August 10th, 2020

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Bill Westbrook
Attention: Zigzag Integrated Resource Project
Zigzag Ranger District
70220 E. Highway 26
Zigzag, OR 97049

RE: Zigzag Integrated Resource Project

Dear District Ranger Bill Westbrook,

As you are aware, Bark's is a public interest advocacy group whose organizational mission is to bring about a transformation of public lands on and around Mt. Hood such that natural ecological processes prevail, where wildlife thrives and where local communities have a social, cultural, and economic investment in its restoration and preservation. Bark has over 31,000 supporters[1] who rely on the public land forests surrounding Mt. Hood, including the areas within the Zigzag project area, for a wide range of uses including, but not limited to: clean drinking water, hiking, nature study, non-timber forest product collection, spiritual renewal, and recreation. Increasingly, our supporters and the public rely on the ecosystem function of the forest to stabilize the regional climate and mitigate the local impacts of climate change. We submit these comments on behalf of our supporters. We request that you actively engage with the substance of these comments and use

[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.

both the scientific and site-specific information herein to create a better restoration project for the Zigzag Ranger District.

Contents

IMPACTS TO RECREATION

As we noted in Scoping, not only is the Zigzag Ranger District well known for its year-round recreation opportunities, these opportunities are intertwined with the local economy. The absence of active timber sales on this district supported this economic shift and now the area provides nationally recognized experiences which largely depend on natural, intact forest. The PA states that "proposed units are generally located away from most key recreation sites and trails." While it is true that most of the areas within the units are located away from these sites, a more useful way of looking at recreation impacts is that *most key recreation sites and trails in the Zigzag planning area are not located away from the units.*

Section 3.1.4 of the PA lists 12 trails potentially affected by the Zigzag project. These don't include PCT, Top Spur, or Timberline trail (accessed in the area by Top Spur). Other recreation sites in the Zigzag planning area include Riley Horse Camp, Trillium Lake, McNeil CG, and Lost Creek CG/Day use.

As we noted in Scoping, there are also many undeveloped, primitive campsites that get a lot of use during the spring, summer, and fall. With the cost of developed camping on the forest these kinds of sites are seeing more use.

As stated in the PA, decreased density of forest canopy is also an expected result of forest thinning activities and a more open appearance may be perceptible to those using trails that transect units after harvest has occurred. Along trails and primary roads, requirements for visual resources management are prescribed by the Forest Plan in the near foreground and far foreground distance zones. In such areas, a 100-foot no-harvest buffer would remain in place along the trail or road, and specific measures to reduce visual contrasts in the "immediate foreground" distance zone (i.e., within 300 feet) would be implemented, including stump treatment, tree marking practices, and retaining understory vegetation. **We encourage the FS to not limit themselves to, and potentially increase from, the 100-foot no-harvest buffers at more frequented areas such as the PCT (unit 96), Top Spur (unit 61), Trillium Lake (FSR 2612; unit 182).** These buffers should be based on topography and visuals specific to the areas.

Of the impacted trails, three transect harvest units: Jackpot Meadows, Veda Lake, and Eureka Peak. The FS has stated that equipment crossings on Veda Lake and Eureka Peak Trails would result in temporary disturbances to trail corridors and

closures. One temporary road would cross Jackpot Meadows Trail resulting in short-term impacts to trail tread and temporary trail closures. Project design criteria require trail segments affected by temporary road and equipment crossings be rehabilitated to previously existing conditions. We encourage the FS to add a PDC which instructs operators to limit the crossings and number of times the crossings are used as much as possible.

According to agency specialists at public meetings before the release of the PA, the southern portion of the Horseshoe area would utilize helicopter logging to avoid reopening roads (including 1825-380 road): Units 62, 64, 68, 80, 82. The logs would be flown down to Old Maid Flat which could result in a public closure for up to one month during the summer.

The PA states that "temporary closures of roads, trails, and dispersed campsites beneath flight paths or in proximity landing areas are anticipated to ensure public safety". **We request that draft Decision include a list of which roads, trails, dispersed campsites, and other recreation sites may be temporarily closed as a result of this project, and for how long.**

In its analysis, the Forest Service is required to disclose potential impacts to the physical, biological, social and economic environments of the affected area due to implementation of the alternatives. For the economic environment, the agency often makes an internal determination that their timber sale projects are economically viable and pursues no further evaluation. Since the natural forest characteristics of Zigzag Timber Sale area is now economically tied to the local recreation economy, we again request that you **please disclose, quantitatively, all potential impacts to the local recreation economy and the related restaurant, service, and small business economies from any public closures, impacted trail or campground experiences, or change in public attitude towards the area due to the return of commercial logging.**

FUELS AND FIRE HAZARD

The "3.13 FUELS AND FIRE HAZARD" section of the PA summarizes the "fuels specialist report", however this report does not seem to exist or have been posted to the Mt. Hood National Forest website's projects page.

The FS has stated that “fuel treatments” may occur “to break up the contiguity of fuels and to reduce the intensity of fire in the event of wildfire”. Indeed, the 2012 Strategic Fuel Treatment Placement Plan for Mt. Hood National Forest includes several roads within the Zigzag project area.

However, this statement is not supported by the local fire regime condition class. Action designed to “reduce the intensity of fire”, is inappropriate for this forest type and vegetation management is not likely to achieve this stated effect.

The fire return interval in this forest type is long and stand replacing. This type of fire regime is unlikely overly influenced by fire suppression given this lengthy interval or tree spacing and fuel density. A leading means of fire spread in this area would be long-range fire spotting. Therefore, this moist mixed-conifer forest would only burn during extreme fire weather2 - conditions during which a fuel break, for example, would likely be largely ineffective in altering fire behavior and could put wildland firefighters' lives at risk if held as a line of defense (especially if created mid-slope).

In the PA, Condition Classes 1, 2 and 3 have not been identified within the areas proposed for treatment. Bark is that much, if not all, of the project area is in Condition Class 1, the least departed from its natural fire regime and proposed fuels treatments would degrade natural succession in this area.

Bark understands the complexity of managing wildland fire, especially near structures and communities. On one hand, fire is recognized as essential to forest ecosystems and the past 100 years of fire suppression has degraded the forest’s ecological conditions in some areas. At the same time, the Fire Management Action Plan directs the Forest Service to fully suppress all ignitions, in direct conflict with the best available science to date, which acknowledges much of the forest needs to burn[3]. Complicating things further, public perception and agency culture are often strongly aligned with inaccurate narratives about the presence and effects of fire

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[2] https://www.fs.usda.gov/nfs/11558/www/nepa/92487_FSPLT3_1455012.pdf

[3] Haugo, R. D., Kellogg, B. S., Cansler, C. A., Kolden, C. A., Kemp, K. B., Robertson, J. C., Metlen, K. L., Vaillant, N. M., and Restaino, C. M.. 2019. The missing fire: quantifying human exclusion of wildfire in Pacific Northwest forests, USA. Ecosphere 10(4):e02702. 10.1002/ecs2.2702

on the landscape.[4] While a significant challenge, the FS has the authority and resources to address fire appropriately, as a natural and necessary part of a forests' lifecycle, by developing fire management practices based on site specific information and application of modern scientific knowledge.

Bark recommends the FS not propose "fuel breaks" as, even if topographical conditions are considered in detail, "fuel breaks" are largely ineffective[5] unless both weather and site conditions are "right", which cannot be guaranteed or controlled. In these moist forests, vegetation regrowth in fuel breaks is typically quick and dense, giving their already unlikely effectiveness a very short time frame. FS should not seek to remove trees and vegetation, build roads, or disturb soils to establish any "fuel break" with a low likelihood of effectiveness. **Please provide a complete description of the overall condition of the project area regarding the fire regime in the forthcoming draft Decision and provide the scientific analysis of how these conditions may interact with "fuels treatments".**

EXISTING AND FUTURE DEAD WOOD

The presence of dead wood (as well as dense forest surrounding it) is important in meeting habitat requirements of Westside indicator species like flying squirrels and spotted owls and are currently in short supply due to past and present management.

Several stands within Zigzag units, both plantation and "fire originated", include significant amounts of large standing and down wood, which, as you know, are currently providing important habitat for the numerous species dependent on dead trees. As is stated in the PA, the "amount of snags and down wood within the fire-originated stands proposed for treatment is highly variable. Many of the stands have large amounts of legacy down wood and some scattered large diameter snags.

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[4] Boyd, R. et. al, 1999, Indians, Fire & the Land in the Pacific Northwest, Oregon State University press, p 19, ("Development of the field of fire ecology was stymied for many years by what has been called the 'Smokey the Bear syndrome': a pervasive belief, peculiar to Western cultures, that fire was a destructive force, particularly in forests, that had to be contained or eliminated.")

[5] Barnett, Kevin; Parks, Sean A.; Miller, Carol; Naughton, Helen T. 2016. Beyond fuel treatment effectiveness: Characterizing interactions between fire and treatments in the US. Forests. 7: 237.

A few of the stands have a fair number of live and dead legacy trees as well as fairly abundant of down wood."

The Zigzag Proposed Action would result in lower levels of both large and small snags and down wood would exist compared to no action. The reduction of trees during though thinning would result in less available trees to naturally die and become snags. In addition, the reduced competition from the thinning reduces density dependent mortality in the residual trees, allowing them to be healthier and live longer before succumbing to competition, insects, or disease.

The FS consistently asserts that thinning improves residual tree health and that, therefore, it may take longer for the residual trees to die (reducing future snag density) in the Proposed Action scenarios compared with No Action. Research has also shown that thinning lowers snag density relative to un-harvested stands.[6] While the agency recognizes that timber harvest has negative effects on snag density, contradictorily, FS also claims that thinning will somehow produce *more* structural diversity in the future. These claims do not present a complete portrayal of ecological processes regarding future snag recruitment, especially in mature, fire-originated forests.

Commercial thinning often prevents or delays development of essential features of old forest ecosystems, features important to salmon, spotted owls and their prey. This is especially true regarding the mid & long-term impacts of thinning on the abundance and size of snags and downed wood. These old-growth structural features are largely overlooked - though available data suggests that thinning does not do an adequate job managing for these features.

Modeling by Pabst et. al[7] (figure below) has shown no difference in the cumulative number of large snags (>19.7" dbh) in un-thinned vs. thinned + snag creation treatments for the first 35 years. But after 100 years, large snags accumulated at a much higher rate in the un-thinned stands. Snags created by artificially killing

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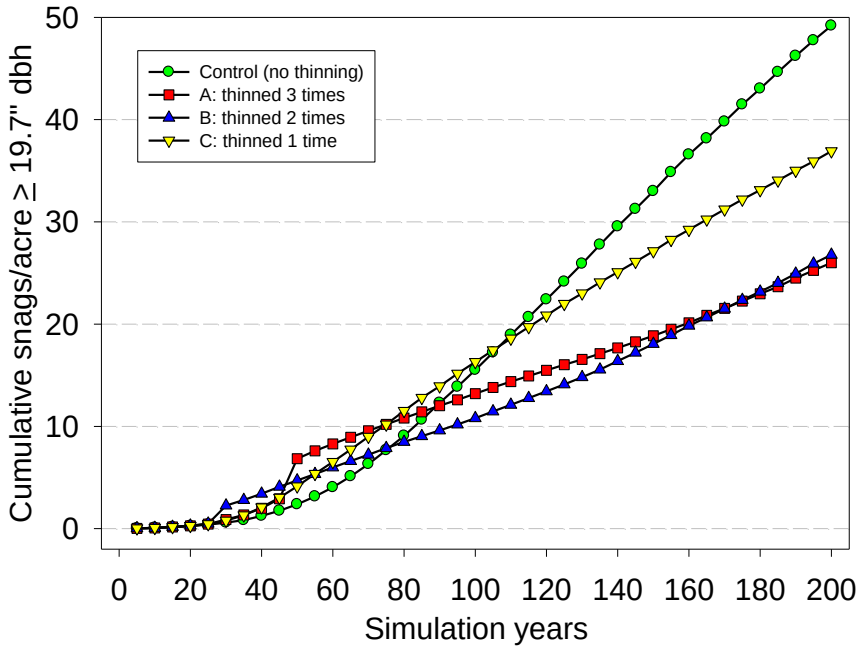
[6] Windom, M. and Bates, L. 2008. Snag density varies with intensity of timber harvest and human access. Forest Ecology and Management 255(7) pp. 2085-2093.

[7] Pabst, R.J., T.A. Spies, M.N. Goslin, and S.L. Garman. 2003. Development of late-successional forest structures after thinning young stands: A simulation study for the Oregon Coast Range. Poster presented at 2003 meeting of the North American Forest Ecology Workshop, Corvallis, OR. Available in PDF document.

trees from the thinned understory in Prescription C were small diameter and did not contribute to the large snag totals over time.



Artificially created snags

The impact of logging on large snag density[8] clearly shows that the lack of large snags across a managed forest landscape relates to the logging of that landscape. Further, the usefulness of artificially created snags by wildlife has been thrown into doubt.[9]

When managing for snag habitat in the Zigzag project area, the Forest Service should always consider that artificially created snag habitat varies substantially from naturally created snags in the type, distribution, and amount of decay which

[8] Issue 42 (March 2002) Dead wood all around us: think regionally to manage locally, by Janet Ohmann and Karen Waddell
[9] USDA Forest Service Gen. Tech. Rep. PSW-GTR-181. 2002

occurs.[10] Retention of existing, naturally formed snags should always be prioritized above artificially created snags (topping, girdling, etc.).

Snags that are artificially created (through girdling) take years to provide any potential habitat (and the quality of this artificial habitat is uncertain). Due to the way these trees die and decompose, the trees then do not include the same medium for cavity nesters and foragers who require a naturally created soft interior with hard exterior, making these snags less valuable from a habitat perspective.

The Zigzag project would result in an immediate and future net reduction of snags across the landscape contributing to the regional snag deficit resulting from previous Forest Service management. Since large snags are required for the habitat requirements of Westside indicator species like flying squirrels and spotted owls[11], but are in short supply due to past and present management, the **FS should exclude stands with high snag and large living tree densities from any logging and apply buffers on key snags and relatively large trees within proposed units.**

Placing snags in skips

Zigzag's PDC *K1. Snags and Down Wood* states "Snags would be retained in all units where safety permits. If snags must be cut for safety reasons, they would be left on site. To increase the likelihood that snags would be retained, they may be included in skips". Bark is in support of this PDC, and further recommends that skips in units containing large amounts of larger snags and down wood not be limited to the 5% of the unit area generally identified for skips in the PA. Some units may require more area in skips if legacy features are to be protected. Snags that are left standing after proposed treatments would be more prone to wind

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[10] A.M. Barry, J.C. Hagar,J.W. Rivers, 2017. Long-term dynamics and characteristics of snags created for wildlife habitat. Forest Ecology and Management. Volume 403, 1 November 2017, Pages 145-151. https://doi.org/10.1016/j.foreco.2017.07.049

[11] Cline, S.P., Berg, A.B., Wight, H.M., 1980. Snag characteristics and dynamics in Douglas-fir Forests, Western Oregon. Journal of Wildlife Management 44, 773–786.

damage and snow breakage than they would have been without treatment. This highlights the importance in planning skips to include areas with the greatest concentration of naturally occurring snags.

Units 62, 64, 65, and 68, contain legacy snags are scattered throughout the stand – since this and other surrounding units are proposed to be logged via helicopter, Bark is concerned that snag retention in these units would be nearly impossible as the turbulence created by the helicopter has the potential to cause trees to fall every which way, making it unsafe for the feller on the ground. In these types of stands, it is particularly important for patches of high snag density to be placed in skips so no operators would be in harm's way. Realistically, many of these snags would likely be felled **unless they were in skips**, reducing the amount of important snag habitat.[12]

OSHA requirements

Project Design Criteria regularly allow for felling legacy snags presumably to ensure contractor safety. The PDCs often state "All snags would be retained where safety permits. If snags must be cut for safety reasons they would be left on site." *Rocky Preliminary Environmental Assessment (PEA) at 23*.

OSHA Regulations specifically state that if a danger tree is not felled or removed, it shall be marked, and no work shall be conducted within two tree lengths of the danger tree unless the employer demonstrates that a shorter distance will not create a hazard for an employee. *29 C.F.R. § 1910.266(h)(1)(vi).* In short, the Forest Service has the option to buffer danger snags, not cut them. While we recognize that the Forest Service needs to protect worker safety, we believe there are options beyond felling danger snags.

Forest-wide Standards and Guidelines

[12] At the 2019 Zigzag public meeting, it was shared that the FS was planning on creating "patch cuts" in unit 62 to promote "deer and elk habitat". This unit is extremely steep and unlikely to be used by deer and elk at any time of year. This rationale should be removed from this unit.

Thinning of maturing forest has been shown to significantly delay attainment of MHNF's objectives related to dead wood habitat.13 The Wildlife Specialists report addresses Standards and Guidelines related to dead wood. However, it is unclear whether the following Forest Wide S&Gs are met through the current Zigzag Proposed Action:

- FW-163, FW-164; p. Four-68
- FW-166, FW-167; p. Four-68

IMPACTS TO NORTHERN SPOTTED OWL HABITAT

According to the PA, the Proposed action may affect, but is not likely to adversely affect territorial or dispersing northern spotted owls and their habitat, due to "maintaining, by avoidance, all suitable habitat conditions".

Features that support nesting and roosting typically include a moderate to high canopy closure (60-90%); a multi-layered, multi-species canopy with large overstory trees (with diameter of greater than 30 inches); a high incidence of large trees with various deformities (large cavities, broken tops, mistletoe infections); large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for spotted owls to fly.

While there is no critical habitat for northern spotted owls in the Zigzag Timber Sale, there are at least 4 home ranges and dispersal/foraging habitat. Treatments include the removal of approximately 13 acres of current dispersal habitat through regeneration harvest and the "maintenance" of over 1,872 acres of current dispersal habitat with variable-density thinning. However, it is not clear how "maintenance" of this habitat is defined.

According to the PA, any habitat that is currently identified as high quality suitable or RA-32 was not considered for habitat altering activities in the Zigzag Integrated

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[13] USDA Forest Service. 2007. Curran Junetta Thin Environmental Assessment. Cottage Grove Ranger District, Umpqua National Forest. June 2007. Using data from stand exams modeled through FVS-FFE (West Cascades variant) the Umpqua NF found that the actual effect of heavy thinning is to capture mortality and delay recruitment of desired levels of large snag habitat for 60 years or more.

Resource project area. However, Bark's field surveys lead us to believe that several parts of units include the structures that are necessary to provide suitable habitat (large dead wood, large trees, multiple canopy layers), either currently or in the near future. These units are multi-aged stands and include Units 4, 6, 8, 18, 20, 31(south section), 33, 43, 62, 63, 119 (north section), 130, 132, 168, 178, and 182. Please take a close look at these units and their structure when considering what habitat is available for NSOs (Northern Spotted Owl), and either disclose this in the Decision or drop sections of these units.

Impacts to northern flying squirrels

In past comments, Bark expressed concern about impacts to northern flying squirrels (a principle spotted-owl prey). The PA states that there would likely be some short-term impact to prey species, including flying squirrels. We bring this concern up again here by referencing and linking to our scoping comments.

Increased negative interactions with barred owls

The northern spotted owl's Revised Recovery Plan identifies competition from the barred owl as an important threat to the spotted owl.[14] In the Pacific Northwest, the recent invasion of barred owls with loss and fragmentation of intact forest are combining to reduce 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*[15], 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 like the barred owl makes the protection of habitat even more important, since any loss of

[14] 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.
[15] Forsman, et.al, 2011, published for Cooper Ornithological Society.

habitat will increase competitive pressure and result in further reductions in spotted owl populations.

The *Population Demography* found that, "[o]ur results and those of others referenced above 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[16]. 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 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 is important for reducing interference competition between the owl species.**

The above recommendation does not contradict the findings of *The Experimental Removal of Barred Owls to Benefit Threatened Northern Spotted Owls Final Environmental Impact Statement*[17] which reasoned that there are no known forest conditions where spotted owls have a competitive advantage over barred owls.

A detailed review for the spotted owl recovery plan found much evidence that barred owls prefer old-growth and older forest habitat, not early seral or edge habitat.[18]A detailed study[19] of the interaction between barred and spotted owls in the moist

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[16] 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.
[17] USFWS (U.S. Fish and Wildlife Service). 2013. Experimental removal of barred owls to benefit threatened northern spotted owls. Final Environmental Impact Statement, Oregon Fish and Wildlife Office, Portland, OR, July 2013.
[18] USDI Fish and Wildlife Service (USFWS). 2011. Revised Recovery Plan for the Northern Spotted Owl (Strix occidentalis caurina). U.S. Fish and Wildlife Service, Portland, Oregon. xvi + 258 pp.
[19] Wiens, J. D. 2012. Competitive Interactions and Resource Partitioning Between Northern Spotted Owls and Barred Owls in Western Oregon. PhD Dissertation, Oregon State University, Corvallis, OR.

temperate forests of western Oregon was done by radio tracking 29 spotted owls and 28 barred owls in 36 neighboring territories over a 2-year period. It found that both owl species had similar use of young, mid-seral, and mature forests and that both species avoided areas within 135 meters of forest/non-forest edges. Both species avoided open areas and young forests less than 60 years of age and used mature conifer forests (60-120 years of age) proportional to their availability within the landscape (second order selection). **Clearly, retaining older forest habitat will result in reduced competition between these owls.** Wiens' study contains the most detailed information applicable to the project area, comparing the use of younger forest by the two species.

In a recently published 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.[20] 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 Zigzag 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 because of barred owl predation. Increases in barred owls could also result in a decline in 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.[21]

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[20] 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

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

In Scoping, within units in the home ranges of known spotted owl, we recommended:

- Retaining an average canopy cover of at least 40% to maintain dispersal owl habitat
- Limiting gaps to 1/4 acre in size with less than 10% of the total stand area in gaps
- Prohibiting cutting of trees larger than 20 inches in diameter (at a height of 4.5 feet)

Since the effects of thinning on spotted owl prey (flying squirrel) as well as predator/competitor (barred owl) both have significant implications to the future survival of northern spotted owls within the Zigzag project area, we re-reiterate our original recommendations above.

THINNING IN RIPARIAN RESERVES/LISTED FISH HABITAT

In the Zigzag project, the FS is proposing 175 acres of Variable-density thinning with skips in Riparian Reserves (RRs) in the Horseshoe area, and 119 acres in the Mud Creek area. According to the FS, in units with RRs, there would "likely be a slight reduction in the amount of large wood available for natural recruitment into streams for several decades. However, there is the opportunity in future decades to fell trees or place logs into rivers and streams to further enhance LWD. The proposed action would have some short-term effects which are considered unsubstantial with mid to long-term benefits." As Bark reads the Proposed Action, it appears that the logging in the RRs would have a negative short-term effect and an inconsequential long-term effect.

As you know, RRs are a part of the NFP's broad Aquatic Conservation Strategy. Northwest Forest Plan, B-12. RRs generally parallel water bodies and streams and are portions of watersheds where riparian dependent resources receive primary emphasis and where specific standards and guidelines apply. *Id. at B-13.* This system was established to "restore and maintain the ecological health of watersheds and aquatic ecosystems." *Klamath Siskiyou Wildlands Ctr. v. U.S. Forest Serv., 373 F. Supp. 2d 1069, 1092 (E.D. Cal. 2004).*

As stated in our Scoping comments, timber harvest in RRs is prohibited, except when **needed** to "acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives." *Northwest Forest Plan, C-31,2*. Thus, the Forest Service has the responsibility to identify which ACS (Aquatic Conservation Strategy) Objectives (ACSO) are not currently met in the RRs and explain how the proposed commercial logging is necessary to acquire the vegetation characteristics needed to meet the ACSOs (ACS Objectives).

In Zigzag, the desired condition in RRs is a multi-layer canopy with large-diameter trees, a well-developed understory, more than one age class, and sufficient quantities of snags and down woody debris. The FS states that "(a)ll units with Riparian Reserve thinning have "plantation-like" conditions (overly dense, small trees, low structural and species diversity). Variable-density thinning would help accelerate late-successional characteristics and improve resiliency to natural perturbations."

The project area currently does not have a sufficient Large Woody Debris and is considered "Not Properly Functioning". According to the FS, this is due to a combination of management history and flooding on the Sandy but there is no indication of what percentage they each contribute to this deficiency.

The Forest Service stated that riparian thinning would not significantly improve desired aquatic habitat conditions vs No Action Alternative. This opens the argument of why they are proposing thinning in Riparian Reserves in the first place if there is an insignificant effect on large woody debris recruitment. Large woody debris is one of their main purposes for this part of the project.

No Action Alternative: "With no action, large wood recruitment potential and riparian function would continue to remain low in the short term (< 10 years) and would improve in the midterm (10-100 years) to long term (>100 years)."

Action Alternative: "Timber felling would have an unsubstantial effect on large wood debris frequency and recruitment in the short-term (<10 years) and a positive effect on large wood debris frequency and recruitment in the mid-term (10-100 years) to long-term (>100 years) due to accelerated development of late seral characteristics and the production of larger diameter wood than would likely occur under the no action alternative."

Several sources point to passive management as the best approach to achieve ACSOs in RRs in many cases. Pollock and Beechie[22] reviewed the sizes of deadwood and live trees used by different vertebrate species to understand which species are likely to benefit from different thinning treatments. They examined how riparian thinning affects the long-term development of both large diameter live trees and dead wood. In forest growth models they created, passive management created dense forests that produced large volumes of large diameter deadwood over extended time periods as overstory tree densities slowly declined. This condition is almost always substantiated by the agency's DecAID analysis within their project areas.

Pollock and Beechie also showed that the few species that exclusively utilize large diameter live trees may benefit from heavy thinning, whereas the more numerous species that utilize large diameter dead wood can benefit most from light or no thinning.

Similarly, Spies et al.[23] concluded that thinning produces unnaturally low-stem-density forests and causes long–term depletion of snag and wood recruitment that is likely detrimental in most RRs. Commercial thinning will produce fewer large dead trees across a range of sizes over the several decades following thinning and the lifetime of the stand relative to equivalent stands that are not thinned. Generally, recruitment of dead wood to streams would likewise be reduced in conventionally thinned stands relative to un-thinned stands.

Specific or unmapped riparian

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

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

In Scoping, Bark shared locations and descriptions of several riparian areas which were not on Scoping maps at the time. The agency has since stated that riparian features that are not perennial or intermittent streams such as seeps, springs, ponds or wetlands would be protected by the establishment of protection buffers or skips that incorporate the riparian vegetation. The list of riparian areas we provided with geospatial coordinates and photos would be examined by the implementation team and when verified, would be dealt with according to the Project Design Criteria. The agency suggested that showing buffers on maps would be premature until areas are field verified – however they also shared that most of the areas were already known. Therefore, it does not seem premature to show these buffered areas on the final unit maps.

We shared this information to help create a more informed representation of baseline condition, because "(i)f an EA does not reasonably compile adequate information and sets forth statements that are materially false or inaccurate the Court may find that the document does not satisfy the requirements of NEPA, in that it cannot provide the basis for an informed evaluation or a reasoned decision." *Western North Carolina Alliance v. N. Carolina Dept. of Transp.,* 312 F. Supp. 2d 765, 776- 77 (E.D.N.C. 2003), citing *Sierra Club v. United States Army Corps of Eng'rs*, 701 F.2d 1011, 1030 (2d Cir.1983). Further, a "material misapprehension of the baseline conditions existing in advance of an agency action can lay the groundwork for an arbitrary and capricious decision." *Friends of Back Bay v. U.S. Army Corps of Engineers,* 681 F.3d 581, 588 (4th Cir. 2012).

Several units Bark has groundtruthed (i.e. units 61, 88, 168) contain riparian areas which are partially underground. In situations like this, it is very difficult to know the extent of the drainage network, and the soils are often very sensitive to ground-based disturbance. When this occurs within the units, **Bark recommends no ground-based heavy machine operations within RRs**. Any thinning could occur using hand equipment, and a non-commercial thin will leave wood within the Reserves.

Many of the units facing northwest along the 1825-125 road are intersected frequently with wide riparian areas dominated by red alder, and devil's club, with surface as well as sub-surface flowing water. Bark sees and appreciates the agency's efforts to protect these areas. They are highly susceptible to soil erosion and should be completely excluded from timber harvest. Extra care should be given

during the layout of these units to make sure to exclude all riparian habitat (which directly feeds listed fish habitat) from the units 71, 48, 38, 13, and 12.

Steep drop into riparian draw in Unit 13, 45.40348, -121.84525

Unit 168 contains extensive areas of riparian habitat that is not mapped and still inside the updated unit boundaries. The northeast corner of this unit should be dropped, as it includes diverse unlogged forest and is separated from the rest of the unit by streams and has not road access. Plants within the riparian areas inside the unit include bog orchid (*Platanthera dilatata*), marsh marigold *(Caltha biflora)* and shooting stars *(Dodecatheon)* – all indicators of riparian condition. The table below details the locations of unmapped riparian areas within unit 168 and others – these areas should be dropped from the units they are within. Again, these are different areas than ones we identified in Scoping and are still inside the most current timber sale unit map (received July 2020) boundaries.

Unmapped Riparian within updated unit boundaries:

Unit #	GPS	notes
8	45.40202, -121.85210	Devil's club patch
13	45.40348, -121.84525	Wet intermittent draw
13	45.40210, -121.84499	Wet draw with devil's club
14	45.40057, -121.84688	Seep

33	45.39838, -121.84321	Devil's club
33	45.39797, -121.84318	Devil's club
33	45.39742, -121.84422	Stream
33	45.39690, -121.84563	Stream
38	45.40937, -121.82974	Subterranean stream
38	45.40877, -121.82923	Subterranean stream
42	45.40010, -121.83332	Stream
42	45.40225, -121.82841	Seep
42	45.39973, -121.83291	Seep on old roadbed
43	45.40622, -121.82553	Stream
43	45.40548, -121.82638	Upper reaches of stream
61	45.41089, -121.79429	channel with subterranean water above
122	45.25794, -121.72348	Unmapped wet area
168	45.25953, -121.75304	Streams and seeps
168	45.25856, -121.75326	Stream
168	45.25747, -121.75391	Seeps
168	45.25587, -121.75469	Seeps
168	45.25531, -121.75556	Marsh
168	45.25508, -121.75571	Seeps
168	45.25468, -121.75605	Seeps on proposed temp road
168	45.25502, -121.75643	Seep
168	45.25743, -121.75405	Subterranean water
168	45.24960, -121.76664	Seep
168	45.24787, -121.76503	Spring with cottonwood
168	45.25004, -121.76573	Seep with channel
168	45.25035, -121.76424	Subterranean water

175	45.26162, -121.74096	Riparian – drop this part of unit
176	45.25994, -121.74401	Unmapped between 174/176

Unmapped seep in unit 168, 45.25953, -121.75304

Unmapped riparian area in Unit 33, 45.39742, -121.84422

21 – Bark's Comments on the Zigzag Timber Sale PA

Impacts: Flooding

Most of the project is in the "transient snow zone", where sudden snow melt can cause flooding. Open canopy caused by logging increases snow accumulation and can therefore increase flood risk, and forest roads divert runoff to streams. The Forest Service Water Quality Report states that the Clear Fork, Mud Creek, and West and East Fork Salmon River are all above the threshold of concern for flooding. This is concerning because the proposed logging will thin out the tree canopy near these already vulnerable streams, allowing more snow to accumulate on the forest floor. Floods typically occur when rains increase and temperatures start to warm in the spring, melting snow rapidly and causing a large volume of water to run off into streams all at once. Additional roads in the area can create a "channelizing" effect where water flows along the roads and is diverted to streams in larger volumes than if it was naturally dispersed on the ground.

Bark recommends increasing buffer sizes around streams that are above the threshold of concern for flooding could help mitigate the above impacts of logging and road building.

Impacts: Streamflow

The FS cited *Perry and Jones 2017 Summer streamflow deficits from regenerating Douglas-fir forest in the Pacific Northwest* in the Zigzag PA. The authors of this study found a reduced streamflow of up to 50% in watersheds that had been at least 50% clearcut. In the Clear Fork watershed, the project would increase the total clearcut percent from 46% to 47%. While the 1% increase is not a lot, this is very close to the 50% threshold found in the Perry and Jones paper where they saw significant impacts on streamflow. The Forest Service's argument is that 47% is less than 50% so no further analysis is needed. However, common sense tells us that there will surely still be some impacts on streamflow seen at 47% as well.

Bark requests that the Forest Service to acknowledge that there will likely be impacts to streamflow even at the 47% level. Bark then also requests an analysis of the potential impacts on streamflow at levels below 50% clearcut.

Impacts: Sedimentation

Modeled sediment delivery showed an increase over background levels in the Clear Fork and Mud Creek catchments as a result of the Proposed Action. In the Clear Fork catchment, based on the 6% short-term increase in sediment that would be spread out in space and time, channel storage and slow metering of sediment through the stream system and the natural conditions that produce massive to minor fluvial deposition that Clear Fork has evolved with, the agency expects that fine sediments levels would not increase to the point that they would cause measurable increases in in-channel fine sediment.

There is an estimated 5% short-term increase in sediment yield over background levels in the Mud Creek catchment. There are in-channel processes that store and slowly release sediment in depositional stream reaches including reaches with less than 2% gradient and wetlands. Here, the agency does not expect that fine sediment levels would increase to the point that they cause measurable increases with in-channel fine sediment.

The Forest Service states that there has not been a survey for bank stability done at Mud Creek. The analysis of potential impacts is incomplete without this data, because they also stated that Mud Creek is above the threshold of concern for flooding. This means that Mud Creek is significantly susceptible to flooding, and we have no data on how secure its banks are. During a flood event, an unstable bank is more likely to release sediment into the water. Sedimentation negatively affects water quality and has been shown to increase the mortality rate of salmon and trout eggs. For the Forest Service to accurately quantify potential impacts, it is imperative to know how well the banks of Mud Creek can hold up to a flood event. This issue is compounded by the fact that, as discussed in the section on Flooding above, the proposed logging and road building activities have been proven to increase flood risk. These three factors together indicate that Mud Creek may be more significantly impacted by the project than the Forest Service has concluded.

The Forest Service states that sections of the Muddy Fork already have greater than 10% unstable stream banks (19%-13%) and sedimentation and embeddedness (12% and 17% respectively) are close to the threshold of concern of 20%. We need further analysis of the potential to increase sediment levels above 20%, which would impair stream function.

The analysis does not adequately address the inevitable reduction in slope stability caused by tree harvest on steep slopes, particularly because they are adjacent to

streams. Trees and other vegetation help to stabilize soil and hold it in place. Removing trees exposes the ground to the elements and removes the stabilizing root systems holding soil in place.

Bark requests that Mud Creek be surveyed for bank stability, and that additional analysis of slope stability impacts is completed afterwards. Specifically, we request an analysis that takes flood potential, bank stability/sedimentation, and streamflow into account as concurrent compounding factors. Currently, their analysis addresses them as separate issues.

Bark also requests a disclosure of confidence intervals and analysis of potential for variability in the values the agency produced. Values such as bank stability and sedimentation cannot be quantified at such an exact level, it would likely be a range. These numbers are based on imperfect mathematical models that produce fairly accurate but variable estimations.

Impacts: Aquatic Species

Threatened fish including steelhead trout, chinook and Coho salmon occur in the Horseshoe area of the Zigzag project. With the protections assumed to be provided by PDCs (provide site specific Project Design Criteria), the proposed action "may affect but is not likely to adversely affect individuals, populations, or habitats of ESA-listed species or essential fish habitat." Consultation between the FS and the National Marine Fisheries Service is ongoing.

The Forest Service Region 6 sensitive species that are likely present in the project area include lamprey and costal cutthroat trout. The proposed action "may impact individuals or habitat but would not likely contribute to a trend towards federal listing or loss of viability to the population or species." Other aquatic sensitive species or survey and manage species could also occur in the project area.

In the Lolo pass area within Horseshoe soil are wet and rocky and terrain is steep. The Upper Sandy Watershed Analysis at 1-6 points out that the area of the Horseshoe units averages 70% slopes. Bark has also noted that on both sides of Clear Creek are slopes of 40 – 70%, with some areas in units being much steeper. The map on 4-17 shows that geology north of the Sandy River, units along 1828, are on weak rock. These are prone to moderate to high debris flow, slumping, and earthflow. 36% of Clear Creek is at a high risk for landslides, and 29% of Lost

Creek. These are places were ESA fish reside. The map on 4-29 shows that Clear Fork and Lost Creek both have high streambank failure potential. Along with erosion from potential logging occurring on these steep slopes, 4-26 notes the already high erosion rate from the powerline corridor.

These risks are especially concerning given that much of the Horseshoe area is providing anchor habitat for several species (Evolutionarily Significant Units) of federally listed salmon and steelhead.

The *Assessment of Anchor Habitat on the Sandy River* on page 51 shows a map identifying two areas of anchor habitat within the planning area, one along the Clear Fork and one along Lost Creek. Referring to the Horseshoe map, one can see that units 4 and 6 are adjacent to this vital habitat for three separate species at the confluence of Clear Fork and the Salmon River. Unit 4, a "fire originated" is over 50% slope consistently.24 Many trees in the unit are pistol butting, indicating earthflow. The many rock formations coupled with steepness create conditions for rockslide/landslides above fish habitat. Further up the Clear Fork is more anchor habitat and units 48, 71, 96, 38, 40, 92, 46, 69, 12, 13, and 8 all propose logging within Riparian Reserves. Lost Creek has anchor habitat for two threatened species of salmon and units 74, 80, and 82 are adjacent to a section of the creek.

Higher peak streamflow is associated with higher rates of salmon embryo (egg) mortality. Higher peak streamflow increases sedimentation, which in turn reduces the availability of oxygen by burying and ultimately killing the salmon embryos. As discussed in the Flooding section above, timber harvest and construction of roads have been shown to increase peak streamflow. The Forest Service states that there is a significant reduction in embryo survival for Chinook, cutthroat, and steelhead trout if fine sediment concentration reaches 15-20%. As discussed in the Sedimentation section above, Muddy Creek is already at 12% sedimentation and has greater than 10% unstable banks. These factors together could result in

[24] The riparian area adjacent to the south of Unit 4 receives a significant amount of dispersed recreation. Soil disturbance/canopy removal above extensive, heavily compacted campsites could result in increased erosion and movement of human waste into Clear Fork.

impaired water quality, reducing the quality of habitat for threatened salmon species that inhabit the stream.

The FS states that most sedimentation would occur at Clear Fork and Mud Creek while tree harvest and road construction are being conducted. After work is complete, they predict sedimentation levels will return to normal for the most part. This is a good opportunity for a timing restriction as mitigation for potential effects on salmon eggs during the spawning season. Limiting work to outside of the spawning season would reduce the possibility of burying and killing eggs.

The Wildlife Report states that habitat for Harlequin ducks is not present in the vicinity of proposed actions. The Upper Sandy WA at 4 -105 notes that Harlequin ducks have been seen on Clear and Lost Creek. Bark has also heard firsthand accounts from local residents that they have seen this species on the Clear Fork. This species is in decline and was identified as a Regional Forester Sensitive Species due to impacts from logging (degraded riparian habitat). **It is unclear whether contracted surveys were done for this sensitive species.**

Similarly, the Cope's giant salamander (Regional Forester Sensitive Species) is thought to be present within the project area. Typically, this species depends on cold water habitat between 8-14° C. This species is in decline due to its restricted distribution along with the potential for increased habitat destruction within its range. **It is unclear whether contracted surveys were done for this sensitive species.**

Given the number of sensitive and protected species dependent on healthy functioning condition of riparian areas within the Zigzag project area, the FS should apply extra consideration to the impacts of logging and roadbuilding on these habitats. Where actions included in RRs "may affect, and are likely to adversely affect", or "may impact individuals or their habitat, but would not likely contribute to a trend toward federal listing or loss of viability to the population or species" **Bark requests again that the FS create an alternative which deletes sections of units which contribute to the Determination.**

Additionally, to reduce impacts to listed fish, limit work to outside of federally protected salmon spawning seasons.

Please also clarify where the agency intends to get the large "fish logs" they stated they will use to enhance stream habitat. **Bark requests that these fish logs not be harvested within Riparian Reserves.**

SOILS/GEOLOGY

According to the FS, known unstable or potentially unstable areas have already been deleted from the proposed units. This is not consistent with Bark's experience in units like 4, 6, 12, 13, and 68, which each contain areas of rocky cliffs and other steep outcroppings.

- Steep rock outcrop Unit 4: 45.39272, -121.86054
- Cliffs in Unit 6: 45.39661, -121.85481; and 45.39606, -121.85548
- Rock outcrop Unit 8: 45.40164, -121.85302
- Rock outcrop Unit 13: 45.40284, -121.84575
- Rock outcropping Unit 68: 45.37506, -121.85802

We are concerned that the geology effects analysis is one short paragraph: "Zigzag Integrated units overlying active landslides included units 2, 4, 7, 40, and 44 (Figure 1) in the Horseshoe portion of the planning area. Areas of units that overlapped active landslides were deleted from the units. No active landslides were noted in the Mud Creek portion of the planning area (Figure 2). No new road construction is proposed in areas of instability."

We read "Detrimental Soil Disturbance (s. 3.6.2.2) - Uses existing skid trails & landings. Temporary roads, landings and some skid trails would be restored." Can one interpret this to mean all skid trails and landings are "existing"? This seems doubtful; however, this statement would indicate it. **Please clarify this in the draft Decision.**

MATURE/FIRE ORIGIN STANDS

In the Mud Creek area, units 198, 196, 194, 192, 190, 182, 102, 108, 114, 117, 119, 129, 130, 132, 180, 181, 184, 185, 186, 165, 168, 175, 176, and 178 are all fire origin stands. Of these stands, only 168, 182, 102, 165 and 175 overlap with 1902 fire layer provided in the Zigzag story map, so the vast majority have a fire history which is currently either unknown or not disclosed.

In the Horseshoe area, units 2, 4, 6, 7, 8, 20, 16, 18, 26, 28, 24, 34, 31, 62, 63, 64, 65, and 68 are all fire origin stands in the Horseshoe area which overlap with the 1902 fire layer provided.

Most, if not all, of these stands are over 100 years old and naturally re-seeded after a fire or after post-fire logging. Not all these stands include forest typically thought of as "late seral" or "mature" in structure (this largely has to do with previous logging history). However, the best way for the FS to ensure that there is an overall increase of mature and old growth forest habitat in the future is to let mature forests like these grow unmanaged.

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

Bark has observed that old-growth features, such as large trees, snags, and multiple tree canopy layers, often begin to be present in mature stands (defined here as over 80 years old). 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."[25] When old forests are in such short supply, these mature stands act as important "life boats" that will carry closed-canopy dependent wildlife through the habitat bottleneck created by decades of overcutting. One example is the R6 (Region 6) Sensitive Cascades axetail slug, which tends to inhabit Douglas fir-western hemlock stands with a vine maple understory. Areas where down wood retains pockets of moisture and where vine maple leaves form a layer to hold moisture is preferred habitat for this species.

If retained, mature forest stands in Zigzag will continue growing and removing carbon from the atmosphere for decades or even centuries. These mature forests have not yet reached their full potential for carbon storage and will continue to sequester additional carbon in both wood and soil for a long time. Old-growth

[25] 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.

forests in the moist “westside” portions of the Pacific Northwest store more carbon per-acre than any other temperate forests in the world.[26]

Bark has visited several “fire origin” units and found that tree ages and sizes vary, and legacy trees and snags scattered throughout the units. It isn’t just fire-origin units that include mature forest habitat characteristics. Some “plantation” units Bark has visited also include legacy trees and snags, among other structural components of a healthy forest.

Structural diversity including old trees and snags in Unit 33 (left) and Unit 168 (right)

Where there are pockets of this habitat within units, as there are in Units 4, 6, 8, 18, 20, 31(south section), 33, 43, 62, 63, 119 (north section), 130, 132, 168, 178, 182 Bark recommends dropping these sections from the units. The northeast corner of 168 should be dropped completely from this project due to being both structurally diverse and riparian.

[26] Smithwick EAH, Harmon ME, Acker SA, Remillard SM. 2002. Potential upper bounds of carbon stores in the Pacific Northwest. Ecological Applications 12(5): 1303-1317. “The C densities we measured in old-growth forests of the PNW are higher than C density values reported for any other type of vegetation, anywhere in the world. … Results showed that coastal Oregon stands stored, on average, 1127 Mg C/ha, which was the highest for the study area, while stands in eastern Oregon stored the least, 195 Mg C/ha. … the highest C density was at stand CH04 at Cascade Head, ORCOAST, with 1245 Mg C/ha.”

Where scattered large down wood, large snags, large live trees, or minor trees exist (is it does in most of the "fire origin" units), **Bark recommends retaining no less than 40% of the canopy cover, retaining as much mid-story component of the stand as is feasible, retaining the largest trees in the stand, as well as retaining all legacy features.**

RED TREE VOLES

Red tree voles (RTV) are Category C Survey and Manage species under the Northwest Forest Plan, and according to the IUCN Red List are "near-threatened". Threats to the species include loss of forest habitat and forest fragmentation. This species has limited dispersal capabilities and early seral stage forests are a barrier to dispersal. Red tree vole Habitat Areas[27] within proposed timber sales require a minimum of 10-acres and are intended to provide for the protection of the physical integrity of the nest(s) and retain adequate habitat for expansion of the number of active nests at that site. The Habitat Areas must include a buffer of one site-potential-tree height around nests on the outer edge of such polygons and include any confirmed inactive red tree vole nests that are located within 100 meters (330 feet) of a confirmed active red tree vole nest.

In the Zigzag project, several proposed units meet the survey protocol prerequisite[28] required by the agency to conduct surveys for RTVs (red tree vole). According to the FS, red tree vole surveys were required by protocol in 16 of the proposed treatment units equaling a total of 449 acres, all within the Horseshoe portion of the project area. Surveys were not required in the other proposed treatment units primarily

[27] https://www.blm.gov/or/plans/surveyandmanage/files/mr-rtv-v2-2000-09-att1.pdf

[28] https://www.blm.gov/or/plans/surveyandmanage/files/sp-RedTreeVole-v3-0-2012-11.pdf

Inactive red tree vole nest located in Unit 86

due to ages of the stands or elevation constraints (all of the Mud Creek area) of the species.

Presence of red tree vole was confirmed within three proposed units in the Zigzag project area. Based on these survey results, two entire units and a portion of one other were dropped from proposed treatment to protect red tree voles and for other resource concerns.

We noted within Zigzag units that several trees had been flagged by surveyors, presumably to mark the dominant trees in the stand. However, not all trees we found marked were suitable for RTV. Additionally, we found several trees which were suitable for RTV which were not flagged (see table below). **We request that these trees and others found throughout the planning process for this project be climbed and that any nests found be buffered appropriately**. If these trees are climbed by volunteer surveyors (such as NEST), **we request that any information submitted to the Forest Service before the Decision is released be incorporated into that Decision.**

Examples of potential red tree vole nest trees in Units located in 43, 119 (above), and 168 and 34 (below)

Unsurveyed trees suitable for RTVs

Unit	GPS	Notes
34	45°23'55.29"N, 121°50'30.54"W	38.5" DBH remnant Doug fir
33	45.39737, -121.84443	50” DBH Doug fir
68	45.37757, -121.85952	45” Doug fir
43	45.4044, 121.82653	five remnant Doug firs
43	45.40426, -121.82615	Two remnant Doug firs
43	45.40513, -121.82551	63” Doug fir
43	45.40584, -121.82521	66” DBH Doug fir
119	45.25623, -121.73002	47.5 DBH remnant Doug fir
108	45.26385, -121.73247	38” DBH Doug fir
108	45.26289, -121.73347	57” DBH Doug fir
129	45.24406, -121.73281	Large remnant Doug fir
130	45.23571, -121.73913	Late seral Doug fir
132	45.23598, -121.73646	Legacy Doug fir 52”

130	45.23660, -121.73563	41” DBH Doug fir
168	45.25711, -121.75448	45” DBH Doug fir
168	45.25611, -121.75461	Remnant Doug firs
180	45.22097, -121.76956	56” DBH Doug fir
178	45.26285, -121.74575	Remnant 61” Doug fir

HEMLOCK DWARF MISTLETOE UNIT/REGENERATION HARVEST

The Zigzag scoping letter includes “regeneration harvest” using mastication treatment of 13 acres of forest within the project area to reduce the spread of dwarf mistletoe (Arceuthobium tsugense), a parasite that depends entirely on its host for food. Major hosts include western hemlock, Pacific silver fir, noble fir, and mountain hemlock. In this stand, Unit 129, the FS proposes to remove brush as well as the stunted, small diameter hemlock trees and presumably to plant the stands with species not susceptible to the plant.

Upon walking this unit, Bark volunteers noted that it varied considerably – there are areas of more open and vigorously growing stand conditions, as well as some large trees (~30-40” DBH) relative to the rest of the unit. We have concerns that these areas are included in the “regeneration harvest” proposal. **We request that all large diameter trees relative to the stand are retained, as well as areas with healthy mature stand conditions as highlighted below. Do not use regeneration harvest in these areas.**

Stand condition in Unit 129 at 45.24516, -121.73198

Large diameter Douglas fir in Unit 129 at 45.24406, -121.73281

It is unclear whether this stand ever supported large permanent openings, or consistently large old growth trees which could support late successional species. The FS in the past stated that forage has declined in large part due to the continued policy of full fire suppression on the District, as fire is the historic source of forage openings. However, there has not been a scientifically supported effort by the FS to provide evidence that increased acres of "regeneration harvest" will result in increased forage overall.

Additionally, recent OSU research has found that in the Pacific Northwest overall, species dependent on late-seral habitat continue to suffer greater population

declines compared to early-seral species.[29] In contrast to generalization that the reduction of clearcutting on federal lands has negatively affected the creation of early-seral ecosystems, the area of diverse early-seral ecosystems on federal land has remained more or less constant.

Increases in areas of large, high-severity wildfires appear to have compensated for any decline in early-seral ecosystems created from logging. Projections of vegetation change and fire in the Pacific Northwest point to increased prevalence of wildfire and expansion of conditions suitable for hardwoods. These changes could create more habitat for species associated with early-seral ecosystems and suggest that active management (including "ecological forestry") may be less needed where these processes occur. **In the Decision, the FS should address this reality and disclose the numbers of early seral vs. late seral species in the project area.**

FW-306 indicates that timber stands should not be regeneration harvested until they have reached or surpassed 95% of culmination of mean annual increment measured in cubic feet. FW-307 explains that exceptions to this may be made where resource management objectives or special resource conditions require earlier harvest. FS stand exam data shows that Unit 129 has not yet reached 95% of culmination of mean annual increment. According to the FS, a Forest Plan exemption is appropriate for FW-106 due to the "urgency of dealing with this dwarf mistletoe situation."

While we acknowledge the agency's interest in actively improving early successional forest structure, and subsequently growing stands of merchantable timber, Bark also values - and must draw attention to - the variety of ecological benefits of mistletoe such as food, cover, and nesting platforms birds and other small animals[30]. Mistletoe has been a natural component of a healthy forest ecosystem for thousands, if not millions, of years.

During this project planning, the ecological benefits of mistletoe should not be under-estimated, and prescriptions should reflect these benefits. For example, it has been suggested that mistletoe is a "keystone species" in many vegetation

[29] https://today.oregonstate.edu/news/nw-forest-plan-25-years-later-wildfire-losses-bird-populations-down
[30] Watson, D.M. 2001. Mistletoe — A keystone resource in forests and woodlands worldwide. Annu Rev Ecol Syst 32: 219-249.

communities. The abundance and diversity of birds is correlated with the degree of mistletoe occurrence, and avian vectors seem to prefer infected hosts.[31]

It has also been noted that mistletoe brooms provide important habitat for relatively high densities of flying squirrels (important prey for spotted owls and other carnivores).[32] This function of mistletoe brooms is quite valuable in typical stands that are deficient in large snags.

The fruit, foliage and pollen of dwarf mistletoe are a food source for numerous bird, mammalian, and insect species. Dwarf mistletoe of all types alters the growth patterns of infected trees, creating structural complexity within forests in the form of witches' brooms and snags, both which are used by numerous wildlife species (including some species of owls) for nesting, roosting and cover.

Research suggests that greater bird diversity is associated with increased mistletoe infestation; the key limiting resource for the birds in this situation may be snags. Management Strategies for Dwarf Mistletoe: Silviculture describes mistletoe control treatments in which infected trees were killed but left standing for woodpeckers and other cavity-nesting animals. Although these snags are used, they remained standing for only a few years. Studies of broom use by wildlife include work by Hedwall[33], and Garnett[34]. These studies identify which birds and mammals use witches' brooms, how they use it (for nesting and roosting), and what kinds of brooms are preferred. This information is useful to determine if retaining certain brooms is a potential benefit for a favored species. Still lacking are specifics of how the number and distribution of snags and brooms relates to levels of mistletoe infestation, and to wildlife populations and the dynamics (rates of generation and loss) of these features.

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[31] Aukema, J.E. 2003. Vectors, viscin, Viscaceae: Mistletoes as parasites, mutualists, and resources. Frontiers in Ecology I(3): 212-219.
[32] PNW Research Station. Rocky to Bullwinkle: Understanding Flying Squirrels Helps us Restore Dry Forest Ecosystems. Science Findings. Issue Eight. February 2006. http://www.fs.fed.us/pnw/sciencef/scifi80.pdf
[33] Hedwall, S. 2000. Bird and mammal use of dwarf mistletoe witches' broom in Douglas-fir in the Southwest. MSc Thesis, Northern Arizona university, Flagstaff, AZ.
[34] Garnett, G. N.; Chambers, C. L.; Mathiasen, R. L. 2006. Use of witches' brooms by Abert squirrels in ponderosa pine forests. Wildlife Society Bulletin 34:467–472.

FAILURE TO TAKE A HARD LOOK AT CLIMATE CHANGE AND CARBON STORAGE IMPACTS

The extremely brief discussion in the EA fails to take a "hard look" at the impacts of the Zigzag project on the carbon cycle & climate change and also on the impacts of the changing climate on the project area. Despite the Ninth Circuit's admonition that "general statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided" this is exactly what the Zigzag EA provides. *Neighbors of Cuddy Mountain v. U.S. Forest Service,* 137 F.3d 1372,1380 (9th Cir. 1998). Once again, the Forest Service is squandering a valuable opportunity to substantively engage with one of the most pressing environmental issues of our times and instead making general statements unsupported by the best available science.

1) What a "hard look" means in the context of analyzing climate change

It appears that most, if not all, of the Climate Change Specialist's Report is copy/pasted from past planning documents and did not substantively engage with any of the information Bark submitted in its five pages of scoping comments, which included extensive cites to relevant, recent scientific studies regarding as well as simple corrections to mistakes in the scoping notice re: terminology. As far as we can tell, none of this was incorporated into the EA's analysis. While the EA states that "The cited science has been considered along with that science cited in this report. That consideration is documented in the administrative record," we found nothing in the record to back up this assertion. As the Ninth Circuit recently found in a case regarding the Crystal Clear Timber Sale on Mt. Hood National Forest: "In its responses to these comments . . . the USFS reiterated its conclusions about vegetation management but **did not engage with the substantial body of research cited by Appellants**." *Bark v. United States Forest Serv.*, 958 F.3d 865, 870 (9th Cir. 2020) (emphasis added). In that case, the Forest Service's failure to engage the submitted science led the court to invalidate the Crystal Clear EA. We encourage the Forest Service to follow the guidance of the court and substantively incorporate the following comments into the final Zigzag EA.

While the state of the law about analyzing climate change in the NEPA process is still in development, the Ninth Circuit established a rule regarding timber sales that a NEPA analyses must consider a project's "impact on global warming in

proportion to its significance." *Hapner v. Tidwell* 621 F.3d 1239, 1245 (9th Cir. 2010). Given that Oregon's forests are increasingly well-known as important carbon sinks, and that climate change may be the most significant ecological crisis of our times, the proposed Zigzag timber sale's impact on climate change is far greater than the extremely brief, inaccurate and out of date discussion included in the EA and specialist report.

In addition, we remind the Forest Service that an agency's defense of its positions must be found within the body of the EA itself, not somewhere in project files. *ONDA v. Rose*, 921 F.3d at 1191; *Blue Mtns. Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1214 (9th Cir. 1998); *see also e.g. Sierra Club v. Bosworth*, 199 F. Supp. 2d 971, 980 (N.D. Cal. 2002) ("[I]t is not an adequate alternative, however, to merely include scientific information in the administrative record."). As is currently written the few paragraphs in the EA give no useful information regarding the climate and carbon impacts of the Zigzag project.

2) Please prepare a quantitative analysis regarding this project's impact on the carbon cycle

In recent projects, Bark has observed that the FS has made a choice not to pursue a quantitative carbon analysis, or address current OSU forest carbon research and its recommendations[35] which were provided to them in multiple ways during Scoping, and since that time have been supported by the Oregon Global Warming Commission's Forest Carbon Accounting Project Report[36]. These findings highlight the importance of project-level tracking of carbon emissions, and question whether converting standing timber into wood products can be an effective strategy for maintaining or increasing overall forest carbon storage.

The PA acknowledges that public comments received suggested a project-specific quantitative carbon analysis. The agency responded that a quantitative carbon analysis was not conducted for this project because it would not likely lead to

[35] https://www.pnas.org/content/115/14/3663

[36]https://static1.squarespace.com/static/59c554e0f09ca40655ea6eb0/t/5c094beaaa4a99fa6ad4dcde/1544113138067/2018-OGWC-Forest-Carbon-Accounting-Report.pdf

changes to the proposed action or to the creation of other alternatives that achieve the purpose and need. This flies in the face of NEPA's direction to have high quality environmental analysis to sharply define the difference in alternatives, including the "no action" alternative. Instead, the Forest Service tacitly admits that it has already decided about this action, without knowing the actual impacts.

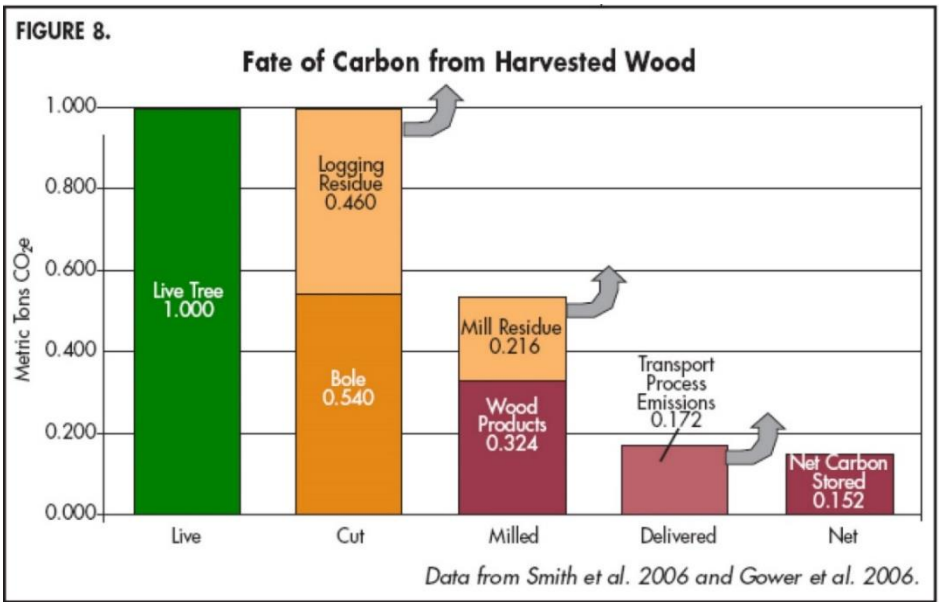
This approach undercuts the NEPA process, as this could be the argument for not analyzing a whole host of impacts. One never knows which analyses for any particular resource area will result in changes to a proposed action or creation of new alternatives, which is why it is important to substantively analyze all major environmental impacts. How else would the agency know if an alternative resulted in impacts, or a better way to achieve a purpose and need?

We encourage the FS to reconsider preparing a quantitative carbon analysis and engage with Land use strategies to mitigate climate change in carbon dense temperate forests[37], a paper released in 2018 which explores PNW forests' role in the regional carbon cycle. In this paper, reforestation, afforestation, lengthened harvest cycles on private lands, and restricting harvest on public lands increase net ecosystem carbon balance 56% by 2100, with the latter two actions contributing the most. Resultant co-benefits included water availability and biodiversity, primarily from increased forest area, age, and species diversity. **Increasing forest carbon on public lands reduced emissions compared with storage in wood products because the residence time is more than twice that of wood products.** Hence, temperate forests with high carbon densities and lower vulnerability to mortality have substantial potential for reducing forest sector emissions.

3) Please correct inaccuracies regarding carbon and "long-lived" wood products and recognize that proforestation is the most carbon beneficial approach to forest management

[37] Beverly E. Law, Tara W. Hudiburg, Logan T. Berner, Jeffrey J. Kent, Polly C. Buotte and Mark E. Harmon Land use strategies to mitigate climate change in carbon dense temperate forests. PNAS March 19, 2018. 201720064; published ahead of print March 19, 2018. https://doi.org/10.1073/pnas.1720064115

As we noted in the scoping comments, the FS mistakenly conflates the carbon sequestration with carbon storage when it asserts that utilizing trees to create "long-lived" wood products *sequesters* carbon. This mistake is still glaringly present in the draft EA, accompanying the myth that wood products hold more carbon than trees and soil in in-tact forests. Studies have found that approximately 15% of a tree's carbon ends up in long-lived wood products, releasing the other 85% into the atmosphere.



Contrary to the outdated assertion in the Report, recent research suggests substitution benefits of using wood versus more fossil fuel-intensive materials may have been overestimated by at least an order of magnitude.[38] While product substitution reduces the overall forest sector emissions, it cannot offset the losses incurred by frequent harvest and losses associated with product transportation, manufacturing, use, disposal, and decay.

Another discredited assertion is that younger forests are better at sequestering and storing carbon, such as that included in the 2014 paper (cited by on the specialist's report) from Oregon Forest Resources Institute (a timber lobby group). More recent research finds that older forests in the westside Cascade Mountains have an extremely high potential carbon sequestration and low vulnerability to future

[38] Beverly E. Law, Tara W. Hudiburg, Logan T. Berner, Jeffrey J. Kent, Polly C. Buotte and Mark E. Harmon, Land use strategies to mitigate climate change in carbon dense temperate forests. PNAS March 19, 2018. 201720064; published ahead of print March 19, 2018. https://doi.org/10.1073/pnas.1720064115

drought and fire. [39]*Carbon sequestration and biodiversity co-benefits of preserving forests in the western USA*, the Pacific Northwest's high-productivity, low-vulnerability forests have the potential to sequester up to 5,450 Tg CO2 equivalent (1,485 Tg C) by 2099, which is up to 20% of the global mitigation potential previously identified for all temperate and boreal forests, or up to ~6 yrs. of current regional fossil fuel emissions. Additionally, these forests currently have high above- and belowground carbon density, high tree species richness, and a high proportion of critical habitat for endangered vertebrate species, indicating a strong potential to support biodiversity into the future and promote ecosystem resilience to climate change.

These results show considerable potential for forests in the western United States to sequester additional carbon over the coming century and demonstrate that protecting high-carbon-priority areas could help preserve components of biodiversity. Preserving high-carbon-priority forests avoids future CO2 emissions from harvesting and mitigates existing emissions through carbon sequestration.

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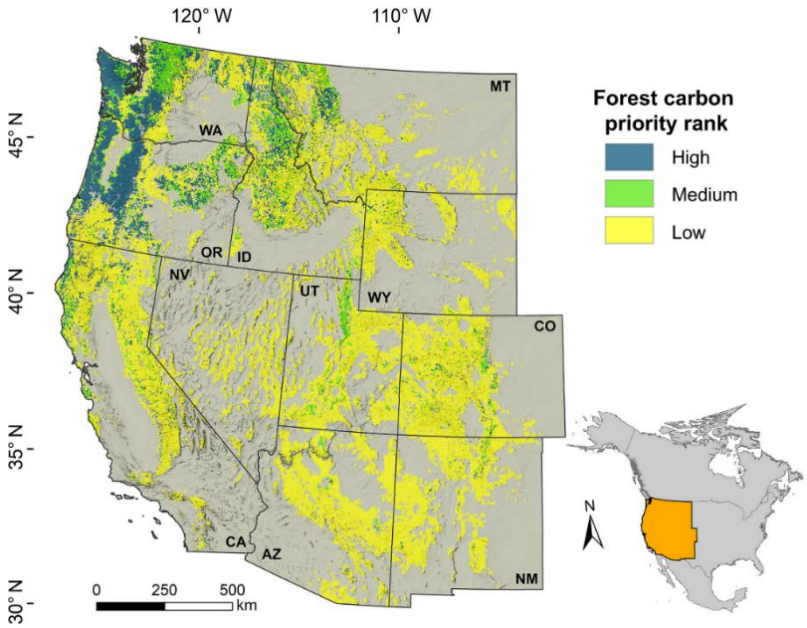
[39] Polly C. Buotte, Beverly E. Law, William J. Ripple, Logan T. Berner. Carbon sequestration and biodiversity co-benefits of preserving forests in the western USA. *Ecological Applications*, 2019; DOI: 10.1002/eap.2039



Forested land in the western conterminous United States classified into priority for preservation to mitigate climate change based on the spatial co-occurrence of low vulnerability to drought and fire and low, medium, and high potential carbon sequestration. WA, Washington; ID, Idaho; MT, Montana; OR, Oregon; CA, California; NV, Nevada; UT, Utah; CO, Colorado; AZ, Arizona; NM, New Mexico.

This is supported by recent research showing that growing existing forests intact to their ecological potential—termed *proforestation*—is the most effective, immediate, and low-cost approach that could be mobilized across suitable forests of all types. Proforestation serves the greatest public good by maximizing co-benefits such as nature-based biological carbon sequestration and unparalleled ecosystem services such as biodiversity enhancement, water and air quality, flood and erosion control, public health benefits, low impact recreation, and scenic beauty.

For example, a study of 48 undisturbed primary or mature secondary forest plots worldwide found, on average, that the largest 1% of trees [considering all stems ≥1 cm in diameter at breast height (DBH)] accounted for half of above ground living biomass (The largest 1% accounted for ~30% of the biomass in U.S. forests due to larger average size and fewer stems compared to the tropics). Each year a single tree that is 100 cm in diameter adds the equivalent biomass of an entire 10–20 cm diameter tree, further underscoring the role of large trees. Intact forests also may

sequester half or more of their carbon as organic soil carbon or in standing and fallen trees that eventually decay and add to soil carbon. Some older forests continue to sequester additional soil organic carbon and older forests bind soil organic matter more tightly than younger ones.

Proforestation has the potential to provide rapid, additional carbon sequestration to reduce *net* emissions in the U.S. by much more than the 11% that forests provide currently.[40]

4) Use Best Available Science to analyze carbon emissions from the Zigzag Project

Given that there are no scientific references later than 2015 in the Specialist's Report, it is not altogether surprising that the Forest Service's conclusions regarding carbon storage and emissions are outdated and not supported by the best available science. Removal of biomass from any forest limits its ability to sequester carbon for a period after the disturbance and subsequently turns the forest into a carbon source.[41] Not only that, but also the act of removing trees requires carbon emissions. Moreover, reducing tree densities increases weatherization of dead biomass, which would increase the rate of carbon emissions from decay.

The Oregon Global Warming Commission states in its 2018 Forest Carbon Accounting Project Report: "Based on credible evidence today, forest harvest does not appear to result in net carbon conservation when compared to carbon retention in unharvested forests…Current analysis suggests that treatments which include medium to heavy thinning result in reduced carbon stores that do not recover in any meaningful time periods."

The FS has often claimed the short-term carbon emissions and the difference in long-term carbon storage that could be attributed 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

[40] https://www.frontiersin.org/articles/10.3389/ffgc.2019.00027/full
[41] Mitchell SR, Harmon ME, O'Connell KEB. 2009. Forest fuel reduction alters fire severity and long-term carbon storage in three Pacific Northwest Ecosystems. Ecological Applications, 19:3; 643-655.

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.

5) Failure to provide actual information about the likely impacts of climate change on the area

Despite the legal standard for NEPA that "general statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided," general statements are all the EA/Report contain. *Neighbors of Cuddy Mountain v. U.S. Forest Service, 137* F.3d 1372,1380 (9th Cir. 1998). This is especially troubling because there is such a wealth of resources available, many from the Forest Service or USDA, that you could be using to create this analysis.

The Report states that "**[w]hile there are no specific projections for the project area**, the situation would likely be one where the summers are drier and the snow melts earlier in the spring." However, there *are* specific projections – from several different sources. Bark advises the Forest Service to review its own 53-page Climate Vulnerability Assessment for The Columbia Gorge Scenic Area and Mt. Hood & Willamette National Forests which provides many specific models and projections for regional trends and local impacts. We also invite you to review the USDA Climate Hub, which encompasses Alaska, Idaho, Oregon, and Washington. The purpose of the Hub is to deliver science-based knowledge and practical information to farmers, ranchers, forest managers, and Native American tribes that will help them to adapt to climate change.[42] The Climate Resilience Data Explorer is also helpful. It is a web application that allows users to view, summarize, and generate reports regarding 10 key metrics related to climate resilience. The goal of the Data Explorer is to support conservation management that increases the adaptive capacity of the landscape and its ability to support native species and

[42] https://www.climatehubs.usda.gov/hubs/northwest

ecosystems into the future by protecting areas which play a key role in facilitating climate adaptation and mitigation.[43] There are also extensive scientific resources regarding impacts of the changing climate on the website for OSU's Climate Impacts Research Consortium[44] that the Forest Service could use to update its outdated scientific research. With the wealth of resources available to inform the Forest Service's climate analysis, there is simply no" justification regarding why more definitive information could not be provided." *Neighbors of Cuddy Mountain,* 137 F.3d at 1380.

6) Impact of Management on Ecosystems Experiencing Climate Change

Human-caused 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. Looking at climate impacts in National Forests, one report concluded that, "climate change will directly affect the ecosystem services provided by national forests and will exacerbate the impacts of current natural and anthropogenic stress factors."[45] Climate change is predicted to result in more flood events and fires across the Pacific Northwest.[46] Many Oregon streams will experience higher winter flow and reduced summer flows as temperature rises and the variability of precipitation increases. The well documented shift from snow to rain, coinciding with increases in temperature, affects hydrologic trends. Snow cover typically accumulates at temperatures close to the melting point, and thus is at risk from climate warming because temperature affects both the rate of snowmelt and the phase of precipitation. With a projected 2°C winter warming by mid-century, almost 10,000 km^2 of currently snow-covered area in the Pacific Northwest could receive winter rainfall instead.[47]

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[43] https://adaptwest.databasin.org/

[44] https://pnwcirc.org/our-science

[45] Blate, G.M., et. al, Adapting to climate Change in United States national forests, Unasylva 231/232, Vol. 60, p57, 2009.
[46] USDA Forest Service, Pacific Northwest Region, Aquatic and Riparian Conservation Strategy, p. 30 (2008).
[47] Heejun Chang, Julia Jones, *Climate Change & Freshwater Resources in Oregon*, Oregon Climate Change Research Institute, Oregon Climate Assessment Report, College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis, OR (2010) at 84.

Climate change, combined with effects from past management practices, is exacerbating changes in forest ecosystem processes and dynamics to a greater degree than originally anticipated in the NWFP.[48] This includes changing patterns of fire, insect outbreaks, drought, and disease.[49] Land managers need to consider this uncertainty and how best to integrate knowledge of management-induced landscape pattern and disturbance regime changes with climate change when making spotted owl management decisions.

In a recent study, the influence of weather and climate on spotted owl populations was evidenced in northern California, Oregon, and Washington. Climate related factors accounted for 84% and 78% of the temporal variation in population change of spotted owls in the Tyee and Oregon Coast Range study areas, respectively. Climate and barred owls together accounted for nearly all (~100 percent) of the changes in spotted owl survival in the Oregon Coast Range.[50] The presence of high-quality habitat appears to buffer the negative effects of cold, wet springs and winters on survival of spotted owls as well as ameliorate the effects of heat. The high-quality habitat might help maintain a stable prey base, thereby reducing the cost of foraging during the early breeding season when energetic needs are high. In general, climate change can increase the success of introduced or invasive species in colonizing additional territory. Invasive animal species are more likely to be generalists, such as the barred owl, than specialists, such as the spotted owl and adapt more successfully to a new climate than natives.[51]

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.

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[48] Revised Recovery Plan for the Northern Spotted Owl, Recovery goal, objectives, criteria and strategy II-11.
[49] *Id.* at III-5.
[50] Revised Recovery Plan for the Northern Spotted Owl, Recovery goal, objectives, criteria and strategy III-9.
[51] Id.

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.[58]

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.[59] 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.[60] 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.[61] 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 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.[62],[63]

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.[64]

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.[65]

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 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.*

7) Administrative direction on Climate Change

The agency claims that the "Forest Plan, as amended, does not contain direction related to climate change." While this may be true, existing environmental law does

require the Forest Service to address both the impact of the project on climate change, and the impacts of climate change on the project.

In responding to comments, the Forest Service has recently claimed that "climate change is a global phenomenon" with the implication that it is impossible to assess the impact of any given project. This excuse was thoroughly rejected by the Ninth Circuit, which found the fact that "climate change is largely a global phenomenon that includes actions that are outside of [the agency's] control . . . does not release the agency from the duty of assessing the effects of its actions on global warming within the context of other actions that also affect global warming." The impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct. *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin., 538 F.3d 1172, 1217 (9th Cir. 2008).*

In 2016, 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. 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 FS must continue to carefully consider the effects of GHG emissions and climate change in all its decisions.**

Newly released draft guidance from CEQ states: Agencies should attempt to quantify a proposed action's projected direct and reasonably foreseeable indirect GHG (greenhouse gas) emissions when the amount of those emissions is substantial enough to warrant quantification, and when it is practicable to quantify them using available data and GHG quantification tools.5 Agencies should consider whether quantifying a proposed action's projected reasonably foreseeable GHG emissions would be practicable and whether quantification would be overly speculative. If an agency concludes that quantification would not be practicable or would be overly speculative, it should explain its decision. Where GHG inventory information is available, an agency may also reference local, regional, national, or sector-wide emission estimates to provide context for understanding the relative magnitude of a proposed action's GHG emissions.52

And, when an agency determines that the tools, methods, or data inputs necessary to quantify a proposed action's GHG emissions are not reasonably available, or it otherwise would not be practicable, the agency should include a qualitative analysis and explain its basis for determining that quantification is not warranted.

Again, the FS insists that the scale of climate impact is inherently global, **ignoring the fact that all emissions are local and the point sources of impact on global climate trends.** Also, the amount of carbon emitted is not "infinitesimal" as the Report stated. ""Infinitesimal" means something that is unable to be measured – but is absolutely possible for the Forest Service to quantify the amount of carbon sequestered in the Zigzag project area (see, for example, the BLM's Hole in the Road EA in which did just that).

The FS should quantify climate change emissions from its projects and take the analysis a step further to examine the carbon tradeoffs, including carbon emitted from the project and the loss of future carbon sequestration because of the project.

The CEQ guidance also 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

[52] https://www.govinfo.gov/content/pkg/FR-2019-06-26/pdf/2019-13576.pdf

action related GHG emissions or increase carbon sequestration in the same fashion as they consider alternatives and mitigation measures for any other environmental effects.

A recent California case discussed the government's failure to take a hard look at how a changing climate exacerbates the adverse impacts of the proposed project, finding that to meet the hard look requirement, "NEPA requires an evaluation of the impact of climate change."*AquAlliance v. U.S. Bureau of Reclamation*, 287 F.Supp.3d 969, 1028 (E.D. Cal. 2018). The court in *AquAlliance* found that failure to consider climate change is a "failure to consider an important aspect of the problem" facing the proposed action. Id. at 1032, citing *Wild Fish Conservancy v. Irving*, 221 F.Supp.3d 1224, 1233 (E.D. Wa. 2016) (Biological Opinion was arbitrary and capricious for failing to adequately consider impacts of climate change). In your PA, please recognize that mature forests are the most climate-resilient ecosystems and provide important habitat refugia for organisms stressed by a changing climate. In this context, old-growth forests take on new significance, thus logging them has greater impact.

To take a hard look at climate change, the questions that the FS should be answering are: How many tons of carbon will the Zigzag Timber Sale emit into the atmosphere during and after project implementation from logging operations and decay? How much carbon sequestration does the project area currently sequester? How much sequestration capacity will be lost, and for how long? How will the forests' resiliency to a changing climate be affected by the logging and road building? **We request you analyze the impacts of the Zigzag project in the context of a rapidly changing climate, and not rely on the results of past logging to inform your analysis as the baselines are rapidly changing.**

SYSTEM ROADS

In Zigzag, the FS is proposing to close 6.5 miles of system road and decommission 2.3 miles. Some changes were made to the proposed action since Scoping - to decommission some additional roads that were found to no longer be needed. Similarly, after consideration of comments, road closures were also increased.

The desired condition is to have a landscape accessed by an appropriate network of roads that provide for management access and visitor safety while minimizing

risk to aquatic resources. For several reasons, Bark believes there should be an emphasis on reducing the road network in the Zigzag project area, specifically road decommissioning. Within the Zigzag project area, the Salmon River watershed has been identified by the Forest Service as being analogous to Tier 1 Key Watershed. The Upper Sandy is a proposed Key Watershed. The Northwest Forest Plan (NFP) states that "(t)he amount of existing system and non-system roads within Key Watersheds should be reduced through decommissioning of roads." *NFP at B-19*.

The **1828-024** road is a Decommission with Delay road which terminates into a popular but illegal target shooting spot where Bark volunteers have observed over the years increased trees being shot down, and trash being shot at dangerously and left on-site. For this reason and others, we recommended in Scoping that the **1828-024 road should be decommissioned as soon as possible.** We now see that a new temporary road is proposed off the 1828-024 into unit 32. This is in a Riparian Reserve. The PA lists this road as "Passive decommission to maintain recreational opportunities." We are perplexed as to what this might mean, and request that the FS consider **actively decommissioning this road to protect riparian values and curtail unauthorized activity.**

The **1828-118** past the Top Spur trailhead is also an approved Decommission with Delay road. This road contains several deteriorating culverts and road-related erosion. Every culvert along this road is outdated and two at **45°24'35.31"N, 121°47'19.72"W** are broken and creating scour and additional erosion. These culverts are failing to capture all the water being directed through the inboard ditch on the upslope, and as a result water is moving over the road and taking fill and sediment with it. Similarly, at its junction with decommissioned road **1828-021**, there is a seep feeding a long inboard ditch with no cross-drainage **45°24'51.21"N, 121°47'53.30"W.** This results in pooling occurring just off and on the road along this ditch's length. For these reason's Bark requests that the **1828-118 road be decommissioned as soon as possible** just past the junction of the new Top Spur trailhead, wherever that is relocated to.

The **1828-022** road has a decision to decommission *without* delay. This road has not been actively decommissioned. It is junction with the 1828 is passively decommissioned for 15-20 feet in but is then stable and drivable. **If this road is reopened and used to for access, it will need to be actively decommissioned upon completion of this project.**

There is a road that was decommissioned prior to Increment I that runs along the north side of unit 16 (approx. **45.395, -121.843**). This road was actively ripped out, including multiple stream crossings. Bark is concerned that reopening this road would undo the work previously done and the rehabilitation that is occurred. We recommend avoiding reopening this road it at all possible. At the very least, the FS should recontour/de-compact/rehabilitate this road to the same extent or more upon completion of this project.

Decommissioned road **2656-124** accesses units 141, 142, 143 along with their associated rebuilt and new temporary roads. This road is right off the main Mud Creek loop and would open access to a large part of the surrounding forest if left open during or after logging would occur. Bark requests that **FS place a functional closure on this road during the non-operating seasons during years in which logging operations are occurring, and then a be decommissioned to an equal or greater extent than it is now after this project is completed.**

Like the road above, FSR **2656-309** has been actively decommissioned just past the Salmon River/Jackpot Meadows trailhead. Bark requests that **FS place a functional closure on this road during the non-operating seasons during years in which logging operations are occurring, and then a be decommissioned to an equal or greater extent than it is now after this project is completed.**

2656-130 Mud Creek crossing at 45.24904, -121.73526

The **2656-130** Mud Creek crossing at 45.24904, -121.73526 has no drainage feature present, and there is currently water running across the road, bringing road fill in sediment into the Mud Creek downstream. There is seemingly no proposed action for this road, although it does access a SNOTEL site. **We recommend dealing with this stream crossing by at the very least installing a culvert.**

In **Unit 61**, at the end of the temporary road (**45°24'32.66"N, 121°47'34.11"W**) into the unit from the 1828-118, there is a barbed wire that remains from some past activity. It is hard to see from a distance and may be posing a risk to wildlife

or people. Bark requests that this barbed wire be removed and disposed of during this project to eliminate this risk.

An exception to FW-208 is needed for the Zigzag Integrated project. Summer range open road density would be reduced from 3.5 to 2.8 miles per square mile which is still above the 2.5 miles per square mile in standard FW-208. In winter range, the open road density would be reduced from 4.7 to 4.5 miles per square mile which is still well above the 2.0 miles per square mile in standard FW-208. Within the summer range in the Horseshoe area, the open road density would be 3.0 miles per square mile and within the Mud Creek area, would be 2.7. The open road density in the winter range area would drop to 4.5 miles per square mile. It is highly unlikely that the road densities could be reduced any further within the project area as most of the remaining roads access Wilderness trailheads, campgrounds, or the adjacent power line corridor and would be required to remain open. While this may be true for Horseshoe, Bark wonders what is keeping the FS from bringing the Mud Creek road density further down? **Please make clear in the draft Decision what factors prevent reducing the road network to comply with FW-208 in Mud Creek specifically. If there are no impossible barriers to this, please decrease the road network in the Mud Creek area.**

Given that the FS is considering changes to a number of miles of roads within the Zigzag project area, and given the large geographic scale of this project, the agency must consider its Travel Analysis Report (TAR) for the Zigzag project, and identify the Minimum Road System (MRS).[53]

In 2015, the FS 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".

To identify the minimum road system, the FS must consider whether each road segment the agency decides to maintain on the system is needed to meet certain

[53] 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.").

factors outlined in the agency's own regulation.[54] Here, the FS should consider whether each segment of the road system within the project area is needed to:

- Meet resource and other management objectives adopted in the relevant land and resource management plan;
- Meet applicable statutory and regulatory requirements;
- Reflect long-term funding expectations; and
- Ensure that the identified system minimizes adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance.

In assessing specific road segments, the FS should also consider the risks and benefits of each road as analyzed in the TAR, and whether the proposed road management measures are consistent with the recommendations from the travel analysis report. Within the Zigzag project area, the TAR recommended that the Forest Service close roads**: 1825-043, 1825-080**, **2656-012, 2656-080, 2656-096, 2656-120.**

Bark requests that the Forest Service fully implement the recommendations in the TAR regarding decommissioning and closing roads or explain why they are not. If the agency does not currently have a funding source to accomplish this road work, having them included in a NEPA decision will make it much easier for the work will occur when such funding is acquired. If the Forest Service does not include all the TAR recommendations, please provide a detailed explanation why these roads are still needed over time.

MHNF (Mount Hood National Forest) staff have expressed to Bark that while considering 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 Zigzag, please consider closing roads which have high combined resource risk, if they are not already identified for closure.

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[54] 36 C.F.R. § 212.5(b)(1). *See also* Attachment A ("analyze the proposed action and alternatives in terms of whether, per 36 CFR 212.5(b)(1), the resulting [road] system is needed"); ("The resulting decision [in a site-specific project] identifies the [minimum road system] and unneeded roads for each sub watershed or larger scale").

TEMPORARY ROADS

Bark has many concerns about the amount of temporary roadbuilding the agency states is required to achieve the Purpose and Need. In the Zigzag project, the FS is proposing to build 3.9 miles of new "temporary" road (3.2 miles in Mud Creek, 0.7 miles in in Horseshoe), 2.6 miles of "temporary" road rebuilding (1.3 in Mud Creek, 1.3 in Horseshoe), and 4.2 miles of system road rebuilding for temp roads (3.2 in Mud Creek, in 1 Horseshoe). In total, 10.7 miles of roadbuilding is proposed.

In Zigzag specifically, the agency asserts that "Temporary roads would be rehabilitated after use by the placement of one or more berms at the road's entrance, construction of water bars, and/or placement of debris such as root wads, slash, logs or boulders where available."

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. [55],[56],[57]. 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.*

Available scientific information shows that 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.[58] The USFS Region 5 method for estimating cumulative watershed effects indicates that even 10 years after road decommissioning, a mile of decommissioned road is equivalent to 0.2 miles of new road in terms of adverse

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[55] 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.

[56] 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.

[57] 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.

[58] Id.

cumulative effects.[59] After 50 years, a mile of obliterated road 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.

Road construction is by far the greatest contributor of sediment to aquatic habitats of any management activity.[60],[61] Temporary road construction can cause resource damage including erosion and sedimentation, exotic species spread and disruption of wildlife.[62] Unpaved roads and stream crossings are the major source of erosion from forest lands contributing up to 90% of the total sediment production from forestry operations.

When we first spoke with the District Ranger, and with agency specialists, we were told that there would not be reopening of previously decommissioned roads as temporary roads in the Horseshoe area. Looking at the Story Map, it seems this is not the case. Given that this area is within listed fish critical habitat, and that these roads were decommissioned to reduce impacts to aquatic species, **we again ask the FS to thoroughly develop an alternative that does not require building temporary roads in the Horseshoe area.**

We have concern for the new "temporary" road which is proposed into Unit 6. The route would cut through very structurally diverse habitat containing old growth noble firs, large snags, and down wood. **Unit 6** is a multi-aged unit that has no apparent ecological need for thinning in the first place. This unit contains several

[59] 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.
[60] Meehan, W.R. (ed.). 1991. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. Am. Fish. Soc. Special Publication 19.
[61] 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.
[62] Trombulak, S.C. and C.A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14:18-30.

old growth trees and healthy mature forest. Dropping this unit would eliminate the need to inappropriately place a new “temporary” road.

Looking at the Zigzag Story Map, it appears that part of the 1825-380 is proposed to be used as a temporary road. Since we have been told that the decommissioned part of this road would not be rebuilt, we are curious as to why this is so. Perhaps it accesses an area to the south that could be used as a helicopter landing? Please clarify this in the draft Decision.

Unit 119 has a proposed 0.61-mile new temporary road running through it. We have concerns about building this road since it would encroach into a significant unroaded area identified by the FS, adding road density and disturbance to an area where elk seasonally move through when they migrate west out of the Salmon Creek meadow. This road would also cross into the Salmon River WSR corridor. Unit 119 itself is already structurally diverse and the road appears to go through some of the best habitat up on the Mud Creek ridge. Bark requests that this road be dropped from the proposal.

The standard and guideline for Key Watersheds requires no net increase of system and non-system roads. 7.7 miles of temporary road would be constructed or reconstructed and then rehabilitated in Key Watersheds, while 1.5 miles of system roads are proposed for decommissioning. Given that the impacts of temporary roads are permanent and that temporary roads are often reused repeatedly, it seems misaligned with the essence of this standard and guideline to propose this level of roadbuilding in the Key Watershed. It is also unclear how many miles of roadbuilding in Key Watersheds are new vs. “existing". **Bark requests that the agency develop and pursue an alternative which does not build new temporary roads in Key Watersheds.**

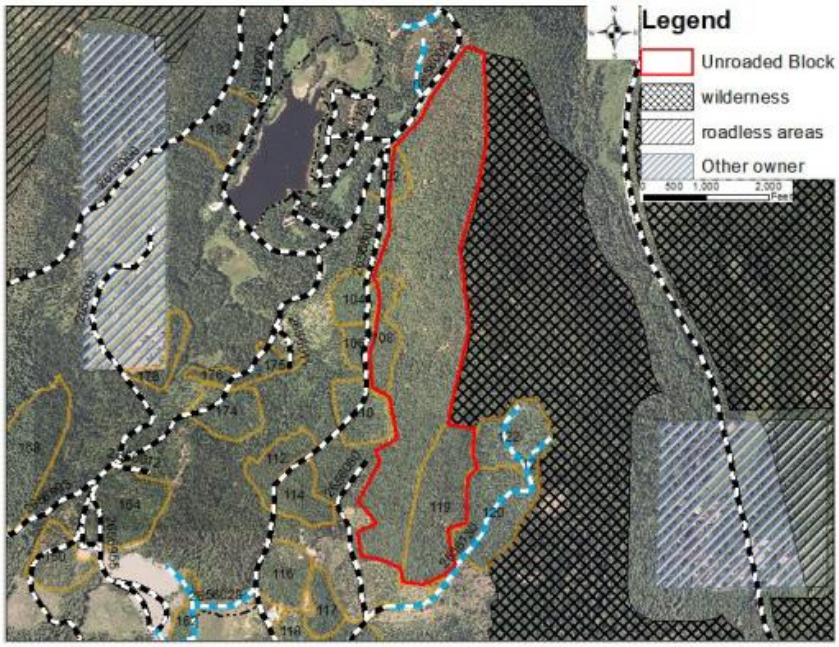
“Temporary” roads are one of the main vectors for noxious weeds into the forest. Units 2, 4, and 8 all abut the energy corridor to the west of the planning area. This puts the forest at risk for the increased spread of these species, especially two species of Hawkweed in the nearby power line and in private holdings. On public field trips to these units (in 2012 and 2019) specialists shared that it is “likely” that Hawkweed would spread into these units in at least a few locations if logging took place off the main 1800/Lolo Pass road.

Regarding “temporary” roads, we encourage the FS to consider these concerns and recommendations, including significantly reducing temporary roadbuilding, as

they develop their alternatives, as this will assist the agency moving forward with the best project possible for the Zigzag District.

UNROADED AREAS

The FS showed in their analysis an unroaded and undeveloped block in the vicinity of Unit 119 in the Mud Creek area. This area is 247 acres and is adjacent to the Salmon-Huckleberry Wilderness to the east. Units 102, 108 and 119 are in this block (shown below). Unit 119 especially includes sections of structural and topographical diversity and is currently unroaded and intact. Logging in these units would would alter this unroaded and undeveloped block by 27%.



Habitat for species dependent on large, undisturbed areas of land, such as northern spotted owls and elk, are disturbed and displaced by the edge effect of surrounding forest roads and old clearcuts, and the noise generated by vehicles on adjacent forest roads. This reduces the habitat effectiveness of the unroaded and undeveloped blocks for species that need unfragmented habitat and solitude. The FS states that species that require large undisturbed areas of land would likely persist in the project area, and the species in question would find similar forest

types in adjacent Wildernesses, Inventoried Roadless Areas, and other undisturbed blocks elsewhere on the Forest.

However, Bark found that the area of Unit 119 is specifically used by elk to migrate through this area. This possibly has to do with the unit being centered on Mud Creek ridge. This unit and the surrounding forest contained more fresh elk scat and track than any other area in the Zigzag project.

Indeed, wintering elk migrate from the eastern edge of the Forest and arrive in the Salmon River Meadows area, directly adjacent to Unit 119, near the end of April. Calves are born in the meadows and the small herds remain in the area into July when they move up in elevation around Mt. Hood until late November when they migrate back to the eastern edge of the Forest.

Bark requests that the FS keep this block intact by dropping Unit 119 and the 0.61 miles of new roadbuilding which are proposed there. We have concerns about building this road since it would encroach into a significant unroaded area identified by the FS, adding road density and disturbance to an area where elk seasonally move through when they migrate west out of the Salmon Creek meadow. This road would also cross into the Salmon River WSR corridor. Unit 119 itself is already structurally diverse and the proposed road appears to go through some of the best habitat up on the Mud Creek ridge. Bark requests that this road be dropped from the proposal, as well as the Unit 119.

A4 SPECIAL INTEREST AREAs

According to the Zigzag PA, there are seven acres of thinning proposed in an A4 Special Interest Areas, located in Horseshoe Unit 74. This A4 is part of the Old Maid Flats Geologic area. Regulated Timber Harvest **shall be prohibited**. *A4-019, LRMP Four-154.* The Forest Plan defines "regulated harvest" as that which contributes timber volume to ASQ. Non-regulated timber harvest activities necessary to achieve Special Interest Area objectives may be allowed. *A4-20.* Are these seven acres proposed as regulated (prohibited) or unregulated harvest? If the FS is proposing un-regulated timber harvest in unit 74, the **rationale and necessity as stated above must be included in the project analysis.**

ADMINISTRATIVELY WITHDRAWN AREAS

Parts of units 119, 120, 121, 122, and 304 are in Administratively Withdrawn Areas (AWAs) under the Northwest Forest Plan. To our understanding, there is no mention of this land allocation or its standards and guidelines anywhere in the PA. Like the A4 areas, if the FS is proposing timber harvest in AWAs, the **rationale and necessity as stated above must be included in the project analysis.**

WILD AND SCENIC RIVERS

The planning area hosts three congressionally designated Wild and Scenic Rivers: The Salmon River, Zigzag River, and Sandy River. Five proposed units are located either entirely or partially within Segment 1 of the Salmon Wild and Scenic River. This portion of the Salmon River is classified as recreational. Salmon River W&S units: Two temporary roads would be utilized to access units: one would be new and the other would utilize a previously decommissioned road. Three helicopter log landings and two smaller service landings will be located within Segment 2 of the Upper Sandy Wild and Scenic River. Segment 2 of the Upper Sandy Wild and Scenic River is also classified as recreational.

All management activities in the Salmon and Upper Sandy river corridors must protect and or enhance the identified outstandingly remarkable values for those segments. *B1-001; B1-002.* For the Upper Sandy, the outstandingly remarkable values are scenery, recreation, fisheries, geology, and botanical. For the Salmon river, the outstandingly remarkable values are scenery, recreation, anadromous fishery, wildlife, hydrology, and botany/ecology. **In the PA, the FS must disclose how the activities included in the proposed action protect and/or enhance these values.**

VISUAL QUALITY OBJECTIVES

The "Preservation" objective is identified along the 774/Horseshoe trail immediately adjacent to Unit 62. Extra care should be given not to cause any impacts to this area inadvertently while carrying out activities within this unit (landings, slash, temporary roads, etc.)

A "Retention" objective is identified at Unit 74 (relatively same area as A4 land allocation overlap). There is also a "Retention" objective surrounding Trillium lake.

According to the Forest Plan, within landscapes where Retention VQOs are prescribed the maximum percent of the seen area visually disturbed should not exceed 8 percent at any one time or 4 percent per decade. *FW-564.*

View of Unit 182 from Trillium Lake

"VQO: Retention (R) / SIO: High = The valued landscape character should appear intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such scale that they are not evident."

It is not clear from the PA how this will be accomplished at a place like Trillium Lake, where unit 182 is clearly visible from the water, and from campsites on the west side of the lake.

"Partial Retention" is a common objective in the Zigzag area. Within landscapes where Partial Retention VQOs are prescribed the maximum percent of the seen area visual1y disturbed should not exceed 16 percent at any one time or 8 percent per decade. *FW-565.*

Timber harvest units within all distance zones should not dominate over natural landscape character i.e. form line color and texture in areas where VQOs of Retention and Partial Retention are prescribed. *FW-560.*

Within units where Modification VQOs are prescribed the maximum percent of the seen area visually disturbed should not exceed 25 percent at any one time. *FW-566.* Harvest units should blend with the natural landscape character where VQOs of Modification are prescribed. *FW-561.*

B6 SPECIAL EMPHASIS WATERSHED

According to the information sheet provided, the Zigzag project includes 3 acres of "Huckleberry Enhancement" within the **B6 Special Emphasis Watershed** land

allocation. This land LRMP allocation directs the FS to "(m)aintain or improve watershed, riparian, and aquatic habitat conditions and water quality for municipal uses and/or long-term fish production. A secondary goal is to maintain a healthy forest condition through a variety of timber management practices. *LRMP Four-246.* In B6, wildlife and fisheries rehabilitation and enhancement projects should emphasize Improvement or rehabilitation of key and/or sensitive wildlife and fisheries habitat. *B6-14, 15, LRMP Four-249.*

Any timber harvest activities shall be consistent with accomplishment of riparian management objectives with consideration for hydrologic recovery. *B6-18, 19, LRMP Four-249.* Watershed impact shall not exceed Threshold of Concern for each B6 area; for example, Still Creek TOC is currently 25%. **In scoping we asked that the FS address how the proposed activities align with these LRMP S&Gs – they did not. We make this request again here.**

IN SUMMARY

Bark has several suggestions for improving the Zigzag project, and requests that the agency review these key issues for detailed analysis and develop project Alternatives that meaningfully incorporate these suggestions – singly or together – to assess their ecological benefit and to create a project that also achieves the purpose & need for the Zigzag project:

- Increase the 100-foot no-harvest buffers at more frequented areas such as the PCT (unit 96), Top Spur (unit 61), Trillium Lake (FSR 2612; unit 182);
- Include in the draft Decision a list of which roads, trails, dispersed campsites, and other recreation sites may be temporarily closed because of this project, when and for how long;
- Disclose, quantitatively, all potential impacts to the local recreation economy from any public closures, impacted trail or campground experiences, or change in public attitude towards the area due to the return of commercial logging;
- Provide a complete description of the overall condition of the project area regarding fire in the forthcoming NEPA analysis;
- Exclude stands with high snag and large living tree densities from any logging and adopt PDC to require "All legacy snags would be retained by creating adequate safety buffers, as needed.";

- Continue to engage with Bark's recommendations regarding pursuing a lighter touch within dispersal habitat in the home ranges of northern spotted owls;
- Provide stand specific impact analysis for units proposed for logging within RRs, and scientific rationale with citation for the actions proposed within these stands;
- Increase buffer sizes around all streams that are the threshold of concern for flooding, sedimentation and bank stability to help mitigate the impacts of logging and road building;
- Survey Mud Creek for bank stability, and provide an analysis that takes flood potential, bank stability/sedimentation, and streamflow into account as concurrent compounding factors;
- Provide a disclosure of confidence intervals and analysis of potential for variability in the values the agency produced in their aquatics impacts analysis;
- Incorporate site specific information provided by Bark regarding unmapped riparian areas in the forthcoming analysis of the draft Decision, and ensure these habitats are protected, and wherever possible please delineate buffers on project Decision maps in the form of unit boundary adjustments and document subsequent acreage adjustments;
- Where it is found that actions included in RRs "may affect, and is likely to adversely affect" aquatic species, or "may impact individuals or their habitat, but would not likely contribute to a trend toward federal listing or loss of viability to the population or species", create an Alternative which deletes sections of units which contribute to any of these Determinations;
- Limit work to outside of federally protected salmon spawning seasons;
- Do not harvest fish logs from within Riparian Reserves;
- Drop all late seral units or sections of pure late seral forest from proposed units. In mixed-aged stands where large down wood, large snags, large live trees, or minor trees exist, retain no less than 40% of the canopy cover, retain as much mid-story component of the stand as is feasible, retain the largest trees in the stand, and retain all legacy features;
- Incorporate information about suitable RTV nest trees provided by Bark in the forthcoming analysis of the draft Decision

- Appropriately buffer any RTV nests located before the Decision is signed, and include these unit deletions and acreage changes in the Decision maps and Proposed Action;
- In unit 129, retain all large diameter trees relative to the stand, as well as areas with ecologically mature stand conditions as highlighted above;
- Incorporate additional opportunities provided by Bark to reduce the road network in the watershed and increase miles of road decommissioning in the Proposed Action;
- Incorporate Bark's site-specific system roads comments in the forthcoming analysis for the draft Decision;
- Explain and provide scientific justification for how the proposed activities may or may not align with LRMP S&Gs for B6-Special Emphasis Watershed;
- Reduce the mileage of "temporary" road construction as detailed above and develop an Alternative which does not require building any temporary roads in the Horseshoe area;
- Quantify carbon emissions associated with the project operations and examine the carbon tradeoffs, including carbon emitted from the project and the loss of future carbon sequestration because of the project;
- Analyze and disclose how a changing climate exacerbates the adverse impacts of the proposed project;
- Drop unit 182, the northern section of 168, and 119; and
- Provide rationale for activities proposed in A4 Special Interest areas and Administratively Withdrawn areas;

As the FS is considering the best method of accomplishing the ecological purpose and need for the Zigzag project, please consider that active management is not always the best avenue to achieve ecological health. In the comments above, Bark has provided ample suggestions to improve this project – based on our survey of both the project area and the scientific literature pertaining to aquatics, wildlife, roads, and ecological health. We expect a thorough review of these comments and look forward to the necessary changes made to both the forthcoming decision and the project itself.

Thank you,

Michael Krochta

Forest Watch Coordinator, Bark