January 15th, 2019

Donald Holmstrom
Bureau of Land Management
Klamath Falls Resource Area
2795 Anderson Avenue, Building 25
Klamath Falls, OR 97603-7891

In Reply to: Stukel Mountain Scoping Document

Dear Mr. Holmstrom:

Introduction

The American Forest Resource Council (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. AFRC represents over 50 forest product businesses and forest landowners throughout the West. Many of our members have their operations in communities adjacent to the Klamath Falls Recourse Area (KFRA), and the management on these lands ultimately dictates not only the viability of their businesses, but also the economic health of the communities themselves. The state of Oregon's forest sector employs approximately 61,051 Oregonians, with AFRC's membership directly and indirectly constituting a large percentage of those jobs. Rural communities, such as the ones affected by this project, are particularly sensitive to the forest product sector in that more than 50% of all manufacturing jobs are in wood manufacturing. AFRC appreciates the urgency to clear these hazards.

Tiering

AFRC would like the KFRA to utilize tiering to the 2016 PRMP/FEIS wherever possible in order to increase analysis efficiencies. The *Griffin Half Moon EA* on the Ashland Field Office describes tiering on page 11, "This document and the effects analysis tier to the 2016 PRMP/FEIS for Western Oregon. Tiering refers to using the coverage of general matters in broader NEPA documents in subsequent narrower NEPA documents. Tiering allows agencies to narrow the range of alternatives, narrow the scope of analysis, and reach a Finding of No Significant Impact for an action that may otherwise potentially have significant impacts. Where issue has already been sufficiently addressed by the analysis in the 2016 PRMP/FEIS, the issue is generally not addressed in detail in this EA, or if it is, the EA analysis is generally a site-specific extension of the FEIS analysis." AFRC would like to KFRA to include this type of language in the ensuing NEPA document.

Purpose and Need

AFRC is glad to see the KFRA proposing vegetation management on their Eastside Management Area and Riparian Reserve (RR) lands that will likely provide useful timber products to our membership. Our members depend on a predictable and economical supply of timber products off Bureau of Land Management (BLM) land to run their businesses and to provide useful wood products to the American public. The treatments on the Stukel Mountain Project will likely provide short-term products for the local industry and we want to ensure that this provision is an important consideration for the decisionmaker as the project progresses. As we will discuss later in this letter the importance of our members' ability to harvest and remove these timber products from the timber sales generated off this project is paramount. We would like the BLM to recognize this importance by **adding economic viability & support to the local infrastructure to the purpose and need** of the Stukel Mountain 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 BLM land, particularly those lands designated as Eastside Management Area, but also on land designated as RR.

NEPA is a procedural statute. It requires only that environmental consequences of an action be analyzed and disclosed. A project designed to produce timber production is entirely consistent with NEPA.

Maximizing Treatment Area

The consideration of active management on every acre of appropriate land, regardless of its land allocation, is important to our membership as each year's timber sale program is a function of the treatment of aggregate forested stands across the landscape. Based on the scoping notice, it appears that the KFRA is proposing treatment on less than 30% of the project area within BLM ownership. This percentage is typical of many BLM vegetation management projects. Although AFRC would like to see the agency treat a higher proportion of the landscape, we understand the lack of economically feasible forested land in the area. The majority of the land is juniper and sagebrush making up 1,271 acres of the 3,123 acres of proposed thinning treatments. Given the relatively small scale at which this project is proposed to be implemented on, we urge the KFRA to look for ways to maximize treatment where it **is** proposed and to avoid deferring units or setting aside portions of units for what is often referred to as "skips". Skips within the watershed are plentiful, what is not plentiful are openings. If the KFRA truly wants to diversify the landscape, then it should focus on creating openings in the forest and minimizing untreated areas within the 3,123 acres of proposed for thinning treatments. The scoping notice indicates that "patch cuts" of various sizes will be considered. We recommend utilizing this treatment type on all of the land allocations where management is proposed. The size of these cuts will have to be tailored to each land allocation, but we believe that they can be used to meet objectives for each of these three allocations.

On Eastside Management Area - Forested Lands, large patch cuts could be implemented to produce timber to contribute to the attainment of the probable sale quantity, improve merchantability and value, and reduce stand susceptibility to natural disturbance such as fire, windstorm, disease, or insect infestation. On RR land, small and medium sized patch cuts can be implemented to provide species and structural diversity at the stand level in otherwise uniform plantations of primarily ponderosa pine or mixed conifers.

Fire is a major component of this forest type. AFRC supports prescribed burning activities but we are concerned that the vast number of acres of existing burn backlog in combination with new projects can be accomplished in a timely manner. Please provide a general plan of how and when prescribed burning is going to be accomplished in the Stukel Mountain planning area.

We also urge the KFRA to consider a range of thinning intensities when developing prescriptions to create diversity across the landscape and to provide additional timber products where appropriate. Thinning from below ends up being the most common thinning method utilized by the BLM. AFRC urges the BLM to thin throughout all diameters, in any aged stand, thin from above, and use group selections as laid out on page 57 of the RMP. The forest is in urgent need of seral class diversity and fire resistance in this wildland urban interface. Remember that every time a stand is treated a legacy is left on the land.

When creating the ensuing NEPA document please keep in mind how the information will be relayed to the public. Table 2-6 below is from the *Griffin Half Moon EA* on page 53. AFRC appreciates this format but would also like to see estimated Basal Area (BA) densities for pre-harvest and post-harvest. This would allow for relative densities to be calculated. The 2016 requires the Eastside Management Area – Forest Lands to maintain a 15-55 percent relative density, but it also allows them to "vary outside of this range based on vegetation type, site productivity, and fire risk factors" (RMP, p. 57). If the KFRA plans on deviating outside of this range, please identify and explain the reason based on the conditions outlined in the RMP. AFRC would like to see the KFRA complete sustainable forestry with many areas dropping to the lower extent of the relative density range. Approximately 3,123 acres (29% of the project acres) are proposed for thinning treatments, leaving 7,490 acres of the project area as untreated where relative density will be maintained at 100% in those locations.

Table 2-6. Unit Stand Age, Acreage, and Proposed Commercial Harvest Prescription by Alternative.

Unit	Stand Age	Acres	Alternative 2 Prescription	Alternative 3 Prescription	Alternative 4 Prescription
1-1	90	225.5	RH	HRRH	CT
1-2	110	4.6	RH	HRRH	CT
7-1	170	162.0	RH	WFRH	CT
7-2	140	194.9	RH	WFRH	CT
10-1	130	8.1	RH	HRRH	CT
11-1	90	65.9	RH	CT	CT
11-2	110	31.2	RH	HRRH	CT
11-3	110	13.1	RH	HRRH	CT
12-1	110	24.9	RH	HRRH	CT
13-1	110	31.0	RH	HRRH	CT
13-2	110	39.0	RH	HRRH	CT
13-3A	110	34.5	RH	CT	CT
13-3B	110	3.5	SH	SH	SH
13-4	110	12.5	RH	HRRH	CT
15-1	110	71.1	RH	CT	CT
15-2	100	10.5	RH	HRRH	CT

RH – Regeneration Harvest; HRRH – High Retention Regeneration Harvest; WFRH – White Fir Regeneration Harvest; CT – Commercial Thin; SH – Selection Harvest.

Table 2-7 on page 54 of the *Griffin Half Moon EA* does a fantastic job at summarizing the alternatives. This type of table is useful to the public for a quick view of the proposed action.

Table 2-7. Summary of Proposed Activities in Alternatives 2, 3, and 4.

Vegetation Management	Alternative 2	Alternative 3	Alternative 4
Commercial Prescriptions	**Est. Acres**	**Est. Acres**	**Est. Acres**
Regeneration Harvest	929	0	0
High Retention Regeneration Harvest	0	400	0
White Fir Regeneration Harvest	0	357	0
Commercial Thin	0	172	929
Selection Harvest	4	4	4
Total	933	933	933
Estimated Volume[1]	**Est. MMBF**	**Est. MMBF**	**Est. MMBF**
Estimated Volume[1] Contribution to ASQ	9.5 to 15.8	5.5 to 9.1	3.1 to 5.2
Non-Commercial Prescriptions	**Est. Acres**	**Est. Acres**	**Est. Acres**
Fuels – Hand Piling and Burning[2]	933	933	933
Fuels – Underburning[2]	933	933	933
Pre-Commercial Thinning	392	392	392
Planting	933	767	0
Scalping, Grubbing and Gopher Treatments[3]	933	767	0
Timber Harvest Method	**Est. Acres**	**Est. Acres**	**Est. Acres**
Ground-Based Yarding	933	933	933
Designated Skid Trails	0.26 (0.18 mi.)	0.26 (0.18 mi.)	0.26 (0.18 mi.)
Potential Landings (new and existing)	22.5	22.5	22.5
Transportation Management	**Est. Miles**	**Est. Miles**	**Est. Miles**
Temporary Road Construction	0.39	0.39	0.39
Road Stabilization and Drainage Improvements	14.92	14.92	14.92
Timber Haul	33.43	33.43	33.43
Wet Season Haul[4]	17.92	17.92	17.92
Decommissioning (Long-Term Closure)	1.85	1.85	1.85

[1] Preliminary estimate of volume each alternative will yield in million board feet (MMBF). Actual volumes will be determined following cruising.

[2] These acres reflect the potential acres where either treatment may be applied depending on the post-harvest assessment. Post-harvest assessment would likely recommend a combination of lop and scatter, hand piling and pile burning, and underburning.

[3] These acres reflect the potential acres where either treatment may be applied depending on post-harvest assessment and monitoring.

[4] Of these 17.92 miles of roads that are available for wet season haul, none of them have continual wet-season connection to project units.

Prescription

AFRC was able to enter the East side of the project area by foot off the Webber Rd. The units in this location will benefit largely from management. The forest is generally healthy, but single storied and lacks diversity. By creating gaps, clumps, and a second cohort of trees through thinning between the clumps and gaps, higher diversity and different animal habitat will be created. Additionally, simply creating gaps with thinning throughout the matrix around it can be an alternative option. Vertical and horizontal diversity is lacking in the project area.

Economics and Operating Restrictions

AFRC would like to pose a few issues to the BLM.

1) How would the proposed activities affect the socioeconomics of the local communities?
2) How would the proposed activities be paid for?
3) How would the proposed activities allow for a sustainable flow of timber?

The timber products provided by the BLM are crucial to the health of our membership and local economy. Without the raw material sold by the BLM, these mills would be unable to produce the amount of wood products that the citizens of this country demand. 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 BLM 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 manner in which these products are permitted to be delivered from the forest to the mills. 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 BLM forestland. Logging contractors must average 10 months of work per year in order to be profitable. To be clear, we are advocating that you consider the economic viability of the project and make sure that it is designed in a way that makes sense for the market. This is not the same thing as maximizing economic value of the project.

In addition, we urge the BLM analyze the economic effect of a "No Action" alternative. Stressing the importance of timber harvest on local economies and the need for industry to stay vibrant to fund other work in the woods. Please help us tell the sustainability story of conscious timber harvest across landscapes. The "what would happen if industry went away" story that often is neglected in the No Action alternative.

AFRC would like to see the effects to the socioeconomics in the local communities analyzed for this project. When a project is analyzed and does not sell AFRC is left wondering what happened in the planning phase. Without an economic or socioeconomic analysis, AFRC cannot help the BLM assess possible changes to create more economic sales. There are not many BLM projects that have analyzed the effects to the local economics or socioeconomics. AFRC sees this as an oversite and would like the BLM to disclose this analysis to the public. We have provided five examples of this type of assessment from the Forest Service for the BLM to review. Each example contains specific analysis topics AFRC would like to see utilized in the ensuing NEPA document. They have been identified below and should provide ample ideas for the KFRA to get started.

1. *Lowell County EA* – Willamette National Forest (Economics, pg. 173-178)
    - AFRC believes this analysis includes most of the key factors of a thoughtful economic analysis, but not all of them. Those included are:
        - Log prices
        - Agency Costs
        - Estimated Volume and Profit

2. *Chetco Bar Fire Salvage EA* – Rogue River-Siskiyou National Forest (Economics, pg. 3-61 to 3-65)
    - This analysis covers a few main topics, but what AFRC appreciates the most is the table below (pg. 3-64). This table allows AFRC to develop a better understanding for how the Agency developed its final cost and profit values. Without this information it is difficult for AFRC to help the Agency more accurately determine the net return of a project.

Table 17. Costs for Determining Project Revenue.

Zone Averages Costs per Mbf	$/Mbf
Tractor Logging - Stump to Truck	$187
Skyline Logging - Stump to Truck	$245
Helicopter Logging – Stump to Truck	$400
Haul Costs	$87
Road Maintenance	$26
Road Reconstruction	$25
Brush Disposal	$9
Other Contract Costs	$11

3. *Black Torch EA* – Chequamegon-Nicolet National Forest (Socioeconomics, pg. 123-133)
    - AFRC likes the use of these 5 distinct Economic Indicators to analyze the socioeconomic effects of the project. They provide solid metrics to compare the different alternatives.
        - Twenty Five Percent Fund, Payment in Lieu of Taxes Act of 1976, Secure Rural Schools and Community Self-Determination Act of 2000
        - Employment
        - Income Generated
        - Harvest Volume
        - Potential Biomass Harvest

4. *Shores EA* – Hiawatha National Forest (Economics, pg. 134-136)
    - The acknowledgment that costs outweigh profit of the project is key in this analysis. AFRC would like to point out that the acres/volume in a sale effect the overall return on investment in a project. Had this project included more acres or if more volume per acre was removed, this project may have had a net positive return (even in a downturned market). Understanding the reason for a net negative return is important and an economic analysis can help determine the factors for this return.

5. *Niagara EIS* – Hiawatha National Forest (Financial and Economic Efficiency Analysis, pg. 128)
    - AFRC appreciates the use of a very simple and easy to understand table.

Table 28. Comparison of Estimated Tangible Costs & Returns for the Niagara Project.

	Proposed Action	No Action	Alt. 1	Alt. 2
	ESTIMATED COST			
Timber sale preparation & admin	($291,400)	$0	($150,400)	($413,600)
Handtool site preparation for natural	($10,313)	$0	($4,181)	($14,618)
Mechanical site preparation for natural	($14,111)	$0	($10,005)	($14,111)
Full plant	($43,800)	$0	($31,000)	($31,000)
Regeneration survival checks	($15,529)	$0	($7,358)	($22,008)
New system road construction	($51,336)	$0	($41,540)	($51,336)
Temporary road construction	($14,921)	$0	($12,529)	($14,921)
Close existing roads	($6,900)	$0	($6,900)	($6,900)
Decommission roads	($15,773)	$0	($15,773)	($15,773)
Construct log landings	($5,562)	$0	($5,464)	($5,562)
TOTAL COSTS	($469,645)	$0	($285,149)	($589,827)
	ESTIMATED RETURNS			
Volume	12.4 MMBF	0	6.4MMBF	17.6MMBF
Volume (07/07 monetary value)	$636,368	$0	$317,564	$938,492
25% return to counties	($159,092)	$0	($79,391)	($234,623)
10% return to roads & trails fund	($63,637)	$0	($31,756)	($93,849)
TOTAL RETURNS TO TREASURY	($56,006)	$0	($78,735)	$20,193

The primary issues affecting the ability of our members to feasibly deliver logs to their mills are firm operating restrictions. As stated above, we understand that the BLM must take necessary precautions to manage 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 BLM Environmental Assessment (EA) and contracts (i.e. dry conditions during wet season, wet conditions during dry season). We are glad to see that the BLM is shifting their methods for protecting resources from that of firm prescriptive restrictions to one that focuses on descriptive end-results. There are a variety of operators that work in the BLM market area with a variety of skills and equipment. Developing an EA and contract that firmly describes how any given unit shall be logged may inherently limit the abilities of certain operators.

For example, restricting certain types of ground-based equipment rather than describing what condition the soils should be at the end of the contract period unnecessarily limits the ability of certain operators to complete a sale in an appropriate manner with the proper and cautious use of their equipment. 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 is planned for cable harvest, there are opportunities to use certain ground equipment such as feller bunchers and processors in the units to make cable yarding more efficient. Allowing the use of processors and feller bunchers throughout these units can greatly increase its economic viability, and in some cases decrease disturbance by decreasing the amount of cable corridors, reduce damage to the residual stand, and provide a more even distribution of woody debris following harvest.

The newest operating system is tethered logging. This system allows ground based equipment to operate on slopes greater than 35% by decreasing the PSI of the machine and therefore the ground disturbance. The Region 6 soils cadre is developing a better understanding of tethered logging. Please do not write yourself out of using this innovative technology. **We recommend phrasing the language in your ensuing NEPA document to focus on desired end results for soil conditions rather than prescribing the type of equipment necessary to meet those conditions.**

<u>Roads</u>

Constructing forest roads is essential if active management is desired, and we are glad that the BLM is proposing the roads that are needed to access and treat as much as the project area as possible in an economically feasible way. Proper road design and layout should pose little to no negative impacts on water quality or slope stability. Consistent and steady operation time throughout the year is important for our members not only to supply a steady source of timber for their mills, but also to keep their employees working. These two values are intangible and hard to quantify as dollar figures in a graph or table, but they are important factors to consider. The ability to yard and haul timber in the winter months will often make the difference between a sale selling and not, and we are glad the BLM is working to accommodate this by proposing rock application to roads that include cable yarding systems.

<u>Riparian Area Treatment</u>

AFRC urges the BLM to consider taking a proactive approach to treating RR areas. We are glad to see that some units have started incorporating this into their projects. After visiting several stands proposed for treatment it's clear that the undesired forest conditions (overly dense and uniform stands) that exist in the uplands also exist in the riparian reserves. The forest health benefits that you expect to attain through upland thinning treatments can therefore also be achieved in RR areas with similar active management prescriptions, and so we urge the BLM to strive toward maximizing the acres of riparian reserve treated to meet those objectives. It has been well documented that thinning in dense, uniform forest stands accelerates the stand's trajectory to produce large conifer trees, vertical diversity, and tree-species diversity (Garman, Steven L.; Cissel, John H.; Mayo, James H. 2003.); all characteristics that we assume are desirable in RR areas as much as they are desirable in the uplands.

The tradeoffs that the BLM 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. AFRC wants to remind KFRA that the RMP allows thinning within the entire RR of the Eastside Management Area and does not require a no-cut buffer around them. It is not appropriate to thin or harvest trees directly up to the stream in all cases, but please take a valiant approach at analyzing the effects of doing it in areas where it is needed.

Impacts of the Proposed Action on Carbon Sequestration and Climate Change

Carbon sequestration as it relates to climate change is a topic that often gets broadly analyzed in NEPA documents. The analysis that the BLM will likely be conducting through the ensuing environmental analysis will discuss forest health benefits, effects on carbon sequestration and storage potential and meeting the purpose and need all within the context of an economically viable timber sale. We would like the BLM to review the following summary of information and incorporate this into its environmental analysis. AFRC believes this will help educate the public about and disclose localized effects to the forested landscape regarding carbon sequestration, carbon storage, and climate change as a whole.

Background

The Stukel Mountain Project consists of variable density thinning which may affect the treated stands ability to resist, respond, or be resilient to climate change in the project area. The direct, indirect, and cumulative effects of carbon sequestration and storage and its relationship to climate change in regard to this project must be viewed at much larger scales than the general project area because the scientific literature regarding these, only support analysis on larger scales. There is a large body of literature on management strategies that have the greatest carbon sequestration benefit. In general, actively managing the forest will produce a positive net increase in carbon sequestration thus a positive benefit to reducing anthropogenic effects on climate change (IPCC, 2007). AFRC urges you to analyze the type of treatments being proposed and determine through the literature how they will affect carbon sequestration potential through time.

As defined by the USFS in the Climate Change Glossary,

> "Climate change refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external forces, or to persistent anthropogenic changes in the composition of the atmosphere or in land use" (USFS, n.d.).

The United States Environmental Protection Agency (EPA) estimated that national greenhouse gas emissions were 6.87 billion metric tons CO_2-eq/yr in 2015 (EPA, 2016). With increased concentrations of greenhouse gasses, more heat is retained leading to an increase in the earth's average surface temperature e.g. global warming (USFS, 2010). In total, 91.262 billion metric tons of carbon is stored in the managed US forests as of 2016. In 2016, the US sequestered 216 million metric tons of carbon in its forests (Woodall et. al, 2015). According to the EPA (2016), 11% of the US CO_2 emissions were sequestered in forests and associated wood products in 2014. National Forest System lands only represents 13% of all forest sequestration in the US.

Strategies

There are two main strategies for addressing climate change: adaptation and mitigation.

"The International Panel on Climate Change (IPCC) (*http://www.ipcc.ch/*) defines *adaptation* as an initiative to reduce the vulnerability of natural or human systems to expected climate change effects." (USDA, 2011)

Adaptation strategies include the following:

1. Building *resistance* to climate-related stressors such as drought, wildfire, insects, and disease.
2. Increasing ecosystem *resilience* by minimizing the severity of climate change impacts, reducing the vulnerability and/or increasing the adaptive capacity of ecosystem elements.
3. Facilitating large-scale ecological *transitions* in response to changing environmental conditions." (USDA, 2011)

According to the Office of Sustainability and Climate Change, "Forest ecosystems capable of adapting to changing conditions will sequester carbon and store it more securely over the long term, while also furnishing woody materials to help reduce fossil fuel use (Office of Sustainability and Climate Change, 2016). Therefore, adaptation can be enhanced through active forest management activities which improve the health and vigor of the forest ecosystem. By enhancing the vigor and growth of the forest, the forest as a carbon sink, can also be vitalized.

"The IPCC defines *mitigation* as an intervention to reduce the emissions or enhance the storage of greenhouse gases. Mitigation is predicated on adaptation: the long-term capability of ecosystems to capture and store carbon depends in large part on their ability to adapt to a rapidly changing climate" (USDA, 2011).

Mitigation strategies include the following:

1. Promoting the uptake of atmospheric carbon by forests and the storage of carbon in soils, vegetation, long-lived wood products, and recycled wood materials.
2. Indirectly reducing greenhouse gas emissions (for example, through the use of carbon-neutral bioenergy to offset fossil fuel emissions and substituting wood for more fossil fuel-intensive building products)
3. Diminishing greenhouse gas emissions (for example, through the cooling effects of urban forests, which reduce the need for fossil fuels to run air conditioners) or through more prudent consumption in facilities, fleet, and other operations.

This is why active management is vitally necessary. The world is at a time where deliberate action needs to be taken for the future of humankind. Through meaningful and well-developed forest practices, increased adaptation and mitigation can occur. "An actively managed forest landscape that provides a large amount of sustainable biomass yield while at the same time maintaining large standing forest carbon stocks, provides greater climate benefits in the long run compared to unmanaged forests" (Lundmark et al. 2016). Which is tied back to Nabuurs and Masera 2007 and Lundmark et al. 2014. "Several studies have shown the importance of a sustained or increased yield in actively managed forest to increase the climate benefit (Canadell and Raupach 2008; Malmsheimer et al. 2008; Poudel et al. 2012; Lundmark et al. 2014; Sieva¨nen et al. 2014) … In order to make additional climate benefits compared with today, the most efficient strategy … is to increase growth and yield and to maximize the substitution benefits" (Lundmark et al. 2016).

Carbon Sequestration

Regeneration and Patches

When a forest stand is harvested, the stored carbon removed is transferred into other pools. It could go into the carbon sequestration of harvested wood products (HWP pool), into the soil organic carbon (SOC pool) or released into the atmosphere due to decomposition or slash burning. The small portion that is released into the atmosphere is captured again through increased photosynthesis of the remaining or new stand in a short period of time. Davis et al. (2009) suggested that just after 55 years, carbon sequestration was similar in harvested as un-harvested forests. Not only can forests have equal sequestration over the long term, but it is suggested that the recovery of the ecosystem can be extremely elastic as well. Amiro et al. (2010) discovered that, "A clear GPP[1] recovery occurred within about the first 20 years following a stand replacing harvest." AFRC acknowledges the fact that there is a reduction in the short term in net primary production (NPP[2]) following a harvest. However, when a long-term (>40years) scale is used, harvesting older trees or thinning overstocked stands will always increase positive climate change benefits because of long term storage of carbon in furniture, houses, etc., the substitution effect and increased CO_2 sequestration due to increased photosynthesis.

Some may argue that maintaining canopy cover or a continuous forest will best allow for trees to remain as secure carbon storage on the landscape while thinning underneath can provide the wood the timber industry needs, but "[t]he long-term annual average carbon stock change in living trees is close to zero for a continuous cover forest while an annual net increase occurs on production forests where clear-cuts are utilized." (Lundmark et al. 2016). This shows how forests that grow in a patchy environment will always have higher increment growth with greater carbon sequestration potential than continuously thinned stands.

Old Trees

Yu et al. (2017) in their paper titles "Influence of site index on the relationship between forest net primary productivity and stand age" found the following:

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[1] (Gross primary production (GPP) is the total amount of carbon dioxide "fixed" by land plants per unit time through the photosynthetic reduction of CO_2 into organic compounds."

[2] Net primary production (NPP) of plant structural biomass in stems, leaves, and fruit, labile carbohydrates such as sugars and starch, and, to a much lesser extent, volatile organic compounds used in plant defense and signaling.

- "Similar to previous studies, our results also show that forest NPP[2] increases quickly at young ages, reaches the maximum value at middle age (10±40 years old), and then decreases to a relative stable level at old ages. However, we additionally found that forests under better site conditions have faster growth rates in young ages and steeper declines after reaching the maximum."
- "NPP increases rapidly before reaching its maximum and thereafter decreases to a relatively steady state. At younger ages, carbon is mostly accumulated in stems, branches and coarse roots so the total NPP is dominated by living biomass increments. The decline of NPP with age is mainly caused by the decreasing rate of living biomass increment. At older ages, NPP-age curves are dominated by leaf and fine-root turnovers since carbon allocations to these two components are larger than the other parts."
- "Coniferous forest NPP decreases substantially after reaching to its maximum value."
- "Studies indicated that NPP in old forests generally decreased to about half or one-third of its maximum value."
- "The decrease of NPP at old ages is mainly due to the declining carbon allocation to wood components, in addition to increased autotrophic respiration for sapwood maintenance, decreased photosynthesis efficiency and declining N-availability to trees (Ryan et al. 1997). In addition to these factors affecting the performance of individual trees, changes in forest structure, such as self-thinning and wind damage, would also negatively impact forest NPP at old ages (Smith et al. 2001). For old age forests, leaf and fine root turnovers take a large part of photosynthetic productions (DesRochers et al. 2001). Accurate estimates of leaf and fine root turnovers and carbon allocation ratio of new fine roots to new leaves are of importance to NPP calculation." (Yu et al., 2017).

Harvested Wood Products (HWP)

The utility that forest products provide humans in their day to day lives is paramount. Products connected to the forest are used every day by everyone. "If forested ecosystems are to be managed with carbon sequestration in mind, then wood product market fluctuations must be considered in addition to ecosystem responses to harvest" (Davis et al., 2009). Often when carbon pools are brought up, the HWP pool is left out or misrepresented. The fact is that humans use wood products that do not decompose quickly; in fact, "only 30% of the carbon from paper and 0–3% of the carbon from wood are ever emitted as landfill gas. The remaining carbon … remains in the landfill indefinitely. Some of this carbon may be removed during leachate treatment, but a large portion is permanently sequestered where its impact on global warming is negligible. The placement of forest products in landfills serves as a significant carbon sink, and its importance in the global carbon balance should not be overlooked" (Micales & Skog, 1997). Carbon is stored securely in HWP of all kinds. The potential of any given acre to store carbon is exponentially increased when active management occurs on that piece of land because of harvesting and storing wood in the HWP pool, the substitution effect, and replanting after final harvest. When carbon is stored in houses, furniture, fences, light poles and other products, the wood is not only storing carbon, but serving a tangible benefit as well. Many of these products will outlive the tree/s they came from due to insects, disease, or fires that would have otherwise killed the tree, released the stored carbon and had its carbon legacy taken away. The homes, dresser, rocking chair, or local bar all get to live on.

Substitution

One of the most frequently disregard factors concerning the harvest of trees as it relates to CO2 sequestration or emissions is the carbon footprint of the materials that will be used as substitutes if these trees are not utilized to build homes, make furniture or any of the myriad of products produced from wood fiber. These commonly include concrete, steel, and plastics. The use of "forest products led to a significant reduction in atmospheric carbon by displacing more fossil fuel-intensive products in housing construction. The result has important policy implications since any incentive to manage forest lands to produce a greater amount of forest products would likely increase the share of lands positively contributing to a reduction of carbon dioxide in the atmosphere." (Perez-Garcia et al. 2005)

The Consortium for Research on Renewable Industrial Materials (CORRIM; www.corrim.org), a not for profit university lead research group of 16 research institutions, developed a research plan in 1998 to study the complete environmental performance of wood. Since its inception in 1996, CORRIM has developed comprehensive environmental performance information on wood building materials consistent with International Organization for Standardization (ISO) standards for life-cycle inventory (LCI) and lifecycle assessment (LCA) research.

They summarize their research to date in the following fact sheet.

Wood Use Can Reduce Carbon Dioxide in The Atmosphere By:

1. Growing trees removes CO2 from the atmosphere and stores it as carbon in the forest.
2. Products made from trees move the stored tree carbon to their point of use.
3. Using Wood Products Creates Opportunities to Avoid the use of Fossil Intensive Products (like steel, concrete, aluminum & plastics) that emit far more CO2 than using wood products.
4. Wood is both Renewable and Sustainable resulting in CO2 initially taken out of the atmosphere and being returned to the atmosphere when decomposed at end of life (a two-way flow) whereas using fossil fuels creates a one-way flow of CO2 accumulating in the atmosphere.
5. Intensively managing forests increases yields, resulting in greater opportunities to avoid using fossil fuels.
6. Using woody biomass for fuel displaces CO2 emissions from fossil fuels although with a lower efficiency of conversion compared to displacement from wood products used in construction.
7. Further CO2 benefits are possible by recycling demolition wood at the end of first life

through reuse or reprocessed products such as panel boards, burning the lowest grades of wood for energy, or storing waste wood in landfills where it either does not decompose or the gases produced are collected and burned to avoid producing methane a most harmful greenhouse gas, or better yet use the energy from burning to displace the use of fossil fuels.

8. Managing forests for best use varies by region with natural disturbance risk playing a key role.
9. Increasing carbon values (taxes or incentives) will affect the cost of sustaining critical habitat.
10. Policies customized for specific interests that ignore life cycle impacts, need revision in order to avoid their unintended consequences.

Fire Risk

In Oregon Forest & Industries Council's (OFIC) October newsletter a forestry specialist from the University of California Berkley is highlighted who spoke at their 2018 Annual Meeting. Dr. William Stewart's research focuses on carbon impacts of active management of private forestlands compared to the "not-so-active" management on federal forestlands. He uses comprehensive forest carbon modeling systems to do this. Stewart's research suggests that private landowners are sequestering significantly more carbon than USFS. His research proposes this phenomenon is due to institutional decisions not climate change. Stewart's research also points to the probability of federal forest reserves burning and releasing carbon emissions being three times more likely now than in previous decades. Stewart thinks the prognosis is clear, less active management on federal forests slowed net growth across Oregon, California, and Washington. Conversely, active management clearly moves carbon out of the forest and into products which decreased the likelihood of mass carbon dumps from fire into the atmosphere.

In summary, any analysis of the effects of timber harvest on CO_2 emissions or sequestration must be made using a long term, life cycle approach incorporating long term storage of currently sequestered carbon, net primary production of forest stands, and the net increase of CO_2 emissions associated with the use of substitute materials. Much research has been done on these subjects which supports the position that managing forests using regeneration timelines related to NPP will result in greater net carbon sequestration than non-management approaches. Research also supports positive potential climate change effects of thinning to promote increased growth and vigor. Fire should also be included in this type of analysis due to their large carbon loading into the atmosphere. Generally, all of the silvicultural tools need to be used to maximize the positive benefits trees and forests provide for the world. To find more information about Oregon's forest benefits you can view a report by the OFIC here. OFIC does a wonderful job at explaining just how wonderful an environment Oregon is to grow trees and the fantastic carbon sequestration power they have here.

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Monitoring

AFRC recognizes all the demanding work put into completing NEPA. Therefore, we would like to see a detailed monitoring methodology for implementation and post implementation (pre-sale and post cut-out). It is not always clear if and how all the arduous work on the front end is coming to fruition. It is paramount quality control occurs. If site specific prescriptions are not written correctly or if those prescriptions are not implemented correctly, then all the work put into the NEPA is moot.

Other Comments

It would be very helpful to differentiate public vs. private roads and where gates exist on any analysis map. This allows the public and commenters to develop the most helpful comments by focusing ther time and effort in those locations that are accessible. This project does not have man public access points. AFRC would appreciate a public field trip to this project in order to develop useful and pertinent comments to the proposed action as it is developed. If field trips cannot be created, then can the KFRA please include pictures of the project area in all of the NEPA documents?

Due to the lapse in government appropriations, project documents were not available on the agency website for our review prior to the previous comment deadline of January 19th, 2019. AFRC requests the ability to submit further comments after funding is restored and the project documents are made available.

Thank you for the opportunity to provide scoping comments on the Stukel Mountain Project. We look forward to following the implementation of this project as it moves forward.

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