efficient manner while also adhering to the necessary practices that are designed to protect the environmental resources present on Forest Service forestland. The primary issues affecting the ability of our members to feasibly deliver logs to their mills are from 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. This is especially true with salvage projects where burnt trees may have low value and the logging needs to be completed using the most cost-effective method.

    The picture below of the project area shows slopes that are over 35% slope which might lend themselves to tethered logging. We would like the District to consider this method as the Final EA is prepared.

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 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 pounds per square inch 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 urge the Forest to consider allowing this equipment to be used where appropriate on the Bitterroot Front Project area 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 harvesterforwarder thinning in western Oregon. *For. Sci.* 66(1):82–96

Key Points 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.

We would like the District 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 Bitterroot National Forest market area with a variety of skills and equipment. Developing an 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 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 proposed area may be planned for cable harvest, there may be opportunities to use certain ground equipment.

13. Table 19, below, shows the types of roads and mileages in the Project. The District is proposing improvements to the road system, as well as road decommissioning.

Table 19. Proposed changes to National Forest System of roads mileage

Road Status or Proposed Action	Miles
Existing of National Forest System of Roads mileage	371.30
Construct new NFSRs	+1.98
Add undetermined road to National Forest System of roads	+8.54
Decommission NFSRs	-10.08
Decommission NFSRs and maintain as National Forest System trails	-0.62
Total National Forest System of roads mileage after project implementation	371.12

Source: USFS GIS 2023

While AFRC agrees that a lot of work is needed to bring the roads up to standard and to address problematic roads in the project area, we would like to remind the Forest that an intact road system is critical to the management of Forest Service land, particularly for the provision of timber products in the matrix lands. 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 Management Plan directs that the land base covered in the Bitterroot Front Project area is to be managed for a variety of objectives. Removal of adequate access to these lands compromises the agency's ability to achieve these objectives and is very concerning. For roads being decommissioned, we suggest using barriers or blockage of the road entrances. AFRC does not support obliteration or recontouring roads that are to be decommissioned because of the high costs involved.

Furthermore, there are alternative methods to mitigate potential resource damage caused by poorly designed or poorly maintained roads aside from full decommissioning. Removing or replacing ineffective culverts, installing waterbars, or blocking access are all activities that can mitigate resource damage while maintaining useful roads on the landscape for future use. Please consider these methods as an alternative to full 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 attacks in a more safe and effective manner.

If the Forest Service proposes to decommission, abandon, or obliterate road segments from the Bitterroot Front Project area, AFRC 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.

We would like the District to carefully consider the following three factors when deciding to decommission any road in the Project area:

- Determination of any potential resource risk related to a road segment.
- Determination of the access value provided by a road segment.
- 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.

14. The Forest has done a good job of analyzing how the Action Alternative could impact climate change, including:
"The proposed action would manage for the most drought- and fire-tolerant species in each forest type. The direct effects would reduce stand densities and the amount of shade-tolerant ingrowth. This would cause an immediate reduction of forest fuels, insect and disease host species, and the associated overall size class and structure. Reducing stand densities would reduce forest carbon storage in the short term, until the desired tree species begin to regenerate. At the landscape scale, treatments would increase the structural diversity and size class diversity across the project area. Treatments in high-elevation, cold forests would focus on reducing the risk of fire, insects, and disease for species such as whitebark pine, which are at a greater risk from climate change."

By reducing the risk of large wildfires, which is the largest source of carbon emissions, the proposed action would lower the potential for increased emissions. Additionally, establishing new and vigorously growing age classes would improve carbon storage and increase genetic diversity based on site-specific conditions (Birdsey et al. 2019). Shifting the species' compositions to early seral, fire-tolerant species; reducing stand densities; reducing ladder fuels associated with the ingrowth of shade-tolerant species; and increasing the size class diversity across the landscape would reduce fuels and the risk of larger and higher-severity wildfires. Forest thinning followed by a prescribed burn treatment could reduce the severity of wildfires; however, this method does not apply to all forest types.

While AFRC is pleased to see the carbon analysis, we encourage the Forest to conduct a detailed analysis on the Project's impacts to climate change, carbon sequestration, and greenhouse gas emissions. Regulations pertaining to the analysis of this resource have

recently been updated and the Forest Service must conduct its analysis on this Project accordingly. 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 products derived from them embody a closed-loop system in which emissions associated with harvests and forest products use are eventually recovered as forests regrow.
- Although forest 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. Failure to do so would hamper the 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 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 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 old and represent the only carbon sequestered on those 100 acres at the end of the 150-year cycle (assuming they do not 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 Bitterroot Front Project analysis.**

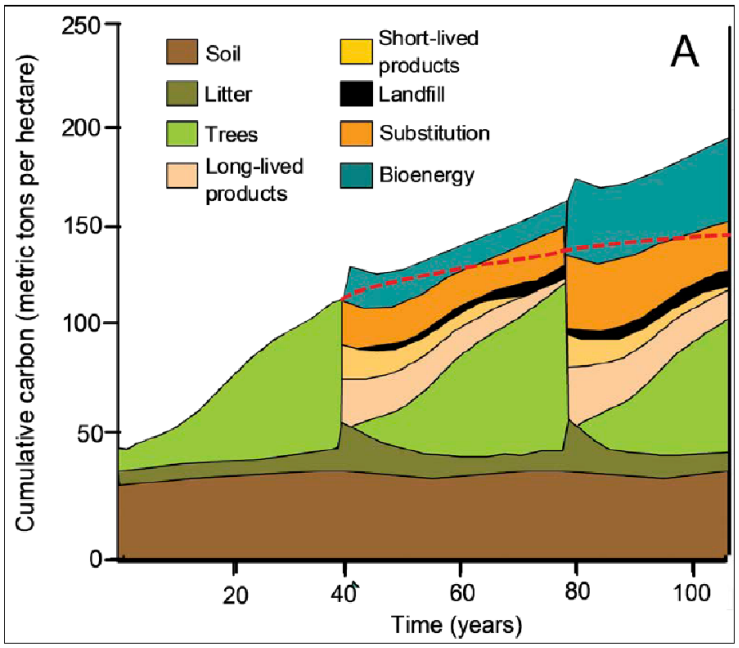

Figure 8.7—Carbon balance from a hypothetical forest management project in which the forest is harvested roughly every 40 years from land that started with low forest carbon stocks. This figure accounts for forest regrowth and carbon stored in wood products in use and landfills as well as the prevented 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 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% to 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 carbon at a faster rate than small trees on an individual basis, their contribution to carbon 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 carbon stocks, but they play a minor role in additional carbon 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_2, 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 U.S. Department of Agriculture recently published a Technical Report on the future of America's forests and rangelands.

Key points of the Technical 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 carbon 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.

In addition to this study, a recent report by the Forest Service titled: USDA: Forests Converting to Carbon Emitters finds that U.S. 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, which is 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.

- 000101_skog_carbon_sequestration_in_
- 050101_corrim_life_cycle_carbon_assess
- 060200_Feb. 2006, Lippke - fuel remova
- 060401_corrim_Wilson_OSU.pdf
- 100901_Final_Zhang_Powers_Skinner_s
- 111111_journal_of_forestry_forest_carb
- 140801_lippke_oliver_carbon_mitigation
- 201209_CORRIM_letter_to_Congress.pdf

Thank you for the opportunity to provide Draft EA comments for the Bitterroot Front Project. I look forward to following the Project through the Objection Process.

Sincerely,

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