5/17/17
BARK
PO Box 12065
Portland, OR 97212
www.bark-out.org
503-331-0374

John Huston, Cascades Field Manager
BLM Northwest Oregon District
1717 Fabry Road SE
Salem, OR 97306

Dear John,

Bark's mission is to bring about a transformation of public lands on and around Mt. Hood into a place where natural processes prevail, where wildlife thrives and where local communities have a social, cultural, and economic investment in its restoration and preservation. Bark has over 25,000 supporters[1] who use the public lands surrounding Mt. Hood, including the areas proposed for logging in this project, for a wide range of uses including, but not limited to: clean drinking water, hiking, nature study, non-timber forest product collection, spiritual renewal, and recreation. We submit these comments on behalf of our volunteers and supporters.

The Bi-County project would log approximately 705 acres of 40-130 year old forest stands within the Ambiqua-Pudding Creek, Butte-Pudding Creek and Rock Creek watersheds. We are concerned to see stands of up 130 years of age being targeted, "regeneration harvest" in an area already low in intact forest, and logging along steep slopes near riparian areas. We believe that the phrase "reset stand development" is also a euphemism for "clearcut". Bark volunteers have walked several stands within the project area, and many of the following comments reflect these on-the-ground

[1] Supporters in this case is defined as significant donors and petition-signees which Bark has identified as being active users of forests surrounding Mt. Hood.

observations. We look forward to exploring additional stands currently behind locked gates with the Agency in the future.

PUBLIC PARTICIPATION

In recent NEPA comments to federal land management agencies, Bark has provided much factual information, as well as raising several concerns regarding commercial logging and road building, that have been oftentimes disregarded. A greater level of pre-decisional engagement is especially valuable for all parties and will result in better, more informed decisions. In the final decision, Bark requests detailed, direct responses to public input, including changing the project further to address input and concerns, as this is the only way to maintain meaningful involvement in the decision making process for our public lands.

Bark volunteers were unable to visit several sites in the project area because of limited access, e.g. locked gates. We believe that public access to any proposed project area on our public lands is important for well-informed public comment. We would appreciate being invited along on any future field trips.

ROAD WORK TO BE COMPLETED WITH THE BI-COUNTY PROJECT

Bark is concerned that the BLM may propose new road segments to facilitate logging. In past projects, Bark has provided evidence that temporary road construction can cause resource damage including erosion and sedimentation[2], and has provided the following road-related recommendations for those projects based on a recent synthesis of science relating to implementation of the Aquatic Conservation Strategy[3]:

- Prohibit the construction of new permanent and "temporary" roads, except in limited instances were construction of a short segment of new road is coupled with and necessary for the decommissioning of longer and more damaging segments of existing road.

[2] Trombulak, S.C., and C.A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14: 18-30.

[3] Frissell, Christopher A., R. J. Baker, D. DellaSala, R. M. Hughes, J.R. Karr, D. A. McCullough, R. K. Nawa, J. Rhodes, M.C. Scurlock, R. C. Wissmar. 2014. Conservation of Aquatic and Fishery Resources in the Pacific Northwest: Implications of New Science for the Aquatic Conservation Strategy of the Northwest Forest Plan . Coast Range Association, Corvallis, OR. 44 pp. (http://coastrange.org/documents/ACS-Finalreport-44pp-0808.pdf)

- Allow no net increase in road density in any watershed.
- Require each proposed forestry and other development project to meet a target of incremental reduction of the road system in all watersheds affected by the project.
- (R)oads for which there are not adequate funds for maintenance and upkeep should be decommissioned.

During the planning process, we hope that the BLM considers these recommendations and be clear on what action will be applied to what road segment, as well as their current conditions. With such a thorough analysis, the concerned public and the BLM will have more success in addressing road-related issues as well as produce a plan that promotes a higher quality of ecological health. We look forward to seeing a thorough analysis regarding road construction.

FIRE RISK AS STATED RATIONALE FOR PROJECT

Another stated purpose of the project is to reduce fire risk. In areas without human habitation, a central fallacy is the premise that fire is a problem to be prevented. The natural systems of this bioregion evolved with fire, and there are many native species that thrive after a fire. Some native plant seeds are unable to germinate without fire. Why is disturbance as a result of fire assumed to be a problem here?

The second fallacy is the assumption that the best way to reduce the probability, spread, and intensity of forest fires is by reducing fuel loading. In fact, many other factors are at play - ambient temperature, humidity, slope, and more. In many cases the most important factor is wind speed. Numerous studies of fire behavior have shown that cleared areas typically allow much faster and more extensive spread of fire at any intensity. The proposed thinning may reduce the canopy enough that the wind-breaking effect of wooded areas is greatly reduced, potentially allowing higher winds and accelerating the land-clearing effect of fire.

Canopy reduction also encourages the growth of sun-loving and highly flammable species such as grasses and Himalayan blackberry, which provide fine fuels that both increase the probability that a fire will begin, and support its spread.

DISEASE AS STATED RATIONALE FOR PROJECT

The Bi-County scoping letter suggests that one purpose of the project is disease prevention. Do the forest units show evidence of disease? Bark staff and volunteers have as yet had limited access to the site. We are interested in greater access to view and assess possible disease and areas that might conceivably benefit from removal of diseased trees.

The BLM often asserts that dense, single story conditions present in plantations can lead to stands being more susceptible to root disease and decay, and that natural processes cannot and will not ever prevail in such "unnatural" conditions. Most root diseases naturally fluctuate and have positive ecological roles in the ecosystem--such as thinning the forest, part of the purpose identified for this project.

THINNING IN MATURE AND NATIVE FOREST

We are concerned to see that some of these stands are entering Early Mature or Mature stages of growth. Bark believes the BLM must ensure that there is an overall increase of old growth forest habitat in the future, and let healthy mature forests grow unmanaged. This action would be recognition of the new urgency to protect mature trees to store carbon in order mitigate climate change, and to provide additional habitat as soon as possible to increase the chances that forest dependent species liked the northern spotted owl can persist in our region.

Bark believes that any logging, even thinning mature stands or removing mature trees, will reduce the quality of habitat and delay attainment of old-growth characteristics such as snags and dead wood, which are defining characteristics of old growth and provide essential ecological services, including fish & wildlife habitat, carbon storage, slope stability, and capture-storage-release of water and nutrients.

In 2016, The USFS and the BLM released a bibliography, complete with annotations, compiling studies that have examined the impacts of thinning in mature forest stands[4] which was recently reviewed by Paul Reed, a PhD student at the University of Oregon[5]. Overall, the bibliography managed to address a variety of characteristics of old-growth forest structure. While there is some reason to believe that thinning could positively affect certain aspects of old-growth development, there is generally a lack of or inconsistency in evidence. This is especially true regarding the impacts of thinning on the abundance and size of snags and downed wood; these old-growth structural features were largely overlooked and the evidence that does exist suggests that thinning does not do an adequate job managing for these features. Based off this lack of compelling evidence, according Reed, it may be most appropriate to implement a precautionary approach towards managing and thinning mature forest stands.

Bark has seen on the ground that old-growth characteristics often times begin to be present in mature stands such as large trees, snags, multiple layers, slope stability, and carbon storage. Scientific literature demonstrates how "(s)ites that do not have the full complement of old-forest characteristics can partially function as old forests for those attributes that are present."[6] When old forests are in such short supply, these mature stands can act as important "life boats" that will carry closed-canopy dependent wildlife through the habitat bottleneck created by decades of overcutting. These is especially important as these areas are surrounded by tree farms, tree plantations, and agriculture.

In some units we have visited, there are large trees between 35 to 45 inches in diameter (Fig. 1). Trees of this size are of utmost importance to maintaining habitat for the majority of organisms associated with late successional forests such as pileated woodpeckers. In addition, these mature forest patches have been found to surround headwaters and are typically on steep slopes (25-35 degrees). This would also greatly affect the hydrology of the area (see riparian reserve section). Because of this, Bark would request that this project remove all forests stands containing mature trees from further consideration.

[4] Powers, M., and S. Wessell. 2016. Management impacts and developmental patterns in mature Douglas-fir forests of the Pacific Northwest: An Annotated Bibliography.

[5] Reed, P. 2016. Reviewing the US Forest Service and Bureau of Land Management's "mature stand thinning" bibliography. Available by request.

[6] Everett, R., P. Hessburg, J. Lehmkuhl, M. Jensen, and P. Bourgeron. 1994. Old Forests in Dynamic Landscapes: Dry-Site Forests of Eastern Oregon and Washington. Journal of Forestry 92: 22-25.

Figure 1: Examples of mature tree stands; directly next to and to the west of decommissioned section of road 7-2E-27.3; GPS coordinates for the start of the mature forest patch: N44° 56.219' W122° 32.837'. DBH of mature trees in the area range from 35 to 45 inches.

Mature trees, ranging from 19 to 26 inches in diameter, are intermixed with younger trees in most if not all units. These are particularly large for what Bark is used to field-checking in proposed thinning units. In addition, the tree density of the units we have surveyed appears to be distributed fairly well throughout the unit. How many trees per acre will be proposed to be removed for each stand? If a given unit meets the targeted trees per acre already, then removing these larger trees would be ecologically detrimental to unit and surrounding area.

Bark also believes that decreasing tree density along the edges of clearcuts, tree farms and on steep slopes facing the river will lead to the remaining trees becoming less wind-firm and cause ecological damage. **We request that further analysis of stand characteristics (including tree density, diameter averages, and age distribution within the units) is addressed through the planning process.**

REGENERATION HARVEST AND EARLY SUCCESSIONAL SYSTEMS

BLM's scoping letter states that one possible purpose for "regeneration harvest" in the Bi-County project is to "produce complex early-successional ecosystems".

From past experiences with other timber sales, we believe that "regeneration harvest" tends to leave few or no snags, and even when logging retains snags, the usual prescription is to have a minimum per acre which can be and has been considerably fewer than needed for cavity-nesting animals. As snags decay, they provide a long-term nutrient and water supply, and their removal obstructs nutrient cycling on the site. As such, this practice can reduce the species richness and key ecological processes associated with natural early-successional ecosystems.

In addition, natural early-successional forest ecosystems have unique characteristics, including high species diversity, complex food webs and ecosystem processes.[7] Compared to historic conditions (i.e. before industrial-scale logging was common on public lands), this type of habitat is currently lacking on the public forest landscape, mainly because of the decades federal agencies have suppressed fires, and programmatically "salvage" logged the areas where fires do occur and replanted conifers, quickly taking away any early-seral habitat value. The only way to produce large, complex early-seral habitats is through a natural pathway, wildfire.

Even though natural, complex early-seral habitats are lacking in our forests, early-successional habitats that have partial habitat values produced by regeneration harvest is abundant in this area and most other managed areas. Furthermore, timber harvesting is only one source of early successional habitat. Agriculture, land clearing for human habitations, and other forms or human development create both early successional habitat and edge effects. These types of early-seral habitats have provided plentiful resources for animals that rely on early-seral habitats when currently the wildlife species requiring mature forest are losing habitat rapidly.

In addition, there are some units where regeneration harvest would be costly and ecologically damaging. Units like 15A-D which have steep slopes could require helicopter logging. This type of activity in this unit could increase

[7] Swanson, M. E., et. al. 2010. The forgotten stage of forest succession: early-successional ecosystems on forest sites. Frontiers in Ecology and Environment: 10.1890/090157

sedimentation to Butte Creek, potentially reducing habitat quality for salmon species. The alternative action for this area would be commercial thinning but would be equally damaging to the area since the area is prime wildlife habitat. We therefore strongly recommend that this unit be dropped.

Bark has worked over the years to leverage public support in ending the destructive practice of clearcutting on Mt. Hood's forests, and interprets this proposed action as a relapse to the type of traditional forestry that has led to the majority of human-caused, long-term impacts on the forest today. Given that natural, complex early-seral habitat can only be produced by natural wildfire and the needs for early-seral habitats are being met via other forms of human development, we do not endorse the use of large-scale "regeneration harvest" as part of this project, and do not believe it would meet the goals of enhancing early seral habitat.

SKIPS ON AREAS OF HIGH DIVERSITY

In many areas throughout the sale, there are places that are of high diversity, or add diversity to the surrounding area, and are thereby valuable habitat. However, these areas vary considerably and need further clarification.

Within units 13A, there are areas that have a mixture of habitat qualities and provide habitat for a wide range of wildlife. These areas have special habitat components such as clumps of minor species (hardwoods and conifers), large snags, down logs, and wet areas. Furthermore, there are areas of unit 13B that have hardwoods that are not typically common in forested areas such as oak and cherry species.

Furthermore, in units 25A and B, there are clumps of minor species that bring diversity to the units. These areas include either places that have a mixture of Doug Fir and true fir species or a mixture of Doug Fir and maple species.

Areas with higher diversity can act as an oasis for wildlife, even within actively managed timber units. Therefore, in addition to areas that are valuable habitat such as riparian areas and mature forest patches, skips should be placed where there are special features such as clumps of minor species, large snags, down logs, wet areas, or locations of rare species.

OHVS IN UNIT 27A

Outside unit 27A there are designated OHV trails which connect with existing, established trails within the unit itself. Bark has seen these trail networks

expand post-logging, especially if logs are skidded off the trails and temporary roads and skid trails are not blocked and rehabilitated in a timely manner.

Some road closure and trail rehabilitation projects completed recently within Mt. Hood National Forest's Goat Mountain project area have been effective in reducing unauthorized OHV use in stands proposed for thinning. Restoration actions have included boulders and slash being placed along the road, berms, obliteration, re-contouring/de-compacting, re-vegetating, and the removal of trash. We believe these actions that where implemented have been effective and encourage the FS to employ these types of strategies within the Bi-County project.

While Bi-County is under contract, roads and skid trails constructed for the project could provide unregulated motorized access over the course of multiple years, as roads may be needed for more than one season.

To prevent expansion of the existing OHV trail network, Bark requests a commitment from the BLM to enforce effective barricades on roads and skid trails built or rebuilt for this project when operations are not occurring. This includes time when the area is still under contract but outside the normal operating season.

We suggest that any final decision mitigate potential risks associated with future road development by: 1) continuing to firmly limit construction of new roads; 2) ensuring controlled access during the project implementation; and 3) ensuring timely & secure road closure upon the project's completion.

In order to restrict access to temporary roads and skid trails built or rebuilt for this project when operations are not occurring (including between the normal operating seasons if work in sale unit in question is not complete in one season), please consider the following recommendations:

- Between operating seasons and at the conclusion of the contract, include seasonal erosion control measures such as waterbar placement, and diversion ditch creation;

- Between operating seasons and at the conclusion of the contract, include piling slash on the first few hundred feet of temporary road or skid trail, and placing boulders at the entrance to units from main road;

- Incorporate skips to help obstruct unauthorized OHV use in thinned units. Leave a thick, "vegetated screen" along roads in areas where OHV use is expected based on past and current use. If there are areas within

the units in question that would benefit ecologically from skips (such as seeps or other riparian areas), do not remove these in exchange for the vegetated screens, but look to achieve both the visual and ecological goals of the skips in these units;

- Provide adequate Sale Administration staffing for workload, so that coverage is available when the assigned Sale Administrator is not working;
- Require the Sale Administrator to discuss all requirements with contractor at pre-work meeting, review all pre-work discussions with contract representatives on site, and reemphasize as unit completion is eminent;
- Require inspection by Sale Administrator before contractor's equipment is moved offsite;
- Require implementation and effectiveness monitoring of PDFs by both Sale Administrator and other specialists, including during the harvest activities; and
- After project implementation and before conclusion of the contract, fully implement and monitor effectiveness of the aforementioned activities in order to impede further damage from unauthorized motorized access to units after thinning has taken place.

PRESENCE OF RED TREE VOLES

According to the IUCN Red List, red tree voles are "near-threatened"[8] and were formally Category C Survey and Manage species under the Northwest Forest Plan. Threats to this species include loss of forest habitat and forest fragmentation. This species has limited dispersal capabilities, and early seral stage forests (which largely surround Bi-County units) may be a barrier to dispersal.

On a recent field trip, we were told by BLM staff about the presence of a red tree vole nest in unit 23A. BLM has been pressed by conservation groups recently to consider new information (from either within the agency or from the

[8] Linzey, A.V. & NatureServe (Scheuering, E. & Hammerson, G.). 2008. Arborimus longicaudus. The IUCN Red List of Threatened Species 2008: e.T42615A10729936.

public) regarding red tree voles in their planning process after official surveys have been completed. Bark requests that any new information regarding the presence of red tree voles be included in the NEPA effort, and that no-cut buffers are immediately applied. **For this, and for the red tree vole nest already identified by the BLM, we recommend a 10-acre surrounding buffer where no ground disturbing activities or tree cutting can occur.**

CUMULATIVE EFFECTS

After spending some time in the area assessing the accessible units, and noting the conditions of the surrounding area, the cumulative effects of logging in this area is hard to ignore. Exploring these units, we saw ample signs of wildlife and migratory bird activity. These intact forests are vital for the critters of the area when everything else is tree farms and agriculture. As one example, many birds migrate from the mountains in the winter seeking similar habitat in the lowlands to spend the season. We hope to see a strong "big picture" analysis of the wider ecosystem to fully assess the impact of implementing this project.

The regulations implementing NEPA state that cumulative effects result "from the incremental impact of the action when added to other past, present, and reasonably foreseeable future [federal and non-federal] actions." 40 C.F.R. § 1508.7. "Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts." There will certainly be cumulative effects of logging 705 acres of forest on soils, vegetation and wildlife in concert with ongoing activities and the activities of your neighbors. The BLM needs to analyze the cumulative impacts of this project and other past, current, and future projects, including timber sales, herbicide use, and other recreation and management activities on the watershed.

To correctly assess the cumulative effects of a logging project, it must be analyzed in light of a much wider spatiotemporal context. The current and future conditions of adjacent lands must be factored into the assessment, whether or not the surrounding area comprises public or private land. In other words, how the proposed thinning project will affect the environment *in combination with* surrounding land management activities. Most of the analysis we have seen regarding the scattered O & C Lands are erroneously analyzed as an isolated project, regardless of surrounding management activities. While we recognize the challenges of gaging the effects of the

activities of others, the BLM needs to prioritize the health of the ecosystem over merchantable timber.

Looking back to see historically how the BLM has engaged with cumulative effects we found the following analysis in the Annie's Cabin EA, "Effects to the watershed would continue to occur from the development of private and other agency lands (primarily timber harvesting and road building)" (EA/FONSI, page 34). These effects are not accounted for, or even mentioned, in the cumulative effects determination for the proposed action. We hope to see more with the Bi-County EA.

This area has a history of clearcut logging, and much of the adjacent industrial land is in a short rotation, with plans on the horizon for wide scale cutting. More information is needed about the nature of private land use, past management history and future management plans. How do these plans, in combination with your own, effect the watersheds? Fish? What will be the overall road density in the area? What is the available habitat for critters that are dependent upon intact forest? How will this project meet snag and downed wood requirements? These are some of the questions that we need to engage with to fully understand impacts to the overall landscape.

Also, if this land is designated to undergo cyclic disturbance, an accurate and complete cumulative impact analysis must include adverse effects anticipated because of future thinning. The exact time of future harvest is perhaps not known but if that is the intent, to "achieve continual timber production" than it is clear future actions are anticipated.

We look forward to seeing a large-scale analysis of the Butte Creek and Rock Creek watersheds, assessing the cumulative effects of this proposal.

ACTIVE MANAGEMENT IN RIPARIAN RESERVES

Throughout the scoping comment period, Bark volunteers and staff members have noticed that there is no specific management direction within Riparian Reserves. This is mainly due to the type of land allocation that the Bi-County timber sale is under, MITA. Regardless of the land allocation, we are concerned about the treatments within these areas because Butte Creek has recently found Salmon traveling up this river and riparian areas are often associated with high diversity and excellent habitat. Furthermore, many studies have been

pointing to passive management as the best approach to maintain the existing conditions or restore healthy conditions within riparian areas.

Pollock and Beechie reviewed the sizes of deadwood and live trees used by different vertebrate species to understand which species are likely to benefit from different thinning treatments.[9] They then examined how riparian thinning affects the long-term development of both large diameter live trees and dead wood. Ultimately, they used a forest growth model to examine how different forest thinning intensities might affect the long-term production and abundance of live trees and dead wood. In Pollock and Beechie's study, passive management created dense forests that produced large volumes of large diameter deadwood over extended time periods as overstory tree densities slowly declined.

Pollock and Beechie's results showed that the few species that utilize large diameter live trees exclusively may benefit from heavy thinning, whereas species that utilize large diameter dead wood benefit most from light or no thinning: "because far more vertebrate species utilize large deadwood rather than large live trees, allowing riparian forests to naturally develop may result in the most rapid and sustained development of structural features important to most terrestrial and aquatic vertebrates."

Spies et al. concluded that thinning produces unusually low-stem-density forests and causes long–term depletion of snag and wood recruitment that is likely detrimental in most riparian areas.[10] According to this work, thinning with removal of trees will generally produce fewer large dead trees across a range of sizes over the several decades following thinning and the life-time of the stand relative to equivalent stands that are not thinned. Generally, recruitment of dead wood to streams would likewise be reduced in conventionally thinned stands relative to un-thinned stands.

Considering the developing science around riparian thinning, the solution to this problem may NOT be to take more trees out of the ecosystem before they reach the age/size to fall on their own. Removing the trees that are most likely

[9] Pollock, Michael M. and Timothy J. Beechie, 2014. Does Riparian Forest Restoration Thinning Enhance Biodiversity? The Ecological Importance of Large Wood. Journal of the American Water Resources Association (JAWRA) 50(3): 543-559. DOI: 10.1111/jawr.12206

[10] Spies, T., M. Pollock, G. Reeves, and T. Beechie. 2013. Effects of riparian thinning on wood recruitment: A scientific synthesis. Science Review Team, Wood Recruitment Subgroup, Forestry Sciences Laboratory, Corvallis, OR, and Northwest Fisheries Science Center, Seattle, WA. 28 January 2013. 46pp. http://www.mediate.com/DSConsulting/docs/FINAL%20wood%20recruitment%20document.pdf

to die naturally, which are necessary for watershed health, are especially important as there have been recent sightings of anadromous fish species in Butte Creek.

We are recommending that the BLM uses passive management within areas that fit the criteria of riparian habitat. With less habitat being available for cold water fish species, every new potential habitat that may be affected by timber harvesting should be under careful analysis. We're looking forward to the analysis of these areas during the EA process.

CLIMATE CHANGE

The evolving analysis of climate change within the NEPA process is an important benchmark in the future of public involvement. This has become a major point of concern, not just for the scientific community, but an issue that has squarely fallen within the public interest. The White House's Council on Environmental Quality (CEQ) released this past summer final guidance for federal agencies on how to consider the impacts of their actions on global climate change in their NEPA analysis. This final guidance provides a framework for agencies to consider both the effects of a proposed action on climate change, as indicated by its estimated greenhouse gas emissions, and the effects of climate change on a proposed action. This guidance advises agencies to quantify projected greenhouse gas emissions of proposed federal actions whenever the necessary tools, methodologies, and data inputs are available. The CEQ provided a suite of tools for federal agencies to use on their Greenhouse Gas (GHG) Accounting Tools page. While the BLM did include numbers on greenhouse gas emissions from the recent Hole in the Road project, as far as Bark is aware the agency did not use any of these tools in their methodology, but did use the ORGANON model to calculate carbon flow as a result of project implementation.

A report released by the Center for Sustainable Economy, Geos Institute and Oregon Wild late last year reveal that these emissions have averaged between 9.75 and 19.35 million metric tons carbon dioxide equivalent (MMT CO2-e) per year since 2000 on forestlands in western Oregon. This represents between 16% and 32% of the 60.8 million MMT CO2-e "in-boundary" emissions estimated for the Oregon by

the latest (2012) GHG inventory (Making the forestry sector Oregon's #2 contributor to greenhouse gas emissions). While it is helpful to have the context of what the Bi-County project's emissions will be compared to Portland's daily vehicle emissions, If the public is to understand the BLM's role in the climate change discussion it would be even more helpful to place this project's emissions in the context of its contribution to the total timber sale emissions by the BLM in western Oregon.

The aforementioned CEQ guidance required the BLM to consider alternatives that would make the action and affected communities more resilient to the effects of a changing climate. The BLM should also choose mitigation measures to reduce action-related GHG emissions or increase carbon sequestration in the same fashion as they consider alternatives and mitigation measures for any other environmental effects. Climate change will continue to have noticeable and/or measurable impacts across the region. To address this damage, BLM is also obligated under FLPMA to prevent "unnecessary or undue degradation" or "permanent impairment" based on damage that is noticeable and measurable throughout the entire resource area.

Temperatures are expected to increase as an effect of climate change, especially in the spring and summer, while predicted changes to seasonal precipitation vary, but are generally expected to slightly decrease in the summer and slightly increase in the winter.[11] Locally, the Oregon Climate Change Research Institute released an extensive report, available at http://occri.net/ocar, which discusses significant changes in rain patterns. The consensus is that the future will bring larger storms and longer periods of drought to the west side of the Cascade Mountains. As such, riparian restoration should include the reestablishment of riparian plant species that are resilient to both floods and droughts. The most recommended form of protecting the biodiversity of riparian areas is through landscape connectivity, and this is especially true in terms of a changing

[11] Chmura, Daniel J.; Anderson, Paul D.; Howe, Glenn T.; Harrington, Constance A.; Halofsky, Jessica E.; Peterson, David L.; Shaw, David C.; St Clair, Brad J. 2011. Forest responses to climate change in the northwestern United States: ecophysiological foundations for adaptive management. Forest Ecology and Management. 261: 1121-1142.

climate. Rivers encounter many types of terrain along their route, and are used directly by animals as thoroughfares between different habitats, or indirectly as rivers' tributaries create a multitude of microhabitats in one given terrain which help sustain groups of populations. Rivers themselves also act to support different population directly or indirectly through the provision of food sources.

In climate change events of the past, riparian areas acted as a refuge for organisms as a heat buffer and heat sink and are expected to act similarly in the next climate change event. Thus, vegetation restoration to provide shade over riparian zones will be crucial to the success of riparian inhabitants, as well as provide the latent effects of water purification and filtration. As increased flooding is a likely effect of climate change, the reunion of rivers to their floodplains will help reduce storm surge and flooding effects far greater than that of levees.[12]

BLM asserts that increased atmospheric CO2 may increase tree growth through increased water use efficiency, but this will depend on the local factors limiting tree growth.[13] Using a spatially comprehensive network of Douglas-fir chronologies from 122 locations that represent distinct climate environments in the western United States, Restaino et al. show that increased temperature decreases growth via vapor pressure deficit (VPD) across all latitudes.[14] As temperature continues to increase in future decades, we can expect water-deficit-related stress to increase, and consequently Douglas-fir growth to decrease throughout its US range. Multiple studies of plant growth in elevated CO2 environments have shown that atmospheric carbon rarely limits plant growth. Every study we have reviewed has demonstrated that plant growth rates are typically limited by other factors, e.g. moisture or soil nutrients. Can BLM point to a study showing CO2 to be the limiting factor in the rate of tree growth in any ecosystem or

[12] Seavy NE, Gardali T, Golet GH, Griggs T, Howell CA, Kelsey R, Small SL, Viers JH, Weigand JF. 2009. Ecological Restoration, 27:3; 330-338.

[13] Penuelas, J., Hunt, J.M., Ogaya, R. and Jump, A.S., 2008. Twentieth century changes of tree - ring δ13C at the southern range - edge of Fagus sylvatica: increasing water - use efficiency does not avoid the growth decline induced by warming at low altitudes. Global Change Biology, 14(5), pp.1076-1088.

[14] Restainoa, C.M., D. L. Peterson, and J. Littell. 2016. Increased water deficit decreases Douglas fir growth throughout western US forests. PNAS 2016 113 (34) 9557-9562

species?

Furthermore, the 50% or more canopy reduction in these "thinning" proposals reduces both transpiration and shading, warming the local microclimate. This accelerates the decomposition of forest floor organic matter, releasing not only carbon dioxide but other global change gases such as nitrogen oxides, which create local pollution and catalyze the destruction of stratospheric ozone, and methane, a much more powerful greenhouse gas than carbon dioxide.

Climate change will not only affect natural systems directly; it will also intensify the impacts of human activities such as off road vehicles, road-building and logging. The BLM must analyze the impacts of these activities in the broader context of climate change and acknowledge that the historic impacts of these activities will be exacerbated by climate change. The BLM must then commit to specific management actions to address the increased impacts of these threats now and to take additional actions as necessary. Increased winter rainstorms provide a positive feedback to erosion from road building, logging and other human soil disturbances. Increased summer drought provides a positive feedback to the increase in local temperatures from land clearing.

A common assumption is that as climate change intensifies, so do the stresses on the forest system, and thus the forest needs to be managed to remove those stresses. This logic often fails to account for the effect that logging has on mycorrhizal growth. Thinning can impact the health and prevalence of ectomycorrhizae in forests, which also help mitigate the effects of drought on individual trees and increase availability of nutrients to trees included in the common mycorrhizal network.[15] Additionally, wood debris from current or future fallen snags act as both inoculum and growth medium for mycorrhizal species and also as a water retention site in the soil. In fact, exporting organic matter out of the forest only limits the ability of mycorrhizae to respond to soil compaction as woody soil debris act as a refuge for certain species. In addition, harvesting equipment compacts the soil,

[15] Wienscyz AM, Gamiet S, Durall DM, Jones MD, Simard SW. 2002. Ectomycorrhizae and Forestry in British Columbia: A Summary of Current Research and Conservation Strategies. B.C. Journal of Ecosystems and Management 2:1.

limiting the movement of oxygen and water through the soil and destroying soil structure. These effects of soil compaction on forest ectomycorrhizal networks can last up to 45 years.[16][17]

In regards to climate change's effects on species, the IPCC states that (1) about 20-30% of known plant and animal species are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5-2.5°C; (2) types of changes seen in plants include range shifts (in both latitude and elevation) and changes in growing season length, and threatened systems include those with physical barriers to migration (e.g. montane ecosystems); (3) non-climate stresses can increase vulnerability to climate change by reducing resilience and adaptive capacity; and (4) unmitigated climate change would, in the long term, be likely to exceed the capacity of natural and managed systems to adapt.[18]

Organisms can respond to climate change by existing in less affected microclimates, by adapting, or by migrating. By assisting the abilities of species to do these three things, greater levels of biodiversity can be maintained and preserved. The BLM can support this by avoiding fragmentation of habitat zones and increasing connectivity between habitats, as well as increasing ecosystem redundancy. Increasing redundancy has the beneficial effect of allowing a species to persist even if a local population dies out. Redundancy can be done literally or functionally; i.e. creating lots of similar habitats or lots of different and distinct habitats with similar purposes—both are useful. Restoring native areas helps establish habitat for existing

[16] Amaranthus, MP, Page-Dumroese D, Harvey A, Cazares E, Bednar LF. 1996. Soil Compaction and Organic Matter Affect Conifer Seedling Nonmycorrhizal and Ectomycorrhizal Root Tip Abundance and Diversity. US Department of Agriculture Forest Service. Pacific Northwest Research Station, Portland, Oregon. Research Paper PNW-RP-494.
[17] Froehlich, Henry A.; Miles, D.W.R.; Robbins, R.W. 1985. Soil bulk density recovery on compacted skid trails in central Idaho. Soil Science Society of America Journal. 49: 1015-1017.
[18] Statement Of Dr. Beverly Law Professor, Global Change Forest Science Oregon State University And Ameriflux Network Science Chair Before The United States Senate Subcommittee On Public Lands And Forests Of The Senate Committee On Energy And Natural Resources November 18, 2009 Concerning Managing Federal Forests In Response To Climate Change, Including For Natural Resource Adaptation And Carbon Sequestration

organisms and increases ecosystem health and biodiversity, which help mitigate the stress of climate change and increase resilience.[19]

BLM is missing opportunities to practice adaptation planning. Failure to do so could allow harm from climate change to occur on sensitive wildlife habitat in the future, which can be interpreted as violating FLMPA obligations to prevent unnecessary degradation. The BLM can (1) increase or maintain carbon sequestration by avoiding forest removal, replanting forests, and restoring ecosystem function; and (2) facilitate response to climate change by sustaining genetic and species diversity through more forest preservation, enhancing landscape connectivity for migration/dispersal of plant and animal species, and by aiding dispersal to favorable climates. *Id.*

CONCLUSION

Bark has several suggestions for moving forward with the Bi-County project, and requests that the agency incorporate these suggestions and analyze these in the Environmental Analysis.

1. Limit construction of temporary and permanent roads;
2. Demonstrate how logging and roadbuilding within the area will maintain and restore the ecological services provided in the Bi-county project area
3. Re-evaluate Bark's road recommendations included above;
4. Demonstrate how silvicultural treatments will reduce fire risk and insect and disease outbreak;
5. Remove all silvicultural treatments in mature, never-logged forest stands in the Bi-County project;
6. Retain all trees 20 inches and above in diameter;
7. Provide information on stand characteristics including tree density, diameter averages, and age distributions
8. Consider and form alternatives to regeneration harvest that are not destructive;

[19] Dunwiddie PW, Hall SA, Ingraham MW, Bakker JD, Nelson KS, Fuller R, and Gray E. 2009. Rethinking Conservation Practice in Light of Climate Change. Ecological restoration, 27:3; 320-329.

9. In addition to identifying areas of high diversity, consider skips in areas of high diversity;
10. Consider the recommendations to prevent expanding existing OHV trails;
11. Protect a 10 acre area around the identified red tree vole nest;
12. Provide a specific explanation of how the measures planned for the Bi-County project (e.g. enhanced PDF's based on lessons learned from recent sales; more stringent sale administration, etc.) will be more effective than those used during past timber sales;
13. Consider an alternative which would make the action area and affected communities more resilient to the effects of a changing climate; and
14. Analyze the impacts of the Proposed Action in the broader context of climate change and acknowledge that the historic impacts of these activities will be exacerbated by climate change

As the BLM is considering the optimal method of accomplishing the objectives of the Bi-County project, please consider that active management is not always the best avenue to achieve forest health. In the comments above, Bark has provided ample suggestions to improve this project – based on our field surveys of the project area and relevant knowledge pertaining to thinning, roads, and forest health. We anticipate a thorough review of these comments and look forward to the necessary changes made to both the forthcoming decision and the project itself.

Thank you,

/s/Rachel Freifelder

/s/Scott Holland

/s/Gradey Proctor

Volunteers, Bark's Forest Watch Committee