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RE: Crystal Clear Timber Sale scoping comments

Bark's mission is to bring about a transformation of public lands on and around Mt. Hood National Forest 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 land lands surrounding Mt. Hood, including the areas proposed for logging in this project, for a wide range of uses including, but not limited to: hiking, skiing, nature study, non-timber forest product collection, spiritual renewal, and other recreation. We submit these comments on behalf of our supporters.

The Crystal Clear project would include 13,271 acres of commercial logging. Knowing this, it is critical that Forest Service (FS) staff take careful steps to foster public engagement by engaging with and responding to public comments as meaningful involvement with knowledgeable, concerned and engaged users of the forest often outweighs the importance of streamlining commercially-driven NEPA projects. We understand that this project is being planned through the Timber Sales Pipeline Restoration Fund, and must pay back the region at a rate of 130% for planning costs within a designated timeframe. As the FS appears to want to fast-track this timber sale, 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.

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

PROJECT PURPOSE & NEED

When first introducing the Crystal Clear Timber Sale to the Wasco Collaborative group in September, District Ranger Kameron Sam said that it was a "straight up timber sale", with the purpose of creating "shelf stock" of 60 mmbf to meet Mt. Hood National Forest's timber target of 35 mmbf/year. This was re-iterated at subsequent collaborative meetings, and captured in the recent executive summary of the March 2nd Wasco Collaborative meeting: "In the spirit of transparency, the CRR is receiving priority due the role the timber sale will have on generating revenue for future retained receipts and meeting the district's quota for timber sales."

Bark appreciated the candid nature of these disclosures by the Forest Service, as it helped build a sense of common understanding about the purpose of the project: to generate the board feet of timber expected from the Forest. However, the recent scoping notice backpedaled significantly from this expressed purpose.

The stated purpose of the project is to "provide forest products where there is an opportunity to restore resiliency to forested areas and reduce the risk of uncharacteristic wildfire." Thus written, it seems like providing forest products is simply a by-product of 1) restoring forest resiliency and 2) reducing the risk of uncharacteristic wildfire rather than the earlier stated purpose of meeting the agency's timber quota.

Drafting the purpose and need to make a "straight-up timber sale" masquerade as fuels reduction and a forest health restoration project is disingenuous and unnecessarily clouds discussions about authentic forest restoration, like road removal, underburning in dry forests, etc. Please re-write the purpose and need to acknowledge upfront that the goal of this project is to meet MHNF's timber quota.

Not only is it more honest to acknowledge the project's commercial timber focus, the forest health rationale given is not, in fact, needed. First, "restoring forest resilience" is the type of approach one would expect to see in a forest that had been degraded through past management such as clear-cuts. Much of the project area is located in mature undisturbed forest, which is widely recognized as the most resilient type of ecosystem in MHNF. How could commercially driven extraction *increase* the resiliency of a native ecosystem?

Second, why propose to reduce the risk of "uncharacteristic wildfire" in moist forests that are likely within their natural fire regime? 6,296 acres of the project is in moist mixed conifer where fire is not a regular presence and the forest is

not outside of its natural fire regime. This was confirmed in the March 2nd Wasco Collaborative meeting (from the notes): "Jeremy asked why they didn't just introduce fire into the stand. Whitney explained because of the moist growing conditions fire *isn't a typical disturbance* and burning wouldn't be successful like in more arid parts of the forest." Fire is not a typical disturbance in this forest type and when it does come, stand replacing fires are the norm. Characteristic wildfire *would* be stand replacing. By artificially altering the forest structure to make it less susceptible to stand replacing fire, this project would actually be increasing the risk of "uncharacteristic wildfire" thus contrary to the stated purpose & need.

THE WINTER SCOPING, PLUS LARGE SIZE, OF THIS PROJECT PROHIBITS THE PUBLIC FROM MEANINGFUL ENGAGEMENT

Bark has continually voiced concerns about the time frame for public involvement in very large projects, especially when the public comment period overlaps with times of winter inaccessibility, and did so with the 2010 Bear Springs NEPA process. Similar to Bear Springs, the Crystal Clear project area was entirely covered by snow during this scoping period. Thus, there are many site specific features of the area that Bark groundtruthing volunteers could not see – as access was barred or they were covered by feet of snow. In addition, the very large size of the project, and the fast timeline the Forest Service is anticipating following, hamper meaningful public involvement in the planning process.

Bark's concerns about the size and timing of this project go to the very purpose of NEPA, that: "federal agencies shall to the fullest extent possible: (b) implement procedures to make the NEPA process more useful to decisionmakers and the public, (d) encourage and facilitate public involvement in decisions which affect the quality of the human environment." 40 C.F.R. §1500.2. And that "[a]ccurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA." Id. at §1500.1(b). Despite this clear directive, the Crystal Springs project is being planned and analyzed in such a way that the public has been unable to fully assess the impacts of the sale or provide high quality involvement or feedback about the impacts of the proposed project. Please slow down a bit, expect additional scoping comments from Bark as the snow melts, and provide a robust public comment period on the forthcoming EIS when the entire area is accessible.

EFFECTS TO NORTHERN SPOTTED OWLS

Section 7(a)(2)of the Endangered Species Act (ESA) requires the Forest Service, in consultation with and with the assistance of the Secretaries of the Interior and Commerce, to insure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. 16 U.S.C. 1536(a)(2). The U.S. Fish & Wildlife Service recently updated the definition of destruction or adverse modification of critical habitat to mean: a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Crystal Clear, along with other timber sales in the Hood River & Barlow Districts, could immediately exacerbate the already degraded habitat conditions for this species.

In addition to the ESA's prohibition on destruction or adverse modification of Critical Habitat, the recent Critical Habitat Rule emphasizes the importance of protecting all high-value habitat, regardless of current occupancy: Given the continued decline of northern spotted owl populations, the apparent increase in severity of the threat from barred owls, and information indicating a recent loss of genetic diversity for the subspecies, retaining both occupied northern spotted owl sites and unoccupied, high-value northern spotted owl habitat across the subspecies' range are key components for recovery. Federal Register, 71879/ Vol. 77, No. 233 /Dec. 4, 2012. Increasing and enhancing of northern spotted owl habitat is necessary to provide for viable populations of northern spotted owls over the long term by providing for population growth, successful dispersal, and buffering from competition with the barred owl.

The 2012 Recovery Plan for the Northern Spotted Owl, the blueprint for management of this species on federal lands in the region, also contains the proviso that long-term benefits to spotted owls of forest thinning treatments must *clearly outweigh adverse impacts from commercial logging for fuels reduction.*

A recent study, Effects of Fire and Commercial Thinning on Future Habitat of the Northern Spotted Owl, tackles this issue head on, and concludes that the long-term benefits of commercial thinning do not clearly outweigh adverse impacts, *even if* much more fire occurs in the future.[2]

[2] Odion, D., Hanson, C., DellaSala, D., Baker, W, & Bond, M., 2014, The Open Ecology Journal, 7, 37-51.

In this study, the authors analyzed fire and forest recruitment trends in 19,000 km² of dry forests in the Klamath and 18,400 km² in the Cascades provinces. Using empirical data, they calculated the future amount of spotted owl habitat that may be maintained with fixed rates of high severity fire and ongoing forest regrowth rates with and without commercial thinning.

In the scenario most comparable to the current project (one time entry in the dry Cascades), the authors found that fuels-reduction thinning reduced *six times* more NSO habitat than it increased (by preventing it from burning in high-severity fire). If the Forest Service intends to maintain fuels reduction through maintaining the open canopy, the combination of thinning and maintenance reduced 6.7 times more late-successional forest than it increased.

The authors found:

Even an immediate doubling of fire rates due to climate change or other factors would result in far less habitat affected by high-severity fire than thinning. In addition, much of the high-severity fire might occur regardless of thinning, especially if the efficacy of thinning in reducing high-severity fire is reduced as fire becomes more controlled by climate and weather. Clearly, the strategy of trying to maintain more dense, late-successional forest habitat by reducing fire does not work if the method for reducing fire adversely affects far more of this forest habitat than would high-severity fire, and the high-severity fire might occur anyway because it is largely controlled by climate and weather.

In addition to the loss of habitat from thinning being much greater than the loss from a future potential fire, the adverse impact to owls from fire, even high-severity fire, are often overstated. Owls may actually benefit from wildland fire, as recognized out in the NSO Recovery Plan:

"For spotted owls nesting in burned areas, reproductive rates are generally similar to unburned areas (Gaines et al. 1997, Bond et al. 2002, Clark 2007)." *III-30.*

"Bond et al. (2009) found owls selecting burned areas, including high-severity burns, over unburned areas for foraging when those areas were within 1.5 kilometers of a nest roost site." *III-30.*

"There is evidence of spotted owls occupying territories that have been burned by fires of all severities." *III-31.*

Unlike commercial logging, spotted owls evolved with fire and they extensively use forests that have burned. Hanson et al point out that: "Fire has been incorrectly perceived as a risk to NSO [northern spotted owl when in fact it may be a key source of habitat heterogeneity required by the NSO in parts of its range . . . Natural heterogeneity from mixed-severity fires may also offer some insurance against unexpected disturbance or severe effects of climatic change."[3]

The Crystal Clear project area provides an important north-south link for northern spotted owls. The USFS recognized this when they designated the critical habitat in Gate, McCubbins, and Clear subwatersheds. Unmanaged stands in the eastern portion of the watershed allowed NSOs to persist where logging has greatly reduced suitable habitat elsewhere (before 1855, suitable habitat conditions in the Eastside Zone only appeared on steep north aspects and topographically sheltered areas along perennial streams, whereas now it appears on the uplands as well). The White River Watershed Analysis also recognized that nesting habitat would likely decline over the long-term in the eastern portion of the watershed, and that habitat must be rebuilt in the "Transition and Crest Zones" to the west. To this end the FS recommended maintaining existing NSO suitable and dispersal habitat in the Eastside Zone until increases in such habitat have been achieved in the Transition and Crest Zones.

The Critical Habitat Rule advises that forest managers should focus active management in younger forest, lower quality owl habitat, or where ecological conditions are most departed from the natural or desired range of variability. Federal Register, 71882/ Vol. 77, No. 233 / Dec. 4, 2012. These are clearly *not* the conditions that describe the land proposed for commercial logging in this project.

The Northwest Forest Plan assumed that eventually 80% of the agency-designated reserves would grow old and provide late successional habitat, while at any given time approximately 20% of the reserves might be affected by disturbance. As a result of climate change these proportions are likely to shift toward greater disturbance and younger forests.

FS should adopt a decision for Crystal Clear that protects ALL existing suitable owl habitat, so it may become a larger part of the landscape and be given a chance to mature and provide complex habitat for owls.

[3] Hanson, C.T., Odion, D.C., Dellasala, D.A., and W.L. Baker. 2009. More-Comprehensive Recovery Actions for Northern Spotted Owls in Dry Forests: Reply to Spies et al., Conservation Biology, Volume 24, No. 1, 334–337.

On February 17, 2017 Judge Mendez in the Eastern District of California ruled in favor of Conservation Congress' lawsuit against the Smokey Timber Sale on the Mendocino National Forest. The Smokey Timber Sale area is significant in that the vast majority of the project is in a Late-Successional Reserve and designated Critical Habitat for the Northern spotted owl. The judge stated the Forest Service violated NEPA because of an inadequate range of alternatives, including failure to evaluate an alternative for a diameter limit on logged trees; inconsistent Limited Operating Periods; failure to address past monitoring practices; and failure to take the requisite "hard look" at the project. **Please analyze, in detail, an alternative that includes an 18-inch DBH limit.**

The lawsuit also forced the Forest Service to re-consult with the US Fish & Wildlife Service multiple times, resulting in the establishment of two new Activity Centers for the spotted owl. The Forest Service had inaccurately designated this area as foraging habitat instead of nesting habitat. It also misrepresented the critical habitat claiming it was marginal habitat that needed logging to "improve" it when the area has many large old growth tress providing excellent owl habitat. Please include a thorough analysis of impacts to NSO in your draft EIS that will not lead to the need of multiple rounds of consultation with FWS.

Lack of cumulative impacts analysis on East Cascades North, Subunit 7

ECN, subunit 7, is 139,983 acres of designated Critical Habitat, mostly in Hood River and Wasco Counties. In the contiguous northern section of the sub-unit, the recent Dalles II project resulted in a total degradation/loss of 785 acres of NSO dispersal and 575 degradation/loss of NSO suitable habitat, for a total of 1,360 acres of habitat degraded for up to 50 years. *Dalles II PA at 3-99*. An additional 365 acres of owl habitat were degraded by the Government Flats fire and the subsequent logging of the North Fork Mill Creek Timber sale. *NFMC EA at 3-28*. The Forest Service has also proposed an additional loss of 1,174 acres of critical habitat in ECN, subunit 7 from the Polallie Cooper Timber Sale. This adds up to almost 3,000 acres of degraded Critical Habitat in addition to that proposed to be degraded by the Crystal Clear project. What are the impacts of the Crystal Clear project when assessed cumulatively with these other past, present and reasonably foreseeable projects? **How does this comply with the Critical Habitat rule and the Spotted Owl Recovery Plan?**

There are three other key issues that MHNF must thoroughly explore in project analyses as they affect the viability of northern spotted owls: 1) long-term effects on prey species habitat, 2) increased competition and initiation of trophic

cascades resulting from the expanding range of the barred owl, and 3) the impact of new road construction and road re-building on northern spotted owl habitat.

Impacts to northern flying squirrels

According to agency cited research, thinning stands within Crystal Clear could reduce habitat suitability for northern flying squirrels from 30 to as much as 100 years. Northern flying squirrel (principal spotted-owl prey) populations in mature and second growth forests decline after the stands are thinned and remain at low levels. Squirrel populations in un-thinned patches are larger than in thinned, and even those decline after *adjacent* areas are thinned[4]. Predation seems to be the most limiting factor – thinning opens the stands and results in several decades when squirrels are very vulnerable to predation, so population remains very low. Prescriptions that retain visual occlusion in the mid-story layers are best suited for maintaining squirrel populations.

A paper published in 2013 by Todd M. Wilson and Eric D. Forsman, includes the suggestion that: "It may be possible to develop new thinning prescriptions that keep moderately high populations of arboreal rodents in young forests while still achieving long-term management objectives for the stand." In the case of Crystal Clear, one long-term objective is the viability of spotted owls in Critical Habitat. To achieve this, you could develop prescriptions in plantation stands that focus solely on skips (patches of trees left unthinned) and gaps (removal of patches of trees). This strategy is in marked contrast with most current prescriptions that typically thin throughout a stand (with or without delineated skips or gaps)." For this approach, Wilson and Forsman's research recommends keeping gaps small (100-400 m^2).[5]

Variable-density thinning keeps squirrel populations suppressed, and may do so for several decades until long-term ecological processes (which are often also suppressed during thinning) provide sufficient structural complexity in the mid-story and over-story favorable to squirrels. Since Wilson and Forsman's recommendations for managing forest include retaining areas of high stem density, retaining the mid-story, and retaining a contiguous closed canopy, we are concerned that the proposed project, especially in native stands, will not

[4] Wilson, T.M. 2010. Limiting factors for northern flying squirrels (Glaucomys sabrinus) in the Pacific Northwest: a spatio-temporal analysis. Ph.D. dissertation. Cincinnati, OH: Union Institute & University.

[5] Wilson, Todd M.; Forsman, Eric D. 2013. Thinning effects on spotted owl prey and other forest-dwelling small mammals. In: Anderson, Paul D.; Ronnenberg, Kathryn L., eds. Density management for the 21st century: west side story. Gen.Tech. Rep. PNW-GTR-880. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 79–90

retaining these key features. A strategy of maintaining adequate area and connectivity in dense, closed-canopy forests within managed landscapes by leaving areas of young forest un-thinned has been recommended by researchers to maintain northern flying squirrel populations.[6]

Increased interactions with barred owls

The Revised Recovery Plan for NSO identifies competition from the barred owl as a key threat to the spotted owl[7]. MHNF's recent NEPA analyses have little mention of the combined impacts of logging with the known effects of competition and trophic cascades associated with the barred owl. In the Pacific Northwest, the recent invasion of barred owls coupled with loss and fragmentation of intact forest is reducing population sizes of native species with limited adaptive responses to novel and fast-acting threats. As noted in the comprehensive work, *Population Demography of Northern Spotted Owls*[8], the fact that barred owls are increasing and becoming an escalating threat to the persistence of spotted owls does not diminish the importance of habitat conservation for spotted owls and their prey. In fact, the existence of a new and potential competitor makes the protection of habitat even more important, since any loss of habitat will likely increase competitive pressure and result in further reductions in spotted owl populations.

The *Population Demography* found, "[o]ur results . . .consistently identify loss of habitat and barred owls as important stressors on populations of northern spotted owls. In view of the continued decline of spotted owls in most study areas, it would be wise to preserve as much high quality habitat in late-successional forests for spotted owls as possible, distributed over as large an area as possible."

Dugger et al. modeled extinction and colonization rates for spotted owl pairs in the South Cascade Demographic Study area where barred owls were detected on some home ranges[9]. They found that extinction rates for spotted owls increased with decreasing amounts of old forest in the core area, and that the effect was 2 to 3 times greater when barred owls were detected. They found that colonization

[6] Manning, T.; Hagar, J.C.; McComb, B.C. 2012. Thinning of young Douglas-fir forests decreases density of northern flying squirrels in the Oregon Cascades. Forest Ecology and Management. 264: 115 –124.
[7] USDI, U.S. Fish and Wildlife Service. February 2011. Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls. Region One U.S. Fish and Wildlife Service, Portland, OR.
[8] Forsman, et.al, 2011, published for Cooper Ornithological Society.
[9] Dugger, K.M., R.G. Anthony and L.S. Andrews. 2011. Transient dynamics of invasive competition: barred owls, spotted owls, habitat composition and the demons of competition present. Ecological Applications 21(7): 2459-2468.

rates for spotted owls decreased as the distance between patches of old forest increased (i.e., increased habitat loss and fragmentation) and that barred owl presence similarly decreased the rate of colonization of spotted owl pairs. They concluded that conserving large blocks of contiguous old-forest habitat was important for reducing interference competition between the two owl species.

In another recent report, Holm et al. describe the potential trophic cascades triggered by the range expansion of the barred owl in our region. The authors suggest that the addition of the barred owl to PNW ecosystems may result in restructuring of communities or even potential local extinctions. If the rate of increase barred owl population continues, forests could experience a loss of prey species as well as loss of important ecological processes.[10] Increased predation pressure on traditional prey of the northern spotted owl by the barred owl could indeed result in a local decline of species present in the area of the Crystal Clear project such as northern flying squirrels and red tree voles.

Holm et al. discuss several potential indirect effects on ecosystem processes, which include a decline in tree and shrub growth and establishment through increased predation pressure on seed dispersing species as a consequence of barred owl predation. More barred owls could also result in the decline of tree squirrel abundance, which could indirectly lead to reduced recruitment and growth of these forests that rely on spore dispersal. A potential decrease in soil processing may also occur with the expansion of barred owls, since reduced numbers of burrowing small mammals would lead to subsequent declines in the rates of decomposition of organic matter and litter, and mixing of forest soil.[11] These impacts all need to be included in the Crystal Clear analysis.

Impacts of road construction

Northern spotted owls create an avoidance buffer of an average of 1,312 feet from forest roads.[12] The Crystal Clear scoping letter provided no maps of proposed road building for the project, so it is difficult to assess the impacts of road building and whether it overlaps with NSO suitable habitat. If the owls have a more than 1,000 foot avoidance area from roads, how will the road building and logging operations affect their use of the forest? While Bark anticipates that the FS will deem these roads temporary, they will have, at the least, an impact

[10] Holm, S.R., B.R. Noon, J.D. Wiens and W. J. Ripple. 2016. Potential Trophic Cascades Triggered by the Barred Owl Range Expansion. Wildlife Society Bulletin; DOI: 10.1002/wsb.714

[11] Pearce, J., and L. Venier. 2005. Small mammals as bioindicators of sustainable boreal forest management. Forest Ecology and Management 208:153–175.

[12] Wasser, S.K., K. Bevis, G. King, and E. Hanson. 1997. Noninvasive physiological measures of disturbance in the northern spotted owl. Conservation Biology 11(4): 1019–1022.

during operations and likely longer. The full impact of these roads on owls, and their use, over time must be assessed.

To fully address effects to northern spotted owls from this project, Bark requests that the FS do a full analysis of the cumulative impacts of the habitat loss, reduction in prey habitat, increase in barred owl populations, and impacts of roadbuilding in suitable habitat.

RESTORING BEAVERS TO THE WHITE RIVER WATERSHED

Historically, beaver-created wetlands were common in the White River watershed and especially throughout the eastern Crystal Clear project area. Beaver activity creates productive and complex slow-water habitats for fish, helps moderate both baseflows and peakflows, traps sediment and nutrients, and helps maintain riparian hardwood plant communities.

The White River Watershed Analysis (WA) makes it apparent that the removal of beavers from the watershed resulted in altered ecosystem processes and decreased functionality including higher erosion and sediment delivery into streams, changes in riparian plant community composition, changes in stand conditions, lack of presence of hardwood-dependent species, degraded fish habitat, and more. Beaver ponding is no longer significant within the Forest boundary, and many streams and wet areas that no longer support cottonwood dominated communities. In some places, conifers have invaded and replaced the hardwoods as a result of beaver removal.

Several species in the White River subbasin depend on riparian hardwoods including yellow warblers, red-eyed vireos, and downy woodpeckers. Black cottonwoods are especially important to downy woodpeckers for cavity excavation. The lack of beavers within the watershed is correlated to the lack of large cottonwood and alder.

Beaver dams and the habitat they create are considered the foraging habitat for the peregrine falcon, a R6 Sensitive Species. As a R6 Sensitive Species, current policy guides the FS to manage for suitable nesting and foraging habitat for the peregrine falcon. As beaver populations increase with development of beaver dams and ponds, waterfowl populations increase, which in turn provides increased prey species for the peregrine falcon.[13]

[13] Baker, B. W., and E. P. Hill. 2003. Beaver (Castor canadensis). Pages 288-310 in G. A. Feldhamer, B. C. Thompson, and J. A. Chapman, editors. Wild Mammals of North America: Biology, Management, and Conservation. Second Edition. The Johns Hopkins University Press, Baltimore, Maryland, USA

For wildlife advocates and agency specialists, reintroducing beavers into MHNF has been part of a long-term vision for restoring the health of Mt. Hood's ecosystems while creating resiliency against the projected effects of climate change on cascade environments. Bark supports this goal and encourages MHNF to explore the following tools relating to the process of beaver restoration as a part of the Crystal Clear project:

ODFW Guidelines for Relocation of Beaver in Oregon

The Beaver Restoration Guidebook - U.S. Fish and Wildlife Service

OFWO - Beaver Restoration

Beaver Restoration Toolbox

MidCoast Watersheds Council: Beaver Outreach & Education Materials

MARTENS, FISHERS, WOLVERINE, AND OTHER WILDLIFE

The White River WA cites evidence of both fisher and pine marten presence within the Crystal Clear project area. Management that emphasizes closed-canopy forests at lower elevations benefits the fisher and has a long-term result of promoting interactions between local populations adjacent to the project area. According to the WA, the White River subbasin may be large enough to support a viable population of fishers capable of providing individuals for recolonization of other adjacent portions of its former range, but only if this type of management is prioritized.

Martens are also associated with dense mature forests, are important indicators of a forest's biodiversity, and are vulnerable to management activities such as fuel reduction treatments that open the forest canopy or remove woody debris. Portions of this project area fall under the B5 Pileated Woodpecker/Pine Marten Habitat Area land designation that has the primary goal of providing mature and old growth forest habitat blocks of sufficient quality & quantity and distribution to sustain viable populations of pileated woodpecker & pine marten. It appears from the CCR project maps that "unmanaged stand logging" is currently proposed for places where B5 overlaps B2. Please ensure there is sufficient high quality Pine Marten habitat in the project area to meet the goals of this land designation.

Recently the Pacific Northwest Research Station investigated the effects of thinning on marten use of forest stands compared to untreated areas. In this study, twenty-two martens outfitted with GPS collars avoided openings and forest stands that had been treated to reduce small-diameter trees, understory plants, and logs in Lassen National Forest. During the summer breeding and kit rearing season, martens were 1,200 times less likely to be detected in openings and almost 100 times less likely to be detected in areas structurally simplified by fuel-reduction treatments compared to structurally complex forest stands. Marten behavior was more erratic, with increased speeds and decreased complexity of movements, in open and simplified stands compared to forested and structurally complex stands. Martens move 3 to 4 miles daily, which is energetically demanding and increases their vulnerability to predation compared to animals that have a smaller daily range. Since martens selected home ranges with fewer openings and avoided stands with reduced structural complexity, the researchers of this study concluded that populations would benefit from increased stand connectivity within home ranges and at a landscape scale.

In the White River WA at 6-14, there is a specific recommendation to retain Pine Marten Reserves 2011W and 2151M, because these areas are needed to provide connection in a fragmented landscape, and are part of the mitigation measures for McCubbins Gulch off-road vehicle area. Otherwise a large migration barrier exists between Clear Creek and White River both down Clear Creek and across the uplands north of the creek. **Knowing what the science is telling us about marten habitat, Bark does not support commercial logging in areas designated for management of pine marten**.

The White River subbasin also has some of the last sightings of wolverine within Mt. Hood NF. In fact, the subbasin may have historically acted as a major habitat link east of Mt. Hood with wolverine populations in Washington. Please analyse the impact of Crystal Clear on the long-term viability of this species within the project area.

Also according to the White River WA, the watershed contains several wildlife species which currently have significantly less suitable habitat than in 1855 (the document's historic reference point). These species include flammulated owl, great gray owl, white-headed woodpecker, pygmy nuthatch, loggerhead shrike, fisher, long-eared myotis, and pallid bat. Several of these species depend on relatively open stands of ponderosa pine/Oregon white oak or ponderosa pine/Douglas fir. However, several of these species also require snag habitat which has been shown to be put in a long-term deficit after commercial thinning. In addition, there is a loss of spotted owl nesting, foraging, and roosting habitat

within the Crystal Clear project area due to previous logging and fire exclusion, which has increased the need for this habitat, especially in the lower fringes of the middle and eastern project area. Active management which would convert stands within this area into open "parklike" stands may benefit some species listed above, but would reduce habitat suitability for northern spotted owls, martens, fishers and other species over the long-term. Bark supports actions to restore habitat for the above species, with utmost care given to maintain habitat for northern spotted owls, and with a priority given to non-commercial treatments which retain woody debris and a diverse mix of tree species.

Some subpopulations of redband trout may be genetically unique to the White River subbasin above White River falls. Among the greatest risks to this species is sedimentation of spawning and rearing areas, increased stream temperatures, and loss of habitat complexity. **Any riparian management in the Crystal Clear project area should prioritize mitigating these impacts to redband trout habitat and restoring conditions necessary for long-term recovery of this species.**

OREGON SPOTTED FROGS

The U.S. Fish and Wildlife Service (FWS) listed the Oregon spotted frog as threatened under the ESA on August 29, 2014. 79 Fed. Reg. 51658 (Aug. 29, 2014); *see also* 50 C.F.R. § 17.11(h). Scientific studies suggest that the species is lost from 70-90% of its historic range.[14]

The Lower Deschutes River Oregon spotted frog Critical Habitat Unit 7 consists of 90 acres which includes Camas Prairie and Camas Creek. Camas Prairie, within the Crystal Clear project area, is the only known location for this species east of the Cascades (and the only known population within Mt. Hood National Forest). The Camas Prairie Oregon spotted frogs are the most geographically isolated population, carry several alleles that are absent or rare in other sites, and have the lowest genetic diversity of Oregon spotted frogs rangewide. This population was once part of a larger metapopulation connected by the Big Meadow system (Camas Prairie, Clear Lake, Timothy Lake, Little Crater Meadows, Clackamas Lake) as late as the 1930s[15]. The frogs at this location

[14] K. A. Cushman and C. A. Pearl, A Conservation Assessment for the Oregon Spotted Frog, U.S.D.A. Forest Service Region 6 and U.S.D.I. Bureau of Land Management, Oregon and Washington, at 3 (Mar. 2007).
[15] Hayes, M. P. 1994. The spotted frog (Rana pretiosa) in western Oregon. Final report to the Oregon Department of Fish and Wildlife. 31 pp. + Appendices.

appear to be the only remaining representatives of a major genetic group that is now almost extinct. [16]

Spotted frogs are warm water marsh specialists that need periods of 3 or more months in warm standing water greater than 77°F to complete their reproductive cycle and mature. Camas Prairie at 86 acres currently provides this habitat, but if it drops to less than 11 acres the population will not persist.

Overgrazing of the Camas Prairie in Oregon was considered a threat to Oregon spotted frog prior to 2008, after which grazing was restricted. Overgrazing by cattle reduced the vegetative hiding cover for frogs, making them more susceptible to predation. Livestock-induced fertilization resulted in an increased density of the aquatic vegetation, which inhibited the ability of frogs to drop below the water's surface when threatened by predation while basking. Based on the 2012 egg mass count, the minimum population size of breeding adults is 152. Although the population trend has been positive at the single known location, the number of individuals in the population remains low.[17]

The White River watershed analysis makes multiple recommendations to designate Camas Prairie as a Special Interest Area to protect habitat for spotted frogs, as well as sandhill cranes, wild cranberry and *Cortinarius wiebeae* (should individuals exist there). The WA further recommends that the Special Interest Area should be large enough to include the "lodgepole pine/meadow edge dynamics".

The following factors have been identified as likely or potential threats to Oregon spotted frog populations:

- Direct loss of marsh habitat, particularly through conversion to other land uses;
- Alteration of hydrological regimes in extant marshes (*e.g.*, from dam construction, channel simplification, groundwater recession, hydroperiod modification);
- Interactions with non-native fishes and American bullfrogs;
- Vegetation changes such as succession and invasion by non-native species;

[16] Blouin, M.S., Phillipsen, I.C., & Monsen, K.J. 2010. Population structure and conservation genetics of the Oregon spotted frog, Rana pretiosa. Conserv Genetics 11:2179–2194. DOI 10.1007/s10592-010-0104-x

[17] DEPARTMENT OF THE INTERIOR Fish and Wildlife Service 50 CFR Part 17 [Docket No. FWS–R1–ES–2013–0013; 4500030113] RIN 1018–AZ04. Endangered and Threatened Wildlife and Plants; Threatened Status for Oregon Spotted Frog

- Livestock grazing, particularly in circumstances of high livestock density and duration, and where Oregon spotted frog habitat is area-limited or in more arid parts of range;
- Degraded water quality;
- Isolation from other Oregon spotted frog populations;
- Drought effects, both direct and indirect.

We request that the Crystal Clear project incorporate the following actions directed toward maintaining or improving local habitat conditions likely to benefit Oregon spotted frog persistence:

- Restore or maintain intact hydrological regimes where Oregon spotted frog may be detrimentally affected;
- Protect and restore ephemeral and permanent wetlands near existing Oregon spotted frog sites;
- Restore or maintain open water and early seral vegetation communities;
- Limit the spread and effects of American bullfrog in areas occupied or potentially suitable for reintroduction of Oregon spotted frog;
- Develop comprehensive grazing strategies or adaptive management plans where livestock will occur in Oregon spotted frog habitat;
- Work locally and cooperatively to maintain or restore habitat conditions, and to monitor outcomes of management actions directed toward Oregon spotted frogs.[18]

WHITE RIVER GRAZING ALLOTMENT

Public land grazing can alter vegetation, soils, hydrology, and wildlife species composition and abundances in ways that exacerbate the effects of climate change on these resources.[19] Removing or reducing livestock across large areas of public land would alleviate a widely recognized and long-term stressor and make these lands less susceptible to the effects of climate change. Batchelor et al. suggest that the removal of cattle can result in dramatic changes in riparian vegetation, even in semi-arid landscapes and without replanting or other active restoration efforts.[20]

[18] Cushman, K.A. & Pearl, C.A. 2007. A Conservation Assessment for the Oregon Spotted Frog (Rana pretiosa). USDA Forest Service Region 6; USDI Bureau of Land Management, Oregon and Washington

[19] Beschta RL, Donahue DL, DellaSala DA, Rhodes JJ, Karr JR, O'Brien MH, Fleischner TL, Deacon Williams C (2013) Adapting to climate change on western public lands: addressing the ecological effects of domestic, wild, and feral ungulates. Environ Manag 51:474–491

[20]Batchelor, J.L, Ripple, W.J., Wilson, T.M., & Painter, L.E. 2015. Restoration of Riparian Areas Following the Removal of Cattle in the Northwestern Great Basin. Environmental Management. DOI 10.1007/s00267-014-0436-2

The White River WA explores the legacy of damage to riparian areas resulting from uncontrolled/poorly controlled grazing of cattle, sheep, and horses prior to WWII and beyond. The document makes clear that "(m)erely removing livestock will not restore the native plant communities or riparian and stream channel conditions." Clear Lake is identified as one of the most impacted wet areas from grazing.

If physical damage to riparian areas has resulted from cattle grazing, long-term channel morphology and native vegetation may recover very slowly and will still exhibit impacts for many years. The WA recommends developing a monitoring program that specifically measures physical damage from cattle. The WA also recommends no grazing in wet meadows, protection of values along the edge of Camas Prairie, and a long-term reduction in grazing within the White River LSR (as forage levels drop over time). **Does the current level of grazing comply with the Aquatic Conservation Strategy? What about State Water quality standards? Has there been monitoring in recent years to assess this compliance? Is grazing currently allowed in LSRs, RRs, or meadows?**

AVOIDANCE OF FURTHER OHV RELATED IMPACTS

The Crystal Clear project area includes the McCubbin's Gulch OHV area, along with several roads (and user-created trails) that have been either closed or decommissioned but are likely in the FS's database for potential templates for temporary roads. Reopening routes which that are currently closed to OHVs also reopens the door for illegal and damaging activities if the roads are left open for an extended period of time.

We have seen these types of circumstances in other projects proposed by the USFS in the nearby Clackamas River Ranger District of Mt. Hood National Forest. Bark is concerned that building or rebuilding numerous roads for logging in Crystal Clear could result in an increase of OHV access, and would undo the restoration work done to remedy the damage done by the original entries.

Figure 1: Illegal OHV trail rehabilitation off FSR 4510

Some road closure and trail rehabilitation projects completed recently within the Clackamas River Ranger District's Goat Mountain project area have been effective in reducing unauthorized target shooting, OHV use, and garbage dumping in stands proposed for thinning (Fig. 1). 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 where implemented have been effective and encourage the FS to employ these types of strategies within the Crystal Clear project.

While Crystal Clear is under contract, roads 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.

Bark requests a commitment from the agency to enforce effective barricades on roads 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 should 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.

Specific Recommendations for reducing impacts from unauthorized recreational use in the Crystal Clear project:

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:

1. Between operating seasons *and* at the conclusion of the contract, include seasonal erosion control measures such as waterbar placement, and diversion ditch creation;
2. 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;
3. 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;
4. Provide adequate Sale Administration staffing for workload, so that coverage is available when the assigned Sale Administrator is not working;
5. 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;
6. Require inspection by Sale Administrator before contractor's equipment is moved offsite;
7. Require implementation and effectiveness monitoring of PDCs by both Sale Administrator and other specialists, including during the harvest activities;
8. 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.

LOGGING IN MATURE AND NATIVE FOREST

The best way to ensure that there is an overall increase of old growth forest habitat in the future is to let mature forests grow unmanaged. Furthermore there is new urgency to protect mature forests that store carbon in order to mitigate climate change impacts, and to provide additional habitat as soon as possible to increase the chances that the spotted owls can co-exist with the invading barred owl (both issues elaborated upon in other sections of these comments).

Any logging in mature stands, including thinning 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 BLM released a bibliography, complete with annotations, compiling studies that have examined the impacts of thinning in mature forest stands[21] which was recently reviewed by Paul Reed, a PhD student at the University of Oregon.[22] Overall, the studies included in the bibliography addressed a variety of characteristics of old-growth forest structure. Reed found that while thinning can positively affect certain aspects of old-growth development, such as minimally increasing diameter size, there is generally a lack of, or inconsistency in, evidence that thinning improves old-growth characteristics. This is especially true regarding 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 is most appropriate to implement a precautionary approach towards managing and thinning mature forest stands.

Bark has seen on the ground that mature stands start to exhibit old-growth characteristics 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."[23] When old forests are in 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.

[21] Powers, M., and S. Wessell. 2016. Management impacts and developmental patterns in mature Douglas-fir forests of the Pacific Northwest: An Annotated Bibliography.
[22] Reed, P. 2016. Reviewing the US Forest Service and Bureau of Land Management's "mature stand thinning" bibliography. Available by request.
[23] 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.

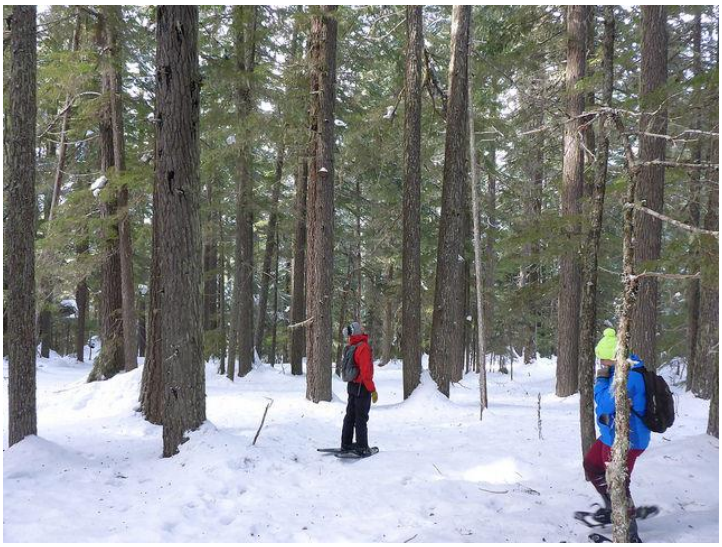

Figure 2: Stand conditions in "Unmanaged Thinning" #447

The FS describes the project area as "(d)ensely stocked non-fire resistant trees, diseased trees, large scale tree mortality areas, and down fuel are creating continuous fuel ladders from the ground to the tree crowns." In stands groundtruthed by Bark volunteers just southwest of the Skyline Snopark (between FSR 42, 4200-220, 4200-470; labeled as "Unmanaged Thinning" #447 on FS stand map, Fig. 2) we noted great structural and species diversity, with 12 species of conifers present (Doug fir, W. hemlock, grand fir, lodgepole pine, W. larch, Mtn. hemlock, W. red cedar, yew, noble fir, Pac. silver fir, Engelmann spruce, W. white pine)! Likely, as described in the scoping letter, this area saw stand replacing wildfires occurring every 100-200 years, and has not missed this fire interval. After making several site visits to this stand, we see no ecological justification for active management in a forest like this and will push back on any proposal which describes this action as "restoration".

Primary forests

The Paris Agreement reached at the 21st Conference of Parties to the United Nations Framework Convention on Climate Change (UNFCCC COP21) recognized the importance of ensuring ecosystem integrity and the role of forests in sequestering and storing carbon.

The World Conservation Congress, at its session in Hawai'i, United States of America, 1-10 September 2016 encouraged States, the private sector and international financial institutions to "avoid loss and degradation of primary forests, including intact forest landscapes". These ecosystems were identified as irreplaceable in terms of biodiversity conservation and ecosystem services including clean water. Native forests in the Pacific Northwest contain globally significant carbon stocks, and these significantly more carbon than degraded and fragmented forests. **Bark advocates for no silvicultural treatments in mature, never-logged forest stands in the Crystal Clear project and elsewhere.**

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. Last summer, the Council on Environmental Quality (CEQ) released 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.

However, on March 28, 2017 the Trump Administration issued an executive order titled "Presidential Executive Order on Promoting Energy Independence and Economic Growth" which attempts to relieve agencies from the requirement to consider the effects of GHG emissions and climate change: https://www.whitehouse.gov/the-press-office/2017/03/28/presidential-executive-order-promoting-energy-independence-and-economi-1. Among other things, this executive order rescinds the CEQ guidance regarding consideration of climate change in federal decision-making, but the E.O. also recognizes that "[t]his order shall be implemented consistent with applicable law" and "all agencies should take appropriate actions to promote clean air and clean water for the American people, while also respecting the proper roles of the Congress and the States concerning these matters in our constitutional republic." While the guidance was finalized in August 2016, it followed a series of court rulings addressing the issue of greenhouse gases and NEPA, which found that whenever greenhouse gases are significant or rise from the project, either directly or indirectly, they much be analyzed in a NEPA document. Thus, despite the E.O., the Forest Service must continue to carefully consider the effects of GHG emissions and climate change in all of its decisions.

The Forest Service has claimed the short-term carbon emissions and the difference in long-term carbon storage that could be attributable to the Proposed Action are of such small magnitude that they are unlikely to be detectable at global, continental or regional scales. Additionally, it has asserted that changes in carbon stores are unlikely to affect the results of any models now being used to predict climate change. The same thing could be, and is, said about every individual timber sale in National Forests in the Pacific Northwest. The failure of federal agencies to place projects within the context of emissions from logging on

a regional or statewide level has led the public to thinking that the forestry sector is no longer a contributor to global greenhouse gas emissions.

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 Crystal Clear project's emissions will be compared to Portland's daily vehicle emissions, if the public is to understand the FS's role in climate change 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 FS in Oregon.

The aforementioned CEQ guidance, which we encourage you to follow, requires the FS to **consider alternatives that would make the action and affected communities more resilient to the effects of a changing climate.** The FS 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.

The recommended form of protecting the biodiversity in riparian areas is through landscape connectivity. This is especially relevant in terms of a changing 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 flooding is an

impending issue of climate change, the reunion of rivers to their floodplains will help reduce storm surge and flooding effects far greater than that of levees.[24]

Research suggests that increased atmospheric CO_2 may increase tree growth through increased water use efficiency but this will depend on the local factors limiting tree growth.[25] 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 tree growth via vapor pressure deficit (VPD) across all latitudes.[26] As temperature continues to increase in future decades, we can expect deficit-related stress to increase and consequently Douglas fir growth to decrease throughout its US range.

Climate change will not only affect natural systems, it will also intensify the impacts of human activities such as off road vehicles, roadbuilding and logging. **The FS 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 FS must then commit to specific management actions to address the increased impacts of these threats now and to take additional actions as necessary.

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 individuals trees and increases availability of nutrients to trees included in the common mycorrhizal network.[27] Additionally, wood debris from current or future fallen snags act as an inoculum 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

[24] 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.

[25] 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.

[26] 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

[27] 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.

debris act as a refuge for certain species. In addition, harvesting equipment compacts the soil, 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.[28],[29]

In regards to climate change's effects on species, the Intergovernmental Panel on Climate Change (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.[30]

Organisms can respond to climate change by existing in less affected microclimates, by adapting, or by migrating. By assisting the abilities of creatures to do these three things, greater amounts of biodiversity can be maintained and preserved. The FS can do 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. Protecting currently "unmanaged" areas helps establish habitat for existing organisms and increases ecosystem health and biodiversity, which help mitigate the stress of climate change and increase resilience.[31]

The FS may be missing opportunities to practice adaptation planning, which could allow harm from climate change to occur on sensitive wildlife habitat in the future. The FS can: (1) increase or maintain carbon sequestration by avoiding

[28] 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.
[29] 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.
[30] 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
[31] 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.

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.*

FS MUST "RIGHT-SIZE" THE WHITE RIVER WATERSHED'S ROAD SYSTEM

As part of its analysis of the Crystal Clear project under NEPA, the Forest Service must consider Mt. Hood NF's Travel Analysis Report and identify the Minimum Road System.

Given that the Mt. Hood NF is considering changes to a number of miles of roads, and given the large geographic scale of this project, this is precisely the type of project where the Forest Service must consider its Travel Analysis Report (TAR) for the Forest, and identify the Minimum Road System (MRS).[32]

In 2015, the Forest Service released its TAR, a synthesis of past analyses and recommendations for project-level decisions regarding changes in road maintenance levels. Included in this report was a list of roads "not likely needed", with the objective maintenance level being "D-decommission".

In the Crystal Clear project area, there are several of these "not likely needed" (Objective Maintenance Level being D-decommission) roads. Bark requests the Forest Service consider decommissioning in this project for the following roads: FSR 2610-020; 4310-260; 4310-261; 2120-013; 2120-330; 2120-017; 2120-370; 2110-280; 2110-021; 2110-020; and the end of FSR 2110.

Mt. Hood NF staff have expressed to Bark that when considering proposed road work in proposed project areas, it is appropriate to recommend that the FS consider changes in maintenance levels on roads with high combined resource risk along with those recommended by the TAR for decommissioning.

For the Crystal Clear project area, please consider the opportunity for additional road decommissioning on the following roads with high combined resource risk (as defined by the TAR and displayed in Appendix 2 of the document): FSR 2110-270; 2110-272; 2110-220; 2130-281; 4885-150; and 4885-155.

[32] 36 C.F.R. § 212.5(b)(1) ("For each national forest . . . the responsible official must identify the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of National Forest System lands.").

MHNF's 2003 Roads Analysis lists the 6th filed watersheds that have the greatest percentage of roads within 200 feet of streams. Two of the 6th field watersheds in the project area, Wapinita Creek and Clear Creek, are in the top 15 watersheds in MHNF for roads near streams. *RA at 23.* Because failing roads are such a persistent source of sediment to streams and rivers, these watersheds should be the focus of ambitious road decommissioning, and specifically analyzed in the forthcoming EA.

In addition, the White River Watershed Analysis, in its recommendations for restoration projects, acknowledges that the Mt. Hood Forest Plan (LRMP) requires MHNF to reduce open road densities to 2.5 miles per square mile in big game summer range, 2 miles per square mile in inventoried winter range, 1.5 miles per square mile in A1 (White River National Wild and Scenic River), B2 (Scenic Viewshed) and B10 (Deer and Elk Winter Range) land allocations. *WRWA at 7-1*. Do the current road densities in the Crystal Clear project area comply with these LRMP standards?

In the Region 6 2005 Aquatic Restoration Strategy, areas with road densities above 2.0 miles per square mile were considered indicators for prioritizing watershed restoration. Terrestrial wildlife is also greatly influenced by road density. Roads impact wildlife in a variety of ways including direct mortality from vehicle collisions, increased poaching, over-hunting, and over-trapping facilitated by access; reduced numbers of snags and down logs; increased negative edge effects; facilitated or hindered movement depending on species; and chronic negative interactions with humans.[33]

The Pacific River Council's (PRC) recommended target road density of less 1.5 miles per square mile in 6th field watersheds is an additional example of a robust, science-based target for watershed restoration in Mt. Hood. PRC published these management recommendations after they were reviewed and contributed to by the Western Environmental Law Center, Friends of Mount Hood, Oregon Wild, Crag Law Center, the Columbia River Inter-Tribal Fisheries Commission, Clackamas River Providers, Oregon Trout Unlimited, Bark and several others. Currently, it is unclear what the current road density average for the Crystal Clear project area is. Please ensure that the NEPA document includes this information.

[33] Wisdom MJ, Holthausen RS, Wales BC, et al. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia basin: broad-scale trends and management implications. Volume 1 – Overview. Portland, OR: US Department of Agriculture, Forest Service, Pacific Northwest Research Station. General Technical Report PNW-GTR-485.

Road surface as a vector for sediment

Elevated road use for log-haul greatly increases erosion and sediment delivery on unpaved roads. Research on logging roads has consistently documented that roads used by more than four logging trucks per day generated more than seven times the sediment generated from roads with less use and more than 100 times the sediment from abandoned roads.[34] The Forest Service's own summary of scientific information on roads[35] concluded that "rates of sediment delivery from unpaved roads are . . . closely correlated to traffic volume." Even with a road surface of crushed rock aggregate,[36] documented that elevated truck traffic increased sediment production by 2 to 25 times that on unused roads in western Oregon.

Primary mechanisms for increased erosion and sediment production from road use are the production of highly mobile fine sediment on road surfaces, road prism damage, disruption of gravel or aggregate surfaces, and rutting. On constructed and reconstructed roads, the highly elevated sediment production from roads used for haul is delivered to streams at stream crossings and other points of connectivity between streams and roads, such as gullies and relief drainage features that dump elevated road runoff laden with sediment to areas in relatively close proximity (e.g., less than 300 feet) to streams. This impact of log hauling at stream crossings, alone, will greatly elevate sediment delivery to the stream system. **The Crystal Clear analysis should include data regarding the projected increase of sediment from log haul on <u>all</u> roads used.** If it is likely that sediment would increase from wet-weather hauling the FS should also include these projections in the analysis.

Temporary roads

The scoping letter states that "(t)he project includes utilizing system and temporary roads to facilitate implementation. In many cases, temporary roads are located on roads that were closed or decommissioned through a previous planning effort, but never effectively physically closed."

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[34] Reid, L.M., Dunne, T., and C.J. Cederholm, 1981. Application of sediment budget studies to the evaluation of logging road impact. J. Hydrol (NZ), 29: 49-62.

[35] Gucinski, H., M.J. Furniss, R.R. Ziemer, and M.H. Brookes. 2001. Forest roads: a synthesis of scientific information. General Technical Report PNW-GTR-509. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 103 p. Available online at: http://www.fs.fed.us/eng/road_mgt/science.pdf

[36] Foltz, R.B. and Burroughs, E.R., Jr. 1990. Sediment production from forest roads with wheel ruts. In: Proceedings from Watershed Planning and Analysis in Action. Symposium Proceedings of IR Conference, Watershed Mgt, IR Div, American Society of Civil Engineers, Durango, CO, July 9-11, 1990. pp. 266-275.

In recent projects, the FS planned to re-use previously decommissioned roads, and since many of these roads have been passively decommissioned, the agency claimed it will be achieving a net reduction in road density after the project when these roads are "rehabilitated". Bark has long found that, while this approach sounds good on paper, it does not reflect what happens on the ground. For example, Bark has been monitoring the implementation of the Jazz Timber Sale, and has found many roads that were not properly winterized and/or closed after the work had been complete. This was exactly what we told the Forest Service would happen in our comments, appeals and litigation on the Jazz project.

We request that the Crystal Clear analysis include a frank assessment of the FS's ability to ensure that "existing" roads are rehabilitated in a way that improves actual conditions on the ground. In addition, please define exactly what "rehabilitated" means, and the timespan in which a re-built, and re-decommissioned, road becomes hydrologically recovered.

It is well-documented that road construction vastly elevates erosion for many years, particularly in the first two years when the construction causes a persistent increase in erosion relative to areas in a natural condition. [37],[38],[39]. Specifically, major reconstruction of unused roads can increase erosion for several years and potentially reverse reductions in sediment yields that occurred with non-use. *Id.*

Road construction is by far the greatest contributor of sediment to aquatic habitats of any management activity.[40],[41] Even temporary road construction can cause resource damage including erosion and sedimentation, exotic species spread and disruption of wildlife.[42] Unpaved roads and stream crossings are the

[37] Potyondy, J.P., Cole, G.F., Megahan, W.F., 1991. A procedure for estimating sediment yields from forested watersheds. Proceedings: Fifth Federal Interagency Sedimentation Conf., pp. 12-46 to 12-54, Federal Energy Regulatory Comm., Washington, D.C.

[38] Rhodes, J.J., McCullough, D.A., and Espinosa Jr., F.A., 1994. A Coarse Screening Process for Evaluation of the Effects of Land Management Activities on Salmon Spawning and Rearing Habitat in ESA Consultations. CRITFC Tech. Rept. 94-4, Portland, Or.

[39] Beschta, R.L., Rhodes, J.J., Kauffman, J.B., Gresswell, R.E, Minshall, G.W., Karr, J.R, Perry, D.A., Hauer, F.R., and Frissell, C.A., 2004. Postfire Management on Forested Public Lands of the Western USA. Cons. Bio., 18: 957-967.

[40] Meehan, W.R. (ed.). 1991. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. Am. Fish. Soc. Special Publication 19.

[41] Robichaud, P.R., L.H. MacDonald and R.B. Foltz. 2010. Fuel management and erosion. Ch. 5 in: W.J. Elliot, I.S. Miller and L. Audin (eds.). Cumulative Watershed Effects of Fuel Management in the Western United States. USDA For. Serv. Rocky Mtn. Res. Sta. Gen. Tech. Rep. RMRS-GTR-231. Fort Collins, CO.

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

major source of erosion from forest lands contributing up to 90% of the total sediment production from forestry operations.

Much of the FS's claim that the road building will not significantly impact the environment is built around its claim that the temporary roads would be decommissioned and revegetated immediately following completion of harvest operations. These claims are not reassuring. As noted above, Bark's post-logging monitoring has found numerous instances of temporary roads left open, with no erosion control measures, many seasons after logging had been completed, such as in the Swag, Dry, Bass, and Drum timber sales in the Clackamas River Ranger District. The problem is so systemic that when NMFS assessed the Jazz Timber Sale, it estimated that "…approximately 21% of the roads may not be decommissioned after project completion". *Jazz LOC at 25*. This does not provide much assurance that the Forest Service will, in fact, follow-through with the road work these projects require.

The commonly accepted definition of road *decommissioning* in scientific literature is defined as the physical treatment of a roadbed with a variety of methods to restore the integrity of associated hillslopes and flood plains and their related processes and properties[43]. The most common forms of road decommissioning include de-compacting the roadbed, restoring stream crossings, and fully re-contouring the hillside. We feel it is important to differentiate between the scientific studies evaluating the effectiveness of road decommissioning in restoring hydrologic functions, and the Forest Service's proposed treatments which can be more akin to road closure than decommissioning or obliteration.

Available scientific information shows that potential Crystal Clear road activities, including reconstruction of closed and abandoned roads, could persistently elevate erosion and sediment delivery in several ways. Reconstructed roads cause elevated erosion and sediment for many years after decommissioning.[44] The USFS Region 5 method for estimating cumulative watershed effects indicates that even 10 years after road decommissioning, a mile of decommissioned road

[43] Switalski, T.A., J.A. Bissonette, T.H. DeLuca, C.H. Luce, and M.A. Madej. 2004. Benefits and impacts of road removal. Frontiers in Ecology and the Environment. 2(1): 21-28. Available at: http://www.fs.fed.us/rm/pubs_other/rmrs_2004_switalski_t001.pdf

[44] Beschta, R.L., Rhodes, J.J., Kauffman, J.B., Gresswell, R.E, Minshall, G.W., Karr, J.R, Perry, D.A., Hauer, F.R., and Frissell, C.A., 2004. Postfire Management on Forested Public Lands of the Western USA. Cons. Bio., 18: 957-967.

is equivalent to 0.2 miles of new road in terms of adverse cumulative effects.[45] After 50 years, a mile of obliterated road has still has impacts equivalent to 0.1 mile of new road. Thus, as it is apparent that decommissioning will not instantaneously eliminate the persistent impacts of roads on erosion and sediment delivery, building these roads will likely have adverse impacts to the aquatic and terrestrial environment.

FUELS REDUCTION: WIDELY HELD ASSUMPTIONS, AND CERTAINTIES

The Crystal Clear scoping letter cites the Mt. Hood National Forest's Strategic Fuel Treatment Placement Plan. This document spatially identifies areas of the forest where the agency believes buffers and fuelbreaks would help meet the Plan's objectives. In the Crystal Clear project area, there are four "Point Protection" locations and two main fuelbreaks; one running generally east to west and one generally north to south. There is no rationale given in the Plan that in any way whatsoever necessitates commercially logging the majority of the project area, especially the western project area (Compartment 1 in the Wasco CWPP) which has no "Point Protection" locations, no residential communities, and is primarily moist mixed conifer. If this project does not directly follow the Strategic Fuel Treatment Placement Plan, please do not list it as providing rationale for implementing this project. Furthermore, if there are components of this project that are not in line with the recommendations Wasco CWPP, please make this clear in the analysis.

Commercial thinning has become, by political default, the prevailing mechanism for fuels reduction that federal land management agencies use because it *usually* offers the least public controversy, while potentially offering the most commercial benefit to the agencies. The current approach assumes that by controlling the amount of fuel in the forest through thinning, fire behavior can be similarly be controlled. However, studies have failed to demonstrate that thinning significantly alters the behavior, spread, or severity of wildfire. It remains the case that the only support for the unsubstantiated speculation that fuel treatments might reduce crown fire hazard is relegated solely to "... informal observations, nonsystematic inquiry, and simulation modeling...".[46]

[45] Menning, K. M., D. C. Erman, K. N. Johnson, and J. Sessions, 1996. Aquatic and riparian systems, cumulative watershed effects, and limitations to watershed disturbance. Sierra Nevada Ecosystem Project: Final Report to Congress, Addendum, pp. 33-52. Wildland Resources Center Report No. 39, Centers for Water and Wildland Resources, University of California, Davis.

[46] Graham, R.T., McCaffrey, S., Jain, T.B. (tech. eds.), 2004. Science basis for changing forest structure to modify wildfire behavior and severity. USFS Rocky Mountain Research Station Gen. Tech. Rep. RMRS-GTR-120.

We know that the FS would be the first to acknowledge that forest fires result from, and are driven by, a multitude of factors including topography, fuel loads, the fire history of the environment in question, and most importantly, weather.[47] Because weather is often the greatest driving factor of a forest fire, and because the strength and direction of the wildfire is often determined by topography, fuels reduction projects cannot guarantee fires of less severity. [48], [49]

In general, large fires are driven by several conditions that completely overwhelm fuels.[50] It is becoming more and more commonly accepted that reducing fuels does not consistently prevent large fires, and seldom significantly reduces the outcome of these large fires.[51] The overwhelming factors driving large blazes are drought, low humidity, high temperatures and most importantly, high winds.

Some research suggests that fuel reduction may exacerbate fire severity in some cases as such projects leave behind combustible slash, open the forest canopy to create more ground-level biomass, and increase solar radiation which dries out the understory. Higher wind speeds through thinned stands may also be a consequence of thinning and fuel management, as could the increased amount of available nutrients in the production of fine forest fuels. Indeed, a US. Forest Service report on the Fourmile Canyon Fire found that "[i]n some cases, treated stands appeared to burn more intensely than adjacent untreated stands, perhaps because of additional surface fuels present as a result of the thinning."[52] This is also somewhat consistent with the Forest's own experience in the N. Fork Mill Creek project area, where the Government Flats fire burned through the canopy of units that were recently thinned. High winds, steep slopes and highly combustible slash contributed to the fire severity.

As implied previously, while the effectiveness of fuels reduction projects can be inconsistent, there are places where they appear to reduce fire spread under *moderate* fire weather conditions but tend to fail under *severe* fire weather.

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[47] Wilderness Society, 2003, Fire & Fuels: Does Thinning Stop Wildfires?

[48] Carey, H. and M. Schumann. 2003. Modifying Wildfire Behavior–the Effectiveness of Fuel Treatments: the Status of our Knowledge. National Community Forestry Center.

[49] Rhodes, J. and W. Baker. 2007. The Watershed Impacts of Forest Treatments to Reduce Fuels and Modify Fire Behavior. Pacific Rivers Council, Portland Or.

[50] Meyer, G and Pierce, J. 2007. Long-Term Fire History from Alluvial Fan Sediments: The Role of Drought and Climate Variability, and Implications for Management of Rocky Mountain Forests. Jennifer Pierce and Grant Meyer. International Journal of Wildland Fire 17(1) 84–95

[51] Lydersen, J., North, M., Collins, B. 2014. Severity of an uncharacteristically large wildfire, the Rim Fire, in forests with relatively restored frequent fire regimes. Forest Ecology and Management 328 (2014) 326–334

[52] Graham, R.T., et al, 2012. Fourmile Canyon Fire Findings, USDA For. Serv. Gen. Tech. Rep. RMRS-GTS-289. Ft. Collins, CO

"Under very moderate conditions, fire behavior may be so benign regardless of fuelbed characteristics that there will be little detectable difference between treated and untreated areas." According to this meta-analysis[53] of fuel reduction effectiveness, in about a third of cases reviewed mechanical fuel reductions *increased* fire spread.

Fire severity and historic conditions

While reducing wildfire risk through fuels reduction can appear questionable in terms of its effectiveness, it can also be argued that the Forest Service should not attempt to reduce wildfire severity. Until recently, dry ponderosa pine forests were thought to have been "park-like" in structure, maintained by mostly low-severity fires. The second part of this assumption is that these forests have become denser and more prone to high-severity fire due to fire suppression.[54] However, there is increasing scientific consensus from landscape-scale assessments that, prior to any significant effects of fire suppression, large, high-intensity fires were common and physical structure was more variable in these pine forests.[55]

Baker used "pre-1900 General Land Office Surveys, with new methods that allow accurate reconstruction of detailed forest structure, to test eight hypotheses about historical structure and fire across about 400,000 ha of dry forests in Oregon's eastern Cascades". Through this study, Baker found historic fire regimes and forest structure to be much more variable than previously assumed. He concluded that given historical variability in fire and forest structure, an ecological approach to restoration would restore fuels and manage for variable-severity fires, rather than reduce fuels to lower fire risk".

Similarly, Odion et al. concluded that "ecological management goals that incorporate successional diversity created by fire may support characteristic biodiversity, whereas current attempts to 'restore' forests to open, low-severity fire conditions may not align with historical reference conditions in most ponderosa pine and mixed-conifer forests of western North America." Rather than a sign of unhealthy forests as portrayed by agency bias, natural processes

[53] Martinson, Erik J.; Omi, Philip N. 2013.Fuel treatments and fire severity: A meta-analysis. Res. Pap. RMRS-RP-103WWW.Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 38 p.

[54] Baker, W. L. 2012. Implications of spatially extensive historical data from surveys for restoring dry forests of Oregon's eastern Cascades. Ecosphere 3(3):23. http://dx.doi.org/10.1890/ES11-00320.1

[55] Odion DC, Hanson CT, Arsenault A, Baker WL, DellaSala DA, et al. (2014) Examining Historical and Current Mixed-Severity Fire Regimes in Ponderosa Pine and Mixed-Conifer Forests of Western North America. PLoS ONE 9(2): e87852. doi:10.1371/journal.pone.0087852

like fire are vital for recruitment of down wood into the ecosystem, create a diversity of wildlife habitat, and naturally *thin* forests.[56] [57]

With this in mind, do modern fire regimes in the project area differ greatly from historic fire regimes? What was the temporal variability of the fire regime over multi-century reference periods?

Environmental Impacts of logging for "fuels-reduction"

The scoping letter does not discuss whether there is an upper-diameter or age limit on the trees to be logged in this project. Most fire ecologists agree that removal of large, old trees is not ecologically justified and does not reduce fire risks. Such trees contribute to the resistance and resilience of the forest ecosystems of which they are a part. Large, old trees of fire-resistant species are the ones most likely to survive a wildfire and subsequently serve as biological legacies and seed sources for ecosystem recovery. They also are exceptionally important as wildlife habitat, before and after a wildfire event, and as sources of the large snags and logs that are critical components of terrestrial and aquatic habitats. For all practical purposes, they are impossible to replace.[58]

Indeed, as this project is planned under the auspices of the Healthy Forest Restoration Act (§102(e)(2)), the Forest Service must follow the Act's command:

The Secretary shall fully maintain, or contribute toward the restoration of, the structure and composition of old growth stands according to the pre-fire suppression old growth condition characteristic of the forest type, taking into account the contribution of the stand to landscape fire adaptation and watershed health, and retaining large trees contributing to old growth structure.

Congress specifically intended for HFRA projects to retain existing older forest structure that existed prior to fire suppression, and **Bark strongly suggests that the Forest Service establish an upper-diameter or age limit on logging, to ensure removal only of trees that are actual fuel hazards in the dry forests.**

In addition, all mechanized fuel treatments guarantee damage to ecosystem components, including soils, aquatics, and vegetation; they also have the potential to spread exotic plants and pathogens. Even if such treatments do

[56] Hanson, C., 2010. Myth of "Catastrophic" Wildfire: A New Ecological Paradigm of Forest Health. John Muir Project Technical Report. Cedar Ridge, CA.
[57] Noss, R.F., J.F. Franklin, W.L. Baker, T. Schoennagel, and P.B. Moyle. 2006b. Managing fire-prone forests in the western United States. Frontiers in Ecology and the Environment, 4(9):481-487.
[58] DellaSala, D., Williams, J., Williams, C., Franklin, J., 2006. Beyond Smoke and Mirrors: a Synthesis of Fire Policy and Science. Conservation Biology, Volume 18, Issue 4 976-985.

reduce fire severity, the ecological cost of those treatments may outweigh any positive effects. In most cases, the negative effects of treatments will cover a substantially greater area than that for which fire severity might be reduced—if, that is, fire does in fact occur (Most fuel reduction projects have little to no influence on fire severity because the probability that a fire will encounter a project in the time frame when fuel reductions are presumed to work is extremely small)[59]. *Bark is unconvinced that the guaranteed detrimental impacts to the watershed from logging are outweighed by maybe affecting the potential future impacts of a possible fire.*

How do the environmental impacts of landscape-scale commercial logging compare with the potential impacts of a possible fire? Will the project have an upper-diameter limit? If trees over 7" are included in the thinning prescription, what is the ecological justification?

Roads and wildfire

It is well established that roadless areas generally have lower potential for high-intensity fires than roaded areas in large part because they are less prone to human caused ignitions[60] [61] [62]. Wildland fire ignition is almost twice as likely to occur in a roaded area as in a roadless area, and the median size of large fires on national forests is greater outside of roadless areas. In his study of the effects of roads on wildfires in national forests in California, Robert F. Johnson concluded that over 52 percent of human-caused fires occurred within 33 feet of a road edge.[63] According to the 2000 USDA report cited above, human-ignited wildfire is almost 5 times more likely to occur in a roaded area than in a roadless area. **Couple this statistic with the fact that only 2% of acres burned in Mt. Hood NF during 2014 were *naturally caused*[64], and one cannot deny the amplifying effect road density can have on fire starts.**

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[59] Rhodes, J. and Baker, W. 2008. Fire Probability, Fuel Treatment Effectiveness and Ecological Tradeoffs in Western U.S. Public Forests. The Open Forest Science Journal, 2008, 1, 1-7

[60] DellaSala, D.A.; Olson, D.M.; Barth, S.E.; Crane, S.L.; Primm, S.A. 1995. Forest health: Moving beyond the rhetoric to restore healthy landscapes in the inland Northwest. Wildlife Society Bulletin 23(3): 346–356.

[61] USDA Forest Service. 2000. Forest Service roadless area conservation. Draft environmental impact statement. Vol. 1. Washington, DC: USDA Forest Service.

[62] Weatherspoon, C.P.; Skinner, C.N. 1996. Landscape-level strategies for forest fuel management. Pages 1471–1492, in: Status of the Sierra Nevada: Sierra Nevada Ecosystem Project, final report to Congress. Vol. II. Assessments and Scientific Basis for Management Options. Wildl. Res. Ctr. Rep. No. 37. Davis, CA: University of California– Davis, Center for Water and Wildland Resources.

[63] Johnson, R.F. 1963. The roadside fire problem. Fire Control Notes 24: 5-7

[64] USDA Forest Service. 2014. Mount Hood National Forest 2014 Annual Report. http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3846032.pdf. p. 15

According to the Forest Service, more than 90 percent of wildland fires are the result of human activity, and ignitions themselves are almost twice as likely to occur in roaded areas as they are in roadless areas.[65] DellaSala and Frost[66] also argue that "in the Western United States, most of the more than 378,000 miles of National Forest roads traverse heavily managed forests with the greatest potential for fire. Although it can be argued that roads improve access for fire suppression, this benefit is more than offset by much lower probabilities of fire starts in roadless areas.

Scientists suggest that, in the face of projected road developments, the potential exists for important changes to the regional fire regime. The Forest Service itself has said: "A potential factor in the increase in fire size and severity may be related to increased incidence of human-caused ignition. Human access is likely to be increased by roads, a factor that will greatly increase the chances of both accidental and intentional human ignitions."[67] Arienti, et al.[68] suggest that there is even a positive association between natural lightning fire frequency and road density.

Looking at the fire start history map put together by the FS, it seems as though the majority of recent fire history in the area has been human-caused. Balch et al.[69] point out that the direct role of people in increasing wildfire activity has been largely overlooked. The researchers evaluated over 1.5 million government records of wildfires that had to be extinguished or managed by state or federal agencies from 1992 to 2012, and examined geographic and seasonal extents of human-ignited wildfires relative to lightning-ignited wildfires. They found that humans have vastly expanded the spatial and seasonal "fire niche" in the coterminous United States, accounting for 84% of all wildfires and 44% of total area burned. During the 21-y time period, the human-caused fire season was three times longer than the lightning-caused fire season and added an average of 40,000 wildfires per year across the United States. Human-started wildfires disproportionally occurred where fuel moisture was higher than lightning-

[65] USDA Forest Service. 1998. 1991-1997 Wildland fire statistics. Fire and Aviation Management, Washington, D.C.
[66] DellaSala, D. A., and E. Frost. 2001. An ecologically based strategy for fire and fuel management in national forest roadless areas. Fire Management Today, v. 61, no. 2, p. 12-23. http://www.fs.fed.us/fire/fmt/fmt_pdfs/fmn61-2.pdf. Donato, D.C., J.B. Fontaine, J.L. Campbell, W.D. Robinson, J.B. Kauffman, and B.E. Law. 2006. Post-wildfire logging hinders regeneration and increases fire risk. Science 311: 352
[67] USDA. 2000. Forest Service Roadless Area Conservation Rule Final Environmental Impact Statement, Ch. 3,.
[68] Arienti, M. Cecilia; Cumming, Steven G., et al. 2009. Road network density correlated with increased lightning fire incidence in the Canadian western boreal forest. International Journal of Wildland Fire 2009, 18, 970–982
[69] Balch, J. K., Bradley, B.A., Abatzoglou, J.T., Nagy, R.C., Fusco, E.J.,& Mahood, A.L. 2017. Human-started wildfires expand the fire niche across the United States. PNAS Early Edition.
http://www.pnas.org/cgi/doi/10.1073/pnas.1617394114

started fires, thereby helping expand the geographic and seasonal niche of wildfire. Human-started wildfires were dominant (>80% of ignitions) in over 5.1 million km2, the vast majority of the United States, whereas lightning-started fires were dominant in only 0.7 million km2, primarily in sparsely populated areas of the mountainous western United States. **Ignitions caused by human activities (which are only made possible by road access) are a substantial driver of overall fire risk to ecosystems and economies.**

Any final decision should mitigate potential fire risks associated with future development by limiting construction of new roads. The science is very clear, fire danger is higher in areas with existing roads and it increases dramatically with construction of new roads.

As noted in previous Bark comments, post-project road closures are not always effective, and the new road network is likely to be used by hikers, bikers, OHV riders and others. Please do not gloss over this reality in the final EIS by suggesting that the PDC will ensure the temp roads will all be effectively closed and not lead to increased access. We all know road closures are regularly breached, and this needs to be addressed honestly.

EXCEPTIONS TO THE MT. HOOD FOREST PLAN

In the scoping notice, the Forest Service stated that Standards and guidelines in the Forest Plan were not written to "specifically address projects that look to implement fuel reduction efforts within pine forest types and overlapping land use allocations," and continued that, "in order to meet the project's purpose and need, several "exceptions" to the Forest Plan standards and guidelines may be necessary. *CC scoping, at 5.* Based on this justification, we expect only to see Forest Plan exceptions regarding the dry mixed conifer portion of the project area. Also, we see that the Forest Service does not intend to amend the Forest Plan in this project. While Bark believes that the Mt. Hood Forest Plan is quite out of date, and that amendments are needed to modernize many aspects of the Plan, we appreciate your choosing not to use project specific amendments to exempt this project from environmental protections embedded in the Plan.

FOREST SERVICE MUST PREPARE AN EIS TO ANALYZE THE CRYSTAL CLEAR PROJECT

To determine whether an action requires an Environmental Impact Statement (EIS), an action agency may prepare an EA. 40 C.F.R §§ 1501.4(b), 1508.9. An EA is supposed to be a "concise document" that "briefly" describes the impacts to the environment in enough detail provide the agency with sufficient evidence

and analysis for determining whether to prepare an EIS or to issue a FONSI. *Metcalf v. Daley*, 214 F.3d 1135, 1143 (9th Cir. 2000). The Forest Service must prepare an EIS if "the agency's action *may* have a significant impact upon the environment." *Nat'l Parks & Conservation Ass'n. v. Babbitt*, 241 F.3d 722, 730 (9th Cir. 2001). (emphasis in original).

NEPA regulations define the term "significantly" as requiring analysis of both the "context" and the "intensity" of a proposed action. 40 C.F.R. § 1508.27. The context of the action includes "society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. . . Both short- and long-term effects are relevant." *Id.* § 1508.27(a). The regulation lists ten, non-exclusive intensity factors. *Id.* § 1508.27(b). The potential presence of even one significance factor is sufficient to require the preparation of an EIS. *Ocean Advocates v. U.S. Army Corps of Eng'rs*, 402 F.3d 846, 865 (9th Cir. 2005). Several factors in this project point to significance.

There are many overlapping "intensity" factors associated with the project. First, when "the unique characteristics of the geographic area in which the proposed activity is to occur involves proximity to ecologically critical areas, the impact of the action may be considered significant." *Ocean Mammal Inst. v. Gates*, 546 F. Supp. 2d 960, 978 (D. Haw. 2008). Unique characteristics of the geographic area include "proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas". 40 C.F.R. § 1508.27(b)(3). As described in details in the above sections, many of these factors are present in the project area, including proximity to wild and scenic rivers, wetlands, and ecologically critical areas.

Second, another intensity factor is whether the effects on the human environment are "likely to be highly controversial," 40 C.F.R. § 1508.27(b)(4). "A proposal is highly controversial when there is "'a substantial dispute [about] the size, nature, or effect of the major Federal action rather than the existence of opposition to a use.'" *Anderson*, 371 F.3d at 489. While there is substantial public controversy and opposition to this project, the high degree of controversy for significance purposes stems from the Forest Service's scientifically unsupported assumptions around the degree of high-severity fire risk in moist conifer forests, and the belief that benefits from the fuels reduction necessarily outweigh the known adverse impacts of logging and road building.

Third, an action may be significant if it is related to other actions with individually insignificant but cumulatively significant impacts. 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. 40 C.F.R. § 1508.27(b)(7). Cumulative impact results when the "incremental impact of the action [is] added to other past, present, and reasonably foreseeable future actions" undertaken by any person or agency. Id. § 1508.7. For a project of this magnitude, it is essential that the Forest Service thoroughly address all the other projects on public, private and tribal lands that may elevate the impacts of the Crystal Clear project to the point of significance.

Finally, significance exists when an action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973. 40 C.F.R. § 1508.27(b)(9). As noted extensively above, this project will adversely impact the threatened (and declining) Northern Spotted Owl, and degrade thousands of acres of critical habitat. Several recent court cases from the Federal District Court for Oregon have confirmed that adverse impacts to Northern Spotted Owls and Critical Habitat is indeed significant under NEPA and requires analysis with an EIS. *See Cascadia Wildlands v. U.S. Forest Serv.,* 937 F. Supp. 2d 1271, 1274, 1283–84 (D. Or. 2013), *Or. Wild v. Bureau of Land Mgmt.,* 2015 WL 1190131, *9-10 (D. Or. 2015). Please follow the clear direction of the court and prepare an EIS to analyze the Crystal Clear project.

This is the largest proposed timber sale Bark has ever seen on the Mt. Hood National Forest in our eighteen years of existence, with many of the most significant impacts. We know that the agency wants to "fast track" this NEPA process, but this ecosystem is too rare, and the potential impacts are too significant, to avoid the in-depth analysis provided by an Environmental Impact Statement for the project.

CONCLUSION

Bark has some key suggestions for moving forward with the Crystal Clear project, and request that the agency take these suggestions as separate alternatives or combinations of alternatives which the agency can then assess for their economic feasibility and value:

1. Conduct a full analysis of the impacts of the reduction in NSO prey habitat, increase in barred owl populations, and impacts of roadbuilding in Critical Habitat;
2. Do not propose any commercial treatments within Suitable Habitat for NSOs;

3. Prioritize management for species historically more prevalent but now rare, sensitive, or extirpated within the watershed: beaver, Oregon spotted frog, fisher, gray wolf, wolverine, pine marten, and redband trout;
4. Remove proposed logging in areas designated for pine marten habitat management (B5);
5. Conduct a full analysis of the impacts of cattle grazing within the project area and how these impacts would interact with those resulting from commercial logging and roadbuilding;
6. See Bark's recommendations for avoiding further unauthorized OHV damage as a result of increased access within the project area;
7. Remove silvicultural treatments in mature, never-logged forest stands from the proposed action;
8. Analyze the known impacts of the project in the broader context of climate change and acknowledge if the impacts of these activities will be exacerbated by climate change;
9. Pursue an alternative that would make the action and affected communities more resilient to the effects of a changing climate;
10. In order to "right-size" the watershed's current road system, refer to the rationale of the TAR, Increment 3, and Bark's own recommendations for potential road decommissioning within the project area;
11. Establish an upper-diameter or age limit on logging, to ensure removal only of trees that are actual fuel hazards; and
12. For a project of this broad scope, an Environmental Impact Statement is necessary to adequately analyze its impacts.

As the Forest Service is considering the optimal method of accomplishing the purpose and need for the Crystal Clear 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 scientific literature 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 EIS and the project itself.

Thank you,

Michael Krochta

Brenna Bell

Forest Watch Coordinator NEPA Coordinator/Staff Attorney