March 30, 2022

Rachel Smith
Forest Supervisor
Klamath National Forest
rachel.c.smith@usda.gov

Luis Palacios
District Ranger
Salmon-Scott River Ranger District
luis.palacios@usda.gov

Danika Carlson
Environmental Planner
Salmon-Scott River Ranger District
danika.carlson@usda.gov

Sent via email to addresses above and through project webpage. A CD with referenced material will be sent to the Fort Jones office.

RE: River Complex Project Scoping

Dear Supervisor Smith, Ranger Palacios and the River Complex ID Team,

Please accept these River Complex Scoping comments on behalf of the Klamath Forest Alliance and EPIC- the Environmental Protection Information Center, as an addendum to those submitted March 17, 2022. The project, primarily in the Taylor/Carter Meadows Late Successional Reserve, is located in the headwaters of the South Fork Salmon (Taylor Creek) and Scott Rivers and proposes to treat 4,710 acres, including: Commercial Salvage Logging (1,728 acres); Site Preparation and Planting (980 acres of plantations; not to exceed 1,728 acres within Salvage Units); Fuels Reduction in plantations that burned at mixed severity (158 acres), adjacent to private property (99 acres), along ingress and egress routes and ridgetop features (872 acres roadside treatments and 479 acres of ridgetop treatment), along trail systems (55 acres); and Prescribed Fire (532 acres). The project would utilize access along 0.81 miles of temporary roads on areas of existing disturbance and would construct 0.43 miles of new "temporary". It is anticipated that 75 landings would be needed.

The scoping notice states that, in addition to Forest Plan direction, the interdisciplinary team considered guidance from the Callahan Ecosystem Analysis, South Fork Salmon River Ecosystem Analysis, the Salmon River Community Wildfire Protection Plan and the Community Wildfire Protection Plan for Siskiyou County. From what is proposed, it is unclear how these documents influenced the project proposal. Please describe how they are incorporated in the forthcoming planning document.

The project title uses the euphemism of "risk reduction" however the best available science and on-the-ground experience in the surrounding watersheds provide a clear example that commercial "salvage" logging is likely to increase future fire risk while significantly damaging ecosystem function, soil, wildlife, habitat connectivity, natural regeneration and water quality. Our organizations support the proposed fuels treatments, which would address small diameter vegetation 12-10 inches and under. However, we remain extremely concerned that the Klamath National Forest continues to target fire-affected Late Successional Reserves and Critical Habitat for widespread clearcut commercial logging, contrary to the purpose and need of project.

<u>TAYLOR/CARTER MEADOWS-CORE HABITAT, PRIME CONNECTIVITY CORRIDOR AND PRIORITY MICROREFUGIA</u>

Late Successional Reserves (LSRs) are to be managed to protect and enhance mature forest ecosystems, which serve as habitat for late-successional and old-growth dependent plant and animal species. Snags provide unequivocal habitat benefits for a variety of wildlife species. Timber harvest in the reserves may only occur if it is required to maintain habitat quality, ecosystem health or if it is crucial to improve the quality of habitat.

The importance of intact fire-affected late successional forests is described below[1]:

> The larger and the most decay resistant snags and logs are the most important ecologically. Larger snags and logs will serve a large array of organisms and functions than smaller snags and logs as well as persist longer. For example, large snags are necessary for large cavity excavators, such as the Pileated Woodpecker and large logs are critical elements in creating stable aquatic habitat. ***Large snags and logs of decay-resistant species--such as cedars and Douglas-fir—can also persist and fulfill habitat and other ecological functions for several centuries in terrestrial environments or even millennia, in the case of stream and river ecosystems.***

[1] Dr. Jerry F. Franklin, Professor of Ecosystem Studies, College of Forest Resources, University of Washington, July 15, 2004. Testimony For The Record On Oversight Hearing On "Restoring Forests After Catastrophic Events" By House Committee On Resources, Subcommittee On Forest And Forest Health. Emphasis is in original.

> The levels of biological legacies such as snags and logs that need to be retained following a major disturbance very much depends upon the natural resource objectives for the property and the natural disturbance regime of the site. Where recovery of natural ecological functions is a primary goal, removal of significant legacies of living trees, snags, and logs through timber salvage is not appropriate. This is particularly true in forest types and on forest sites where stand-replacement ("catastrophic") disturbance regimes are characteristic. It is sometimes argued that following a stand-replacement fire in an old-growth forest that snags and logs are present in "excess" of the needs of the site, in terms of ecosystem recovery. In fact, ***the large pulse of dead wood created by the disturbance is the only significant input of woody debris that the site is going to get for the next 50 to 150 years***—the ecosystem has to "live" off of this woody debris until the forest matures to the point where it has again produced the large trees that can become the source for new snags and logs (Maser et al. 1988).
>
> In conclusion, the scientific lessons regarding biological legacies and the importance of retaining snags, logs, and other woody debris are being applied in regular timber harvesting practices (i.e., structural retention) but have not yet been fully incorporated into restoration policy. Timber salvage may be carried out for economic reasons. However, ***timber salvage will rarely achieve any positive ecological benefit*** as has been pointed out in a recent article in Science (Lindenmayer et al. 2004). Timber salvage should be viewed as a "tax" or debit on the recovery process. Removal of large, decay resistant snags and logs is particularly negative because of impacts on long-term recovery and stand development processes.

The Northwest Forest Plan Record of Decision (NWFP) at page C-14 states, "Management should focus on retaining snags that are likely to persist until late successional conditions have developed and the new stand is again producing large snags." This requirement is explicitly based upon the Final Draft Recovery Plan for the Northern Spotted Owl, which uses this exact same phrase and adds clarity to the intent by saying "retention of <u>all</u> 20-inch DBH snags should be a starting point."

The recovery plan states, at page 71:

> Snags provide a variety of habitat benefits for owls including nest sites for them and their prey species such as flying squirrels. Accordingly, following stand replacing disturbances, <u>management should focus on retaining snags that are likely to persist until suitable owl habitat has developed and the new stand is again producing large snags</u>. … Snags from the original stand will be important structural elements of spotted owl habitat as forests develop after the stand-replacing event. Although there is some uncertainty concerning the optimum density of snags to be provided for spotted owls, <u>management to</u>

provide the maximum likely benefits for owls and their prey is an appropriate strategy …. Snag retention guidelines should be developed for each physiographic province based on the general guidance in this section. … An example of such guidelines for western Washington and Oregon is presented [and] calls for retention of all snags 20 inches and larger. … retention of all 20-inch dbh snags should be a starting point. Smaller diameter snags are generally less important to cavity nesters and are less likely to persist until suitable owl habitat develops. This salvage of these smaller-diameter snags should not impair the development of suitable habitat …. "

"Salvage guidelines [for LSRs] are intended to prevent negative effects on late-successional habitat, while permitting some commercial wood volume removal. … While priority should be given to salvage in areas where it will have a positive effect on late-successional forest habitat, salvage operations should not diminish habitat suitability now or in the future." Northwest Forest Plan page C-13. These words indicate a "zero tolerance" policy for anything that would degrade habitat now or in the future. The agency has a burden to show in the NEPA document that the snags proposed for removal have zero habitat value for spotted owls or other late-successional species now or in the future. The record clearly shows that these large trees provide both future nest sites for owls and their prey species. Snag stands may also provide near-term foraging habitat.

Every large tree removed is a potential nest site lost or a potential foraging opportunity forgone. When the agency may argue that removal affects only a small area and abundant habitat is provided in areas not logged, they fail to recognize the "zero tolerance" language. The agency simply cannot argue that removal of potential nest trees and structures important to prey species will not *diminish* habitat value.

Removal of large numbers of large snags from the LSR and critical habitat would have negative effects on habitat and would diminish late successional old-growth (LSOG) habitat now and in the future by:

1. Directly eliminating nesting opportunities for owls and their prey;
2. Reducing the *quality* of future late successional old-growth (LSOG) habitat that develops within salvage areas;
3. Extending the time period that salvage areas remain non-suitable for owls and other species; causing the premature departure of some LSOG species that are still hanging on in the legacy-rich post-fire environment, and delaying by decades the return of LSOG species to areas that are salvage logged;
4. Retarding vegetative recovery that is already ongoing;
5. Increasing the uncertainty that LSOG will develop from the homogeneous and simplified initial conditions that result from salvage logging;
6. Causing detrimental on current and future LSOG via effects on soils and spreading weeds.

We urge the agency to follow the Northwest Forest Plan and LRMP standards and Northern Spotted Owl Recovery Plan recommendations for retaining all large trees over 20" DBH within the project area.

The project area within the Taylor/Carter Meadows LSR is a vital wildlife corridor, which lies between the Russian Wilderness to the North and the Trinity-Alps Wilderness to the South. The checkerboard ownership and private lands to the East provide little opportunity for movement and to the West lies the Salmon River watershed. Much of the land base within the watershed has been affected by past management and/or is proposed for vegetative treatment, including commercial logging and prescribed burning.

Fragmentation is the single most important factor in declining biological diversity, so preserving forests and natural dispersal corridors, is crucial for the survival sensitive, threatened and endangered species.

As defined in the NWFP Final Environmental Impact Statement, connectivity is a measure of the extent of which the landscape pattern of the late successional and old-growth ecosystem provides for biological and ecological flows that sustain late successional and old-growth associated animal and plant species across the range of the northern spotted owl. It is generally agreed that maintaining habitat linkages between populations (fisher and marten) may be important to ensure the long-term viability of isolated furbearer populations (LSRA page 37).

The July 2019 Final Report*, Habitat Connectivity for Fishers and Martens in the Klamath Basin Region of California and Oregon* prepared by the Conservation Biology Institute in partnership with the US Fish and Wildlife Service (Spencer et al 2019, Connectivity Report[2]) was intended to assess connectivity needs for species of pre-listing conservation interest in the Klamath region. It identifies important landscape connectivity areas in the mid-Klamath Basin and southern Oregon for two forest species of conservation concern: Pacific marten (Martes caurina) and Pacific fisher (Pekania pennanti). It assesses current connectivity status and identifies where connectivity could be improved through restoration or other actions.

The maps on pages 4, 6, 35 and 37 of the Connectivity Report illustrate that the Taylor Creek portion of project area is a critical connectivity corridor and core habitat for the marten and fisher. Page 5 states:

> Core and linkage areas are somewhat more distinct for martens than for fishers, in part because martens live and breed in higher elevation conifer forests that are more limited in the region than the lower-elevation forests preferred by fishers. Marten cores are therefore generally more discrete and widely separated than fisher cores, often with long linkages that must cross lower-elevation habitats,

---

[2] Spencer, W., J. Brice, D. DiPietro, J. Gallo, M. Reilly, H. Romsos. 2019. *Habitat Connectivity for Fishers and Martens in the Klamath Basin Region of California and Oregon*. Conservation Biology Institute. https://doi.org/10.6084/m9.figshare.8411909

> which are unlikely to be suitable as live-in habitat and risky for intercore movements. Managing to maintain or increase forest cover in these linkage areas may help maintain marten metapopulation function.
>
> A population genetic study in this region would be useful for identifying which subpopulations may be genetically connected or isolated to help identify where management interventions may be most beneficial.

The project area has also been documented to provide priority areas for the protection of microrefugia, which is defined as sites with cool and moist conditions conducive to the persistence of species vulnerable to climate change. From Olson et al 2012[3]:

> The Klamath-Siskiyou Ecoregion (KSE) contains globally important biodiversity– only five other temperate forests regions are as diverse or home to as many endemic species and ancient lineages. The special location (latitude and coastal proximity), rugged terrain, climatic stability, and complexity of soils and microclimates have allowed the region to act as a refuge from past climatic changes for species and natural communities requiring cool and moist conditions.
>
> One might expect that the KSE will continue to function well as a climate change refugium as human-caused climate change progresses. However, cumulative land use impacts combined with projected climate change could have a profound impact on the ecoregion's species and ecosystems. In the KSE, over a century of land use activities (e.g., logging, mining, livestock grazing, damming of rivers, mining, and human-caused alterations of fire) have resulted in loss or degradation of mesic habitats that may have previously functioned as refugia over millennia. Impacts include loss of contiguous habitat along intact elevational and other environmental gradients that may facilitate climate-related shifts in natural communities and loss and degradation of most of the mature and old-growth forests (e.g., only about 28% of the historic old-growth forests remain), particularly mesic lowland and mid-elevation habitats. Increasing prevalence of invasive plants and pathogens facilitated by road building and land use practices poses an additional threat to native species and communities.
>
> The existing protected area system (i.e., National and State Parks, Wilderness Areas, National Monuments, Botanical Areas) is inadequate for ensuring the persistence of most of the ecoregion's vulnerable biodiversity. Existing reserves largely protect higher-elevation communities, while the lower-elevation reserves are limited in their geographic extent, thereby missing many distinct lowland species assemblages and areas that may act as potential microrefugia. We define microrefugia as sites with cool and moist conditions conducive to the persistence of species vulnerable to climate change.

---

[3] Olson, David, DellaSala, Dominick A., Noss, Reed F., Strittholt, James R., Kass, Jamie, Koopman, Marni E. and Allnutt, Thomas F. *Climate Change Refugia for Biodiversity in the Klamath-Siskiyou Ecoregion.* Natural Areas Journal, 32(1):65-74. 2012.

Securing a high level of protection and undertaking ecologically based restoration in degraded areas is important, as well as protection of large, complex landscapes with diverse terrains, soils, microclimates and other environmental gradients. In particular, low and mid-elevation habitats in higher precipitation areas (e.g., along the coast) will provide multiple local opportunities for persistence of vulnerable species.

In order to maintain pockets of habitat for climate-vulnerable species, conservation attention should be aimed at securing microrefugia that may uniquely provide opportunities for many species to persist and are particularly threatened due to ongoing habitat degradation and rapid warming. The importance of microrefugia for the long-term persistence of species that are sensitive to climate change is increasingly being recognized. In temperate regions, terrain positions and habitat types that maintain persistent cool and moist conditions favorable for effective microrefugia are increasingly well defined.

Reducing non-climate stressors and securing protection for large, complex landscapes are important long-term actions to alleviate climate change impacts on biodiversity. Equally important is the immediate protection of a network of climate change microrefugia, **particularly old growth and intact forests on north-facing slopes** and in canyon bottoms, lower- and middle-elevations, wetter coastal mountains, and along elevational gradients. Such areas provide local opportunities for vulnerable species to persist within the ecoregion.

Most of the region's biodiversity, endemic species, and species vulnerable to climate change are invertebrates, non-vascular plants, and fungi that are largely restricted to persistently cool and moist late-successional forests. Opportunities for climate change response for vulnerable taxa will necessarily be local due to a limited capacity of many species to move to new habitat, even over relatively small distances where land use practices create inhospitable condition.

The special location (latitude and coastal proximity), rugged terrain, climatic stability, and complexity of soils and microclimates have allowed the region (Klamath Siskiyou) to act as a refuge from past climatic changes for species and natural communities requiring cool and moist conditions.

Impacts include loss of contiguous habitat along intact elevational and other environmental gradients that may facilitate climate-related shifts in natural communities **and loss and degradation of most of the mature and old-growth forests (e.g., only about 28% of the historic old-growth forests remain**; **particularly mesic lowland and mid-elevation habitats. Increasing prevalence of invasive plants and pathogens facilitated by road building and land use practices poses an additional threat to native species and communities** (Citations omitted).

Please address how the proposed logging, road and landing construction would affect microfugia and wildlife connectivity. Better yet, we urge project planners to drop large-scale logging and landing construction in the Taylor/Carter Meadows LSR, particularly in the Taylor Creek portion of the project area.
According to the map on page 10 of the Taylor/Carter Meadows LSRA it appears that many of the commercial units in the project area are within mid-late seral dense stands. Carter Meadows and the wet meadow system with open rock spires to the south are naturally providing a fire-break.

Please note the Taylor/Carter Meadows LSRA pages 58-59 state:

> Thinning activities will occur in young and older plantations and natural early and mid-successional stands.
>
> In any case, no trees larger than 18" dbh would be removed.
>
> The highest priority areas are those plantations and young growth stands that are currently located in the Carter Meadows portion of the LSR (particularly those that are immediately adjacent to late successional or old-growth forest stands). The Carter Meadows area is a priority area for this treatment due to the extreme deficit in late successional and old-growth forest habitat, particularly given the occurrence of two owl activity centers.

<u>TIER- 1 KEY WATERSHED, RIPARIAN RESERVES AND AQUATIC SPECIES</u>

"It is recommended that the Interim Riparian Reserve widths not be reduced at Upper South Fork as a result of this analysis." Upper South Fork WA page 96.

"Riparian Reserve widths applied at Upper South Fork **will be equal to or greater than the interim widths identified in the ROD**." Upper South Fork WA page 97.

Some of the most productive, sensitive, and diverse sites are within Riparian Reserves. They tend to provide moist cool microclimates that are different than adjacent uplands. Riparian areas provide important habitat for fish and other aquatic life forms, as well as a variety of wildlife species, including the willow flycatcher, fisher and bald-eagle. Riparian areas have high wildlife values because of the close proximity of water and structural diversity of the vegetation. Riparian Reserves contribute to the habitat conservation for mature and late-successional forest associated species. Riparian Reserves contribute to connectivity and are especially important for travelways. They provide a network of suitable habitat to include linkage in the form of dispersal habitat.

Please be detailed in explaining the current condition, seral stage and exactly what treatments are proposed in riparian areas and where they are located. The forthcoming NEPA document must describe how this and other projects affect wildlife connectivity in RR's. The cumulative affects of this should be considered district wide, not only in terms of water quality but also in terms of habitat connectivity and effects to aquatic species. We encourage the Forest Service to consider manual fuels reduction only in riparian areas.

We are opposed to any commercial logging in riparian reserve forests, unless absolutely needed to attain Aquatic Conservation Strategy objectives. The negative impact from ground-based or cable yarding are often significant and long-term. Riparian Reserves no treatment zones must be large enough account for riparian associated species. Please see this important research by Olson et al 2007[4]:

> Stream–riparian areas represent a nexus of biodiversity, with disproportionate numbers of species tied to and interacting within this key habitat. New research in Pacific Northwest headwater forests, especially the characterization of microclimates and amphibian distributions, is expanding our perspective of riparian zones, and suggests the need for alternative designs to manage stream–riparian zones and their adjacent uplands. High biodiversity in riparian areas can be attributed to cool moist conditions, high productivity and complex habitat. All 47 northwestern amphibian species have stream–riparian associations, with a third being obligate forms to general stream–riparian areas, and a quarter with life histories reliant on headwater landscapes in particular. Recent recognition that stream-breeding amphibians can disperse hundreds of meters into uplands implies that connectivity among neighboring drainages may be important to their population structures and dynamics. Microclimate studies substantiate a ''stream effect'' of cool moist conditions permeating upslope into warmer, drier forests. We review forest management approaches relative to headwater riparian areas in the U.S. Pacific Northwest, and we propose scenarios designed to retain all habitats used by amphibians with complex life histories. These include a mix of riparian and upslope management approaches to address the breeding, foraging, overwintering, and dispersal functions of these animals. We speculate that the stream microclimate effect can partly counterbalance edge effects imposed by upslope forest disturbances, hence appropriately sized and managed riparian buffers can protect suitable microclimates at streams and within riparian forests.

Karr et al. 2004[5]:

> Logging, landings, and roads in riparian zones degrade aquatic environments by lessening the amount of large wood in streams, elevating water temperature, altering near-stream hydrology, and increasing sedimentation. Roadless areas comprise some of the least disturbed living systems and are therefore especially important to the restoration of watersheds and freshwater systems. Consequently,

---

[4] Olson, Deanna H., Paul D. Anderson a, Christopher A. Frissell, Hartwell H. Welsh Jr., David F. Bradford. *Biodiversity management approaches for stream–riparian areas: Perspectives for Pacific Northwest headwater forests, microclimates, and amphibians.* Forest Ecology and Management 246 (2007) 81–107.

[5] Karr, James R., Jonathan J. Rhodes, G. Wayne Minshall, F. Richard Hauer, Robert L. Beschta, Christopher A. Frissell, David A. Perry. *The Effects of Postfire Salvage Logging on Aquatic Ecosystems in the American West*. BioScience, Volume 54, Issue 11, November 2004, Pages 1029–1033.

> logging activities in these areas undermine the conservation and restoration of aquatic ecosystems (FEMAT 1993, Henjum et al. 1994) even as they increase the risk of extirpation for already imperiled, fragmented, and sensitive populations.
>
> Roads and landings cause enduring damage to soils and streams, help spread noxious weeds, and hinder revegetation. Roads are a primary cause of reduced water quality and of contractions in the distribution and number of native salmonids on public lands.

Please address the multiple impacts from logging in Riparian Reserves and the general downfall of logging to reduce fire risk in Frissell et al 2014[6], *Conservation Of Aquatic And Fishery Resources In The Pacific Northwest: Implications of New Science for the Aquatic Conservation Strategy of the Northwest Forest Plan*:

> Many thinning projects involve road and landing construction and reconstruction, as well as elevated haul and other use of existing roads, all of which significantly contribute to watershed and aquatic degradation. Even if constructed roads and landings are deemed “temporary,” their consequent impacts to watersheds and water bodies are long lasting or permanent. The hydrological and ecological disruptions of road systems and their use, exacerbated by other effects of vehicle traffic, will likely outweigh any presumed restorative benefit to streams and wetlands accruing from thinning and fuels reduction.
>
> Substantial questions remain about the putative ecological benefits of thinning and fuels reduction. This is critical because agency proponents commonly argue that the desired ecological benefits outweigh the adverse environmental effects of logging and fuels treatments. Dispute among federal agencies about claimed ecological benefits of thinning in moister, Douglas-fir-dominated forest types (widespread in the Pacific Northwest) led to an interagency scientific review in 2012-2013. That panel concluded that increased tree growth might be better obtained from thinning very young, high-density stands--which very seldom produces commercially saleable logs. They further concluded that thinning produces unusually low-stem-density forests and causes long–term depletion of snag and wood recruitment that is likely detrimental in most Riparian Reserves. Further depletion of wood recruitment in headwater streams can adversely affect the behavior of debris flows in Pacific Northwest watersheds in ways that further reduce residual wood debris and its important functions over extensive portions of streams and rivers, where present-day wood abundance is decimated compared to historical conditions. Finally, recent reviews also raise compelling, unanswered questions about the effectiveness of thinning forests for attempted control of insect outbreaks.

---

[6] Frissell, Christopher A., Baker, Rowan. J., DellaSala, Dominick A., Hughes, Robert M., Karr, James R., McCullough, Dale A., Nawa, Richard. K., Rhodes, Jon, Scurlock, Mary C., Wissmar, Robert C. *Conservation Of Aquatic And Fishery Resources In The Pacific Northwest: Implications of New Science for the Aquatic Conservation Strategy of the Northwest Forest Plan. Final Report 2014*

> The effect of thinning on fire behavior and effects within riparian areas has been little studied. For western North American forests in uplands the literature is replete with ambiguous and conflicting results regarding the effects of thinning and other mechanical fuels treatments on fire severity, rate of spread, and recurrence. Moreover, the probability of a fire burning through a treated stand within the limited time window of potential effectiveness of a fuels treatment has been shown to be very small. Any presumed benefit is even less persistent in Riparian Reserve areas where woody vegetation regrows rapidly after treatment, and where in moister forest types fire tends to recur with lower frequency. Equally important, we question whether managers should be striving to reduce fire severity in riparian areas as a rule, considering that high-severity fire plays a natural and historical role in shaping riparian and stream ecosystems. Other natural forest disturbances, including windthrow, insect outbreaks, and landslides on forested slopes, appear to play a similarly important role in generating pulses of wood debris recruitment to streams, establishing a long-lasting source of ecological and habitat complexity.
>
> Considering the difficult-to-justify costs and recognized inherent risks of adverse impact associated with such operations in sensitive areas, balanced against the uncertainty in intended benefits, we conclude the following: Thinning and fuels reduction by means of mechanized equipment or for commercial log removal purposes should be generally prohibited in Riparian Reserves and Key Watersheds. Any thinning or fuels treatment that does occur as a restorative treatment in Riparian Reserves (e.g., to remove non-native tree species from a site) should retain all downed wood debris on the ground. Thinning projects that involve road and landing (including those deemed "temporary") construction and/or reconstruction of road segments that have undergone significant recovery through non-use should also be prohibited, due to their long-term impacts on critical watershed elements and processes. Citations Omitted.

The Salmon River provides refuge for the near extinct Spring Chinook Salmon. In fact, six runs of anadromous salmonids use the Salmon River: Fall run Chinook; late Fall/Winter run Chinook; Steelhead, the ESA Candidate Spring run Chinook and the ESA listed Threatened Coho. The riparian dependent tailed frog has also been located in Taylor Creek.

The willow flycatcher is a Region 5 sensitive species and a State listed threatened species. Current management direction is to provide for population viability through the protection of habitat in the form of riparian habitat such as riparian management reserves and wet meadows.

Any activity in RR's must be explained site-specifically in the forthcoming NEPA documents, including location, specific conditions, age class, and vegetation type to name a few. Please note RR entry as a significant issue, especially in the context of cumulative effects.

Riparian areas are generally cooler and have greater moisture content than upslope areas. These conditions provide a natural barrier to fire spread or slow fire spread. The cooler temperatures, moister air and less flammable vegetation can combine to retard fire intensities (LSRA page 24). Logging in riparian reserves is generally prohibited by the NWFP. There is an exception where silviculture is "needed" to attain aquatic objectives, but there is no exception for logging intended to meet fuel objectives, especially given that the project area is not a priority area for fire risk reduction.

Key watersheds are the highest priority for watershed restoration. Logging large old trees and snags that are contributing critical elements of forest structure with ground based, cable and helicopter yarding, road construction/reconstruction, landings and skid trails would not restore but rather degrade the riparian elements within this Key watershed.

We are concerned with the cumulative effects of logging and road and landing construction. For instance, The Eddy Gulch LSR project approved 5,680 acres of underburning in RR's and 898 acres of RR's within commercial logging units.
The DEIS on page 2-18 stated, "Small trees would be removed on 6,578 acres of RR's...with equipment within 30 feet of ephemeral, intermittent and perennial streams." The Caribou Salvage project contained 70 acres of Riparian Reserve harvest. The Caribou Site Preparation project proposed harvesting corridors in an undisclosed amount or Riparian Reserves. The Petersburg Pines Project consisted of 171 acres of commercial logging in RR's. The Jess project contained 120 acres of primarily tractor logging within RR's. The Bear Country project proposes an astounding 800-900 acres of commercial logging in Riparian Reserves.

According to the Upper South Fork WA, multiple landslides occur in the project area, within commercial logging units.

Please include all legacy sediment site locations and the mitigation plan for treating these sites. Please provide a detailed analysis of proposed impacts to soils, hydrology, geology, fishes and aquatic species. We would encourage the agency to follow the recommendations of the watershed analysis and work towards the recovery of ESA protected Coho and Chinook salmon and the protection of aquatic species rather than continually entering fragile riparian ecosystems with heavy equipment in this world-renowned river system.

<u>ROADS, TEMPORARY ROADS AND LANDINGS</u>

Roads are the greatest contributor of sediment to these impaired watersheds. A better understanding of the existing primary and secondary roads, skid trail network construction histories, as well as the proposed River Complex project treatments and a complete inventory of all legacy sediment sites is needed to perform a proper analysis of impacts. Previous forest conditions in some areas were imperiled by multiple cycles of logging with subsequent fire and fire suppression impacts. Many miles of native surface roads are in proposed treatment areas. Please complete a thorough road system analysis and provide the data used to inform the decision maker and the public.

Several, if not all, of the roads in the Taylor Creek portion of the project area have specific recommendations in the Upper South Fork WA. For instance, multiple roads, such as 38N14, 38N14A, 38N10, 38N07A and 38N10A have been recommended for year round closure to minimize disturbance to wildlife, which also includes the recommendation for reducing the roads density in Taylor Creek. Chronic surface erosion is an issue for roads 38N04, 38N07, 38N10, 38N14 and 38N14A. Roads 38N07, 38N14 and 38N14A have multiple crossings within inner gorges contributing sediment to this impaired key watershed. Further 38N04, 38N04A, 38N08 and stream crossings on 38N14 are also called out for harming fisheries.

The negative affect from the construction of roads, even "temporary", and landings is well documented. This is also true for the reconstruction. We are greatly concerned that the project proposes **seventy-five landings** in the Taylor/Carter Meadows LSR and Critical Habitat for the Northern spotted owl. We urge the agency to avoid the long-lasting and often irreversible impacts of any temporary road and landing construction. Please see the report below from a compilation of scientific review entitled *The Watershed Impacts Of Forest Treatments To Reduce Fuels And Modify Fire Behavior* by Jonathan J. Rhodes[7]:

> Roads and landings essentially zero out soil productivity for some time and reduce it for long periods thereafter. This is the case even with "temporary" roads and landings. Due to the persistence of their impacts, "temporary" landings and roads do not have temporary impacts. The negative effects of road and landing construction are large, enduring, and immediate, while recovery is relatively minor and protracted, even with obliteration, all of which belie any application of the term "temporary". The USFS has conceded that the loss of soil productivity on temporary landings and roads is not reversible, because such areas never completely regain their productivity or function naturally even with remediation or abandonment.
>
> The degree of soil compaction on roads and landings retards vegetative recovery and vastly elevates surface erosion for decades after abandonment (References omitted).

Hence, River Complex project planners should not assume that new roads would have little environmental effect because they are "temporary." In fact, scientific research has shown exactly the opposite. Research results, published in *Restoration Ecology,* show there is nothing temporary about temporary roads, and that ripping out a road is not the equivalent to never building a road to begin with. From Luce 1997[8]*:*

---

[7] Rhodes, Jonathan J. *The Watershed Impacts Of Forest Treatments To Reduce Fuels And Modify Fire Behavior.* Prepared for Pacific Rivers Council 2007

[8] Luce, Charles H. *Effectiveness of Road Ripping in Restoring Infiltration Capacity of Forest Roads.* USDA Forest Service Intermountain Research Station, 1221 S. Main, Moscow, ID 83843. September 1997.

> The saturated hydraulic conductivity of a ripped road following three rainfall events was significantly greater than that of the road surface before ripping... most saturated hydraulic conductivities after the third rainfall event on a ripped road were in the range of 22 to 35 mm/hr for the belt series and 7 to 25 mm/hr for the granitics. These conductivities are modest compared to the saturated hydraulic conductivity of a lightly disturbed forest soil of 60 to 80 mm/hr." *id*.
>
> Even this poor showing of restoring pre-road hydrologic effects worsened with repeated rainfall. "Hydraulic conductivity values for the ripped treatment on the granitic soil decreased about 50% with added rainfall (p(K1=K2)=0.0015). This corresponded to field observations of soil settlement and large clods of soil created by the fracture of the road surface dissolving under the rainfall... The saturated hydraulic conductivity of the ripped belt series soils also dropped from its initial value. Initially, and for much of the first event, the ripped plots on the belt series soil showed no runoff. During these periods, run-off from higher areas flowed to low areas and into macropores.... Erosion of fine sediment and small gravel eventually clogged these macropores... Anecdotal observations of roads ripped in earlier years revealed that after one winter, the surfaces were nearly as solid and dense as the original road surfaces." Id. Even though ripped roads increase water infiltration over un-ripped roads, it does not restore the forest to a pre-road condition.

Over the last few decades, studies in a variety of terrestrial and aquatic ecosystems[9] have demonstrated that many of the most pervasive threats to biological diversity - habitat destruction and fragmentation, edge effects, impacts to hydrology and aquatic habitats, exotic species invasions, pollution, and poaching - are aggravated by roads and landings. Roads have been implicated as mortality sinks for animals ranging from snakes to ungulates; as displacement factors affecting animal distribution and movement patterns; as population fragmenting factors; as sources of sediments that clog streams and destroy fisheries; as sources of deleterious edge effects; and as access corridors that encourage development, logging and poaching of rare plants and animals. See Noss *The Ecological Effects of Roads* and Spellerberg 2002 The Ecological Effect of Roads[10].

According to independent scientists, the spread of both native and exotic pests and pathogens in many forest systems can be linked to the travel corridors provided by extensive road networks. Please note that roads are one of the main vectors for noxious weed spread and introduction.

Restoration Ecology, Vol. 5, No. 3. page 268

[9] Ecological Consequences of Roads Science Compilation 2008.
[10] Spellerberg, Ian F. *Ecological Effects of Roads and Traffic: A Literature Review* Global Ecology and Biogeography Letters, Vol. 7, No. 5. (Sep., 1998), pp. 317-333.

Please read the peer-reviewed article by Trombulak and Frissell (2000)[11] detailing some of the negative impacts of road construction and use on both terrestrial and aquatic ecosystems. The abstract for the article reads as follows:

> Roads are a widespread and increasing feature of most landscapes. We reviewed the scientific literature on the ecological effects of roads and found support for the general conclusion that they are associated with negative effects on biotic integrity in both terrestrial and aquatic ecosystems. Roads of all kinds have seven general effects: mortality from road construction, mortality from collision with vehicles, modification of animal behavior, alteration of the physical environment, alternative of the chemical environment, spread of exotics, and increased use of areas by humans. Road construction kills sessile and slow-moving organisms, injures organisms adjacent to a road, and alters physical conditions beneath a road. Vehicle collisions affect the demography of many species, both vertebrates and invertebrates; mitigation measures to reduce roadkill have been only partly successful. Roads alter animal behavior by causing changes in home ranges, movement, reproductive success, escape response, and physiological state. Roads change soil density, temperature, soil water content, light levels, dust, surface waters, patterns of runoff, and sedimentation, as well as adding heavy metals (especially lead), salts, organic molecules, ozone, and nutrients to roadside environments. Roads promote the dispersal of exotic species by altering habitats, stressing native species, and providing movement corridors. Roads also promote increased hunting, fishing, passive harassment of animals, and landscape modifications. Not all species and ecosystems are equally affected by roads, but overall the presence of roads is highly correlated with changes in species composition, population sizes, and hydrologic and geomorphic processes that shape aquatic and riparian systems. More experimental research is needed to complement post-hoc correlative studies. Our review underscores the importance to conservation of avoiding construction of new roads in roadless or sparsely roaded areas and of removal or restoration of existing roads to benefit both terrestrial and aquatic biota.

Please read the published peer-reviewed article by Daniele Colombaroli and Daniel Gaven entitled Highly Episodic Fire and Erosion Regime Over the Past 2000 Years in the Siskiyou Mountains, Oregon[12]. The study indicates that the past 50 years of logging and road construction have had much greater impacts to sediment loading to watersheds than have wildfire events. These findings are directly relevant to the proposal to construct more logging roads and landings in the River Complex project area.

Roads can intercept and concentrate hillslope runoff and eroded sediment derived from sheet, rill, and gully erosion as well as high rates of cutbank erosion and colluvial

---

[11] Trombulak, S.C. and C.A. Frissell. 2000. *Review of ecological effects of roads on terrestrial and aquatic communities.* Conservation Biology 14(1): 18-30.

[12] Colombaroli, Daniele and Gavin, Daniel G. *Highly episodic fire and erosion regime over the past 2,000 y in the Siskiyou Mountains, Oregon*. PNAS, November 2, 2010, vol. 107 |no. 44, 18909–18914.

raveling processes along bare road cuts which contribute accelerated erosion to the inboard ditch. Planting nursery trees and restocking after wildfire with conifers does not offset the negative hydrological effects associated with logging, skid trails, machine piling, road and landing construction and/or temporary roads.

The cumulative impacts of "temporary" road construction, landing construction and tractor yarding cannot be overstated. The large amount of forest removal and disturbance from these actions are not consistent with LSR direction. Details of the current condition, seral stage and location of any proposed landings and "temporary" and existing roads must be disclosed in the forthcoming NEPA document due to the ongoing significant impacts to hydrology, wildlife, fisheries and soils. Please decrease the project footprint and avoid the negative impacts of landing and road construction.

NORTHERN SPOTTED OWL

According to the LSRA, all but one Northern spotted owl (NSO or strix) in the Taylor/Carter Meadows LSR is deficient in suitable habitat. The situation may be worse post-fire. The project should not remove or downgrade any NSO habitat, including post-fire foraging. Multiple Klamath National Forest (KNF), past, present and future projects have/has a likely to negatively affect determination for the strix. The 2016 Westside project involved "take" of over 100 owls, some including the few reproductive pairs on the forest. The nearly adjacent Bear Country project has the potential to harm this species.

Owl populations continue to plummet; therefore it is of utmost importance to protect critical habitat. The agency has no idea what the baseline population is on a regional scale. What is known paints a very bleak picture for the future of this bird. The agency must work towards the recovery of this species.

Please keep in mind that the northern spotted owl is an umbrella species for hundreds of late-successional species. The extreme plight of northern spotted owls cannot be overstated. Meta analysis and demographic studies continue to support the fact that this species is nearing extinction. As the US Fish and Wildlife will contend, the owl is endangered in every sense of the word, with few reproductive pairs left in existence.

With NSO considered functionally extinct through its northern range in Washington and Oregon, the Klamath Provinces represent the last stronghold for the species. This is extremely troubling because the US Forest Service, throughout the region, continues to move forward with commercial timber sales that remove and degrade habitat, including post-fire foraging habitat.

Franklin et al. (2021)[13] published the most recent meta-analysis, spanning 26 years of northern spotted owl demographic data across 11 study sites, that continues to show increasingly dramatic declines in population trends since the last meta-analysis (Dugger

[13] Franklin et al. Range-wide declines of northern spotted owl populations in the Pacific Northwest: A meta-analysis. Biological Conservation 259 (2021) 109168

et al. 2016)[14]. They report annual populations continuing to decline with values ranging from 6% to 9% annually in 6 of the study areas, and 2% to 5% annually in the other 5 study areas. Since 1995, Washington state NSO populations in 2017 have decreased by greater than 75% to 80%, Oregon state 2017 populations decreased by greater than 60% to 75%, and California 2017 populations decreased by greater than 50% to 60% in the NWC demographic study site and Green Diamond site, respectively. In other words, northern spotted owl populations at demographic study sites have shrunk to 20% or 30% of the original population size recorded in 1995.

According to the 2019 Klamath National Forest Monitoring Plan, of the 135 activity centers surveyed, there were 22 singles, 4 non-reproductive pairs and only 2 reproductive pairs reported on the Forest! The situation may be even direr with over 400,000 acres burning at high severity in the August Complex and the overall loss of 92,000 acres of nesting and roosting in the California Klamath Province in 2020. In addition, after the 2018 Ranch Fire on the Mendocino National Forest many activity centers were considered invalid or abandoned. The entire southern portion of the birds range has experienced concentrated fire effects. Agencies do not know accurate population numbers because regional surveys have not been completed in decades. The best guess is based on concentrated demographic studies, project surveys and available habitat, which all point to bad news for the owl. It is of utmost importance that remaining owls and their habitat, including post-fire foraging, are protected. It is also important to consider the effects of widespread logging on its prey species.

The 2020 and 2021 wildfire seasons were unprecedented and the extent of effects on the Klamath Provinces are not yet understood (surveys and change in baseline habitat has not occurred cohesively across the region, including OR, where at least one current US Forest Service post-fire project over several thousand acres in the Klamath Province has a *likely to adversely affect* determination) – we objectively argue, any further direct harm to owls or habitat loss, despite land allocation or title, would likely adversely affect the population overall and lead to a *jeopardy* determination.

Modeling simulations included in the 2012 Final Critical Habitat Analysis estimate that 2,680 Northern spotted owls may be present in the Klamath-Siskiyou region, assuming each female is part of a pair. From 2013 to 2018, federal land managers in the Klamath-Siskiyou Mountains (aka Klamath Provinces) received 211 Northern spotted owl take permits, potentially removing 8% of the population in just five years. That is a significant level of take and habitat loss associated with federal land management in the region, which has not been adequately analyzed on a regional or provincial scale. The 2020 wildfire season in California alone, affected nearly 5% of the Activity Centers (ACs) known to exist in the Klamath and Coastal Provinces.

[14] Dugger er al. The effects of habitat, climate, and Barred Owls on long-term demography of Northern Spotted Owls. Condor Ornithological Society, Volume 118, 2016, pp. 57–116
2016.

It is worth mentioning that in addition to all of the “take” and habitat degradation/removal from national forest timber sales, the 2018 Ranch Fire affected dozens of AC’s, many of which were automatically (done as a map exercise without surveys) considered abandoned or invalidated. This was done to accommodate post-fire logging on the Mendocino National Forest.

The change in baseline habitat conditions throughout the region must be updated and considered prior to any project decisions. Further, protocol surveys must be completed to adequately assess the location and presence of NSO’s throughout the region and specifically in areas proposed for logging activities. It is not scientifically reasonable at this point to assume that NSO’s abandon their Activity Centers post-fire, even in large high severity areas.

Spotted Owls and Forest Fire: a systematic review and meta-analysis of the evidence:

> Abstract: Forest and Spotted Owl management documents often state that severe wildfire is a cause of recent declines in populations of Spotted Owls and that mixed-severity fires (5–70% of burned area in high severity patches with >75% mortality of dominant vegetation) pose a primary threat to Spotted Owl population viability. This systematic review and meta-analysis summarize all available scientific literature on the effects of wildfire on Spotted Owl demography and ecology from studies using empirical data to answer the question: How does fire, especially recent mixed-severity fires with representative patches of high-severity burn within their home ranges, affect Spotted Owl foraging habitat selection, demography, and site occupancy parameters? Fifteen papers reported 50 effects from fire that could be differentiated from post-fire logging. Meta-analysis of mean standardized effects found only one parameter was significantly different from zero, a significant positive foraging habitat selection for low-severity burned forest. Multi-level mixed effects meta-regressions (hierarchical models) of Hedge’s d against percent of study area burned at high severity and time since fire found the following: a negative correlation of occupancy with time since fire; a positive effect on recruitment immediately after the fire, with the effect diminishing with time since fire; **reproduction was positively correlated with the percent of high-severity fire in owl territories;** and positive selection for foraging in low- and moderate-severity burned forest, **with high-severity burned forest used in proportion to its availability, but not avoided.** Meta-analysis of variation found significantly greater variation in parameters from burned sites relative to unburned, with specifically higher variation in estimates of occupancy, demography, and survival, and lower variation in estimates of selection probability for foraging habitat in low-severity burned forest. Spotted Owls were usually not significantly affected by mixed-severity fire, as 83% of all studies and 60% of all effects found no significant impact of fire on mean owl parameters. Contrary to current perceptions and recovery efforts for the Spotted Owl, **mixed-severity fire does not appear to be a serious threat to owl populations; rather, wildfire has arguably more benefits than costs for Spotted Owls.**

> Management Implications: The preponderance of evidence presented here shows mixed-severity **forest fires**, as they have burned through Spotted Owl habitat in recent decades under current forest structural, fire regime, and climate conditions, **have no significant negative effects on Spotted Owl foraging habitat selection, or demography, and have significant positive effects on foraging habitat selection, recruitment, and reproduction. Forest fire** does not appear to be a serious threat to owl populations and **likely imparts more benefits than costs for Spotted Owls; therefore**, fuel-reduction treatments intended to mitigate fire severity in Spotted Owl habitat are unnecessary. These findings should inform revisions to planning documents to consider burned forest, including **large patches of high-severity burned forest, as useful habitat that imparts significant benefits to Spotted Owls.** Forest and wildlife planning documents promote a diverse mosaic of heterogeneous tree densities and ages (USFWS 2017, USDA 2018), the very conditions created by mixed-severity wildfire, and it follows that heterogeneous post-fire structure would lead to greater variation in some Spotted Owl parameters, as was observed in the meta-analysis of variation. **Planning documents** (USFWS 2011, 2012, 2017, Gutierrez et al. 2017, USDA 2018) claiming that forest fires currently pose the greatest risk to owl habitat and are a primary threat to population viability **appear outdated in light of this review (**emphasis added).[15]

Habitat Use and Selection by California Spotted Owls in a Post-fire Landscape. The abstract for this article states:

> "Forest fire is often considered a primary threat to California spotted owls (Strix occidentalis occidentalis) because fire has the potential to rapidly alter owl habitat. We examined effects of fire on 7 radio marked California spotted owls from 4 territories by quantifying use of habitat for nesting, roosting, and foraging according to severity of burn in and near a 610-km2 fire in the southern Sierra Nevada, California, USA, 4 years after fire. Three nests were located in mixed-conifer forests, 2 in areas of moderate-severity burn, and one in an area of low-severity burn, and one nest was located in an unburned area of mixed-conifer–hardwood forest. For roosting during the breeding season, spotted owls selected low-severity burned forest and avoided moderate- and high-severity burned areas; unburned forest was used in proportion with availability. Within 1 km of the center of their foraging areas, spotted owls selected all severities of burned forest and avoided unburned forest. Beyond 1.5 km, there were no discernable differences in use patterns among burn severities. **Most owls foraged in high severity burned forest more than in all other burn categories; high-severity burned forests had greater basal area of snags and higher shrub and herbaceous cover, parameters thought to be associated with increased abundance or accessibility of prey**. **We recommend that burned forests within 1.5 km of nests or roosts of California spotted owls not be salvage-**

[15] Lee, D. E. 2018. Spotted Owls and forest fire: a systematic review and meta-analysis of the evidence. Ecosphere 9(7):e02354. 10.1002/ecs2.2354

> **logged until long-term effects of fire on spotted owls and their prey are understood more fully** (emphasis added)."[16]

Owls have been shown to move around on the landscape and prefer high severity areas for foraging. Post fire foraging habitat throughout the project area is providing a prime environment for prey species. It is imperative that NSO protocol surveys are completed for the entire project area and that all post-fire foraging habitat is maintained. The change in baseline habitat conditions must be completed and considered in the forthcoming NEPA document.

Critical Habitat

While the Strix is on the edge of extinction, with the loss of 92,000 acres in 2020 (August Complex, Slater and Red Salmon Fires) a of its best habitat (nesting and roosting) in the California Klamath Province as its last stronghold and source populations and the loss of thousands of acres of Critical Habitat to high severity fire, the Klamath National Forest can not unsubstantially claim that the further loss of Critical Habitat, logging in Activity Centers (ACs) in the project area, logging green living trees, logging in moderately burned areas, degrading suitable Nesting, Roosting and Foraging habitat would be insignificant, minimal and discountable.

> "Salvage logging of large snags and down boles does not contribute to recovery of late successional forest habitat; in fact, the only activity more antithetical to the recovery process would be removal of surviving green trees from burned sites. Large snags and logs of decay resistant species, such as Douglas-fir and cedars, are critical as early and late successional wildlife habitat as well as for sustaining key ecological processes associated with nutrient, hydrologic, and energy cycles."-Dr. Jerry Franklin, 4/6/15.
>
> "When wildfires do occur on federal lands they create an opportunity for development of high quality early successional ecosystems. Intensive salvage operations and associated site preparation and tree planting are not appropriate if a management goal is to utilize such events to provide for early successional ecosystems. Salvage and related activities can greatly reduce the potential for full development of early successional ecosystems by removing important legacies, eliminating important constituent species, and abridging the duration of early successional development." -Dr. Jerry Franklin and Dr. Norm Johnson, 2/15/12.

As the quotations by the author of the NW Forest Plan above indicate post-fire salvage logging does not contribute to the recovery of critical habitat or late-successional forest ecosystems. Rather, the significant impacts of commercial post-fire logging inhibit forest recovery and can increase future fire hazard. It is incontrovertible that a strong consensus exists among fire ecologists that post-fire logging impedes and delays forest recovery.

---

[16] Bond et al. Habitat Use and Selection by California Spotted Owls in a Post-fire Landscape. Journal of Wildlife Management, 73(7): 1116-1124; 2009.

The goal of management in Late Successional Reserves is to protect and restore high quality habitat for late successional species. The goal in Critical Habitat is to recover populations of listed species by providing the primary constituent elements of nesting, roosting and foraging habitat. Further, the agency has a requirement to analyze habitat capability for Sensitive species.

Developing high quality habitat requires retention of the legacies that represent the site potential and disturbance history of the site. Every stage of forest development is largely a result of what came before on the site. The quality of future habitat is directly related to the initial conditions (including carry-over from one stand to the next) and the pathway that a stand takes from stand initiation through each successional stand and intermediate disturbance and ultimately to old-growth. In order to develop high quality habitat, one must understand that every late successional stand is a product of its history. Logging erases a critical part of the stands history. Post-fire logging eliminates the building blocks for developing complex stand histories that result in complex forests. Post-fire logging leads to forests deprived of history, deprived of legacy, deprived of structure, variability and complexity. If forest restoration and recovery is the goal, as it must be in Late Successional Reserves and Critical Habitat, removing large legacy structures is not the way forward.

This much is clear: traditional industrial post-fire logging results in a 100% probability that large snags will not persist and will not contribute to current habitat or future development of late successional habitat. The agency may not justify logging on the assumption that the fire has destroyed the spotted owls' habitat. The only sure way to destroy owl habitat is to conduct heavy-handed post-fire logging. As described above, studies show that spotted owls are capable of returning to and even prefer habitat highly altered by fire.

Spotted owl biologist Monica Bond found that owls in northern California returned to four sites where the majority of the territory had burned.[17] Fire appears to be beneficial to fitness of northern spotted owls by creating ecotones that improve foraging habitat. Large snags should be retained because they provide the basis for restoration of forest conditions that will support future nesting, roosting and foraging habitat.

In considering the perceived conflict between public safety and LSR, as such critical habitat as well, objectives, around Lake of the Woods, the Rogue River National Forest has said, "The dead and dying trees that are typically identified as hazards to public safety are exactly what LSRs were created to protect, as these are the types of trees that provide habitat for many old growth dependent plants and animals."

Recovery Action 12: In lands where management is focused on development of

[17] Bond, M. L., R. J. Gutierrez, A. B. Franklin, W. S. LaHaye, C. A. May and M. E. Seamans. 2002. Short-term effects of wildfires on spotted owl survival, site fidelity, mate fidelity, and reproductive success. Wildlife Society Bulletin 30(4):1022-1028.

spotted owl habitat, post-fire silvicultural activities should concentrate on conserving and restoring habitat elements that take a long time to develop (e.g., large trees, medium and large snags, downed wood).

There are scores of scientific studies that outline the importance of snag forests and their ecological role in supporting late successional and old-growth dependant species. The agency must follow the standards and guidelines of the NWFP, the Klamath LRPM and the recommendations of the Watershed Analysis, LSRA and the NSO Recovery Plan.

We are extremely perplexed as to why agency biologist are not working towards the recovery of this and all the species that are in peril or nearing extinction. The critical importance of habitat remnants is dire - in this parched landscape and particularly in the Klamath Provinces! Agency biologists need to acknowledge and consider entire ACs (1.5 mile) not only nest cores (0.5). Surveys need to be completed to see the shift in AC locations, thus habitat shifts.

The agencies, USFS and US Fish and Wildlife should follow Recovery Action 12: In lands where management is focused on development of spotted owl habitat, post-fire silvicultural activities should concentrate on conserving and restoring habitat elements that take a long time to develop (e.g., large trees, medium and large snags, downed wood). This includes the Taylor/Carter Meadows LSR, AC's and Critical Habitat.

The forthcoming NEPA document must take a hard look at the fact that salvage logging and replanting within spotted owl critical habitat will put forests on a trajectory toward slow development of low quality owl habitat, whereas natural recovery will lead to more rapid development of higher quality habitat for spotted owls. The Spotted Owl Recovery Plan makes clear that salvage logging may cause significant adverse effects on spotted owls and their habitat compared to natural forest recovery after disturbances. This requires careful consideration in an EIS. Relevant parts of the recovery plan state:

• "There is evidence of spotted owls occupying territory that have been burned by fires of all severities. The limited data on spotted owl use of burned areas seems to indicate that different fore severities may provide for different functions." NSO Recovery Plan p III-31).

• "… [S]upport is lacking for the contention that the reduction of fuels from post-fire harvest reduces the intensity of subsequent fires (McIver and Starr 2000), and planting of trees after post-fire harvest can have the opposite effect." (NSO Recovery Plan III-47).

• "Detrimental ecological effects of post-fire timber harvest include: increased erosion and sedimentation, especially due to construction of new roads; damage to soils and nutrient-cycling processes due to compaction and displacement of soils; reduction in soil-nutrient levels; removal of snags and, in many cases, live trees (both of which are habitat for spotted owls and their prey); decreased regeneration of trees; shortening in duration of early-successional ecosystems; increased spread of weeds from vehicles; damage to recolonizing vegetation; reduction in hiding cover and downed woody material used by spotted owl prey; altered composition of plant species; increased short-term fire risk when harvest generated slash is not treated and medium-term fire risk due to creation of conifer plantations; reduction in shading; increase in soil and stream temperatures; and alterations of patterns of landscape heterogeneity …" (NSO Recovery Plan III-48).

• "Consistent with restoration goals, post-fire management should promote the development of habitat elements that support spotted owls and their prey, especially those which require the most time to develop or recover (e.g., large trees, snags, downed wood). Such management should include retention of large trees and defective trees, rehabilitation of roads and firelines, and planting of native species (Beschta et al. 2004, Hutto 2006, Peterson et al. 2009). We anticipate many cases where the best approach to retain these features involves few or no management activities. Forests affected by medium- and low-severity fires are still often used by spotted owls and should be managed accordingly. Many researchers supported the need to maintain habitat for spotted owl prey. For example, Lemkuhl et al. (2006) confirmed the importance of maintaining snags, downed wood, canopy cover, and mistletoe to support populations of spotted owl prey species. Gomez et al. (2005) noted the importance of fungal sporocarps which were positively associated with large, downed wood retained on site post-harvest. Carey et al. (1991) and Carey (1995) noted the importance of at least 10 to 15 percent cover of downed wood to benefit prey." (NSO Recovery Plan p III-49).

Richard T. Brown, et al, *Forest Restoration and Fire: Principles in the Context of Place* (2004)[18]. In a section on mixed severity fire regimes, the author discusses the importance of key habitat areas provided by large old trees. This is also important for the discussion of habitat provided by large old snags, as efforts taken to remove them are detrimental to forest health:

> Past management practices may have led to development of old-growth stands with "unnatural" multiple canopy layers or accumulations of snags and logs, but these areas may provide key habitat that compensates for the loss and degradation of these habitat elements elsewhere. It may often be appropriate to attempt to secure such habitats from wildfire by treating adjacent areas. Attention should be given to protecting large and old trees. Large fir trees, especially those with heartwood decay, provide important habitat for many species and efforts to "cleanse" the landscape of true firs should be avoided. Strategic location of fuel treatments may slow the spread of fire across the landscape but this concept has been explored only in computer models and needs refinement before being extensively applied. *(References omitted).*

There is no need for forestry "improvements" that do not aid in the recovery of the NSO. In order to protect NSO habitat and simultaneously increase forest resiliency the purpose and need for the project should focus on maintaining old growth and mature late seral trees while treating the small diameter understory and focusing around homes and communities. Forest health must be done in accordance with species protection.

---

[18] Brown, Richard T., James K. Agee, And Jerry F. Franklin. *Forest Restoration and Fire: Principles in the Context of Place.* Conservation Biology, Pages 903–912 Volume 18, No. 4, August 2004.

We bring the Forest Service's attention to a study indicating that radio-tagged NSO's showed greatly reduced forage and roosting use in recently thinned stands as compared to pre-treatment. See Meiman, S., et al. 2002[19]. *Effects of commercial thinning on spotted owl home range and habitat use patterns: A case study:*

> Discussion-
>
> Conclusions drawn from a case study of one animal have limitations...Nonetheless, the data collected on this study indicated that a commercial thinning in a second-growth Douglas-fir stand proximal to active nests of a northern spotted owl resulted in e**xpansion of the nonbreeding home range** of a male spotted owl, a **significantly reduced use of the thinned area** during and after harvest, and a **shift of the core use area away from the thinned stand**. These results suggest that the commercial thin had an immediate and short-term effect on home-range and habitat-use patterns of this male spotted owl.
>
> Management implications-
>
> Results of region-wide demographic analysis of spotted owls (Franklin et al. 1999, Anthony and Ellingson, Oregon State University, unpublished data) indicated that the spotted owl population in the Oregon North Coast is declining.
>
> We therefore recommend that thinning operations not be conducted within core use areas in this region until further research on this topic is conducted.
>
> In situations where core use areas have not been identified using radiotelemetry, we recommend that land managers identify the best spotted owl habitat (old conifer with multi-layered canopy and abundant snags) around the nest site and designate an area where no timber harvest activities will occur. The mean (100-ha) and maximum (250-ha) size of core use areas in the North Coast Rang should be used as guidelines for delineating reserve areas. Where forest stands around owl nests are homogeneous and/ or the best habitat cannot be identified, an area with a 600-m radius (-115 ha) around the nest should be used. This is comparable to the size of areas selected for nesting by spotted owls in the Oregon Cascade Mountains.

Seamans and Gutierrez (2007)[20] found that mechanical treatments (e.g., thinning) of as little as 20 hectares (about 50 acres) within the 400-hectare home range core area of spotted owls reduced colonization of territories by spotted owls, and increased the

---

[19] Meiman, Susan, Robert Anthony, Elizabeth Glenn, Todd Bayless, Amy Ellingson, Michael C. Hansen, Clint Smith. 2002. *Effects of commercial thinning on spotted owl home range and habitat use patterns: A case study*. Wildlife Society Bulletin, Vol. 31, No. 4 (Winter, 2003), pp. 1254-1262

[20] Seamans, M.E., and R.J. Gutierrez. 2007. *Habitat selection in a changing environment: the relationship between habitat alteration and spotted owl territory occupancy and breeding dispersal*. The Condor 109: 566-576.

probability of breeding dispersal away from territories—both substantially negative indicators for spotted owl conservation.

Dugger et al. 2011[21] found that thinning and its variants reduced the competitive advantage that spotted owls have in dense, old forest relative to the more aggressive barred owls, and exacerbated the negative effects that barred owls have on spotted owl occupancy. As described by Dugger et al., it is important not to exacerbate the effects of barred owl competition on spotted owl because the logging can reduce the competitive advantage for spotted owl.

The forthcoming NEPA must analyze and disclose the effects of the proposed treatment on the strix, its prey and habitat and barred owl competition. We again urge the agency to avoid harm and habitat degradation. The KNF is required to follow KNF LRMP and NSO Recovery Plan direction to work towards the recovery of this imperiled species. This can best be achieved by retaining the largest trees and snags in the project area.

<u>THREATENED AND SENSITIVE SPECIES</u>

> "Project areas should be surveyed for the presence of Sensitive species before project implementation. If surveys cannot be conducted, project areas should be assessed for the presence and condition of Sensitive species habitat." LRMP at 4-23
>
> "Management activities shall be compatible with the recovery of Endangered, Threatened (E&T) plants and animals." LRMP at 4-36
>
> "Collect information on Sensitive Species to assess population distribution and habitat associations**…Inventory a portion of the suitable habitat each year.** Assess conditions at occupied sites. Based on the assessment, use appropriate management techniques to maintain or enhance habitat suitability**.**" LRMP at 4-38
>
> "The KNF must "seek to conserve E&T species and shall utilize its authorities in furtherance of the Endangered Species Act." FSM 2670.11
>
> "Conservation strategies, including management objectives for habitat **and populations** of candidate species will be developed in cooperation with the FWS and CDF&G and implemented to **ensure viable populations** of these species throughout their geographic ranges to reduce the probability of their being federally listed." IV-96 LRMP

[21] Dugger, Katie, Robert Anthony, and Lawrence Andrews. 2011. *Transient dynamics of invasive competition: barred owls, spotted owls, habitat, and the demons of competition present. Ecological Applications.* [doi:10.1890/10-2142.1]

> "All proposed projects that involve disturbance to wildlife habitat and have potential to impact listed or sensitive wildlife species **will be evaluated to determine if any listed species are present**." IV-97 LRMP
>
> "Site specific habitat management plans are required for federally listed threatened and endangered species to protect and enhance essential habitat, and to explain allowable, desired and planned management activities within each area. **Habitat area (designated) management plans will be completed**, as part of the biological evaluation process, **for Sensitive wildlife species** that may be affected by proposed management activities." IV- 99 LRMP
>
> "Known nest sites, roost sites, den sites and associated **micro-habitat conditions will be protected for candidate species**:…" IV- 100 LRMP
>
> "Planned timber sale areas should be surveyed to Region 5 protocol for goshawks for a minimum of 1 season (intensive protocol) or 2 seasons (broadcast only)." LRMP 4-38

There have been multiple sightings of both fishers and martens in the Upper South Fork Watershed. There are at least three Goshawk Management Zones in or near the Taylor Creek area. Many Sensitive species require older forest structure, including large snags, and all require relatively undisturbed habitats for at least some part of their life cycle. Please retain large trees with late successional characteristics wherever they occur on this landscape. It is beyond due that the agency, actually perform surveys and create site-specific plans for Sensitive species.

Please provide details of survey results and disclose impacts from the proposed project on fishers and Northern goshawks and all other Sensitive species in the project area.

<u>SURVEY AND MANAGE SPECIES AND MANAGEMENT INDICATOR SPECIES</u>

Please be advised that pursuant to the 2001 S&M ROD the government placed some hard-to-survey species in a category that required strategic surveys by a certain date, and if/when that deadline was missed, the USFS is required to stop logging LSOG forests or complete "equivalent effort surveys." Currently Equivalent Effort Surveys are required for nine species:

- Lichens: Bryoria subcana, Tholurna dissimilis
- Bryophytes: Kurzia makinoana, Marsupella emarginata v. aquatica, Orthodontium gracile, Tritomaria exsectiformis
- Mullusks: Deroceras hesperium, Hemphillia pantherina, Monadenia chaceana.

The forthcoming NEPA document must disclose the timing, results and influence of surveys for Survey and Manage Species and the impacts the proposed treatments would have on these and MIS species.

NEOTROPICAL MIGRATORY BIRDS

The regional decline of migratory birds is a significant issue for this project. Numerous studies have reported local and regional trends in breeding and migratory bird populations throughout North America. These studies suggest geographically widespread population declines that have provoked conservation concern for birds, particularly neotropical migrants. The Alexander 2005[22] report from the Klamath Bird Observatory entitled Local and Regional Trends in Breeding and Migratory Bird Populations in the Klamath and Rogue River Valleys: Monitoring Results for 1993-2003 indicates that several species on songbirds are suffering declining population trends at the regional level:

> Accepting that real declines are occurring raises the question of the cause of these population declines. Further research into the possible weather, climactic, and anthropogenic causes of observed population trends and the demographic mechanisms of these trends are necessary to address the causes of these declines. We suggest a raised concern for understanding the conservation biology of species we have found to be declining locally and regionally, and the strong negative strength of these declines indicates the problem may be urgent.

The forthcoming NEPA for this project should analyze and disclose the potential impacts of logging operations and brush removal on neotropical bird population trends. Simply concluding that the scale of the project is small, relative to the size of the forest, that migratory bird populations will not be affected will not suffice.

PROJECT IS NOT CONSISTANT WITH SALMON RIVER COMMUNITY WILDFIRE PROTETION PLAN

The scoping proposal states the project planning considered the Salmon River Community Wildfire Protection Plan. The agency should not "cherry pick" only the portions of the CWPP that is useful to furthering their resource extraction tendencies. Please honestly consider all portions of the CWPP that the community, along with fire specialists, has developed:

> The Salmon River Fire Safe Council is responsible for helping to plan, implement and monitor the reinstatement of natural fire regimes in the Salmon River ecosystem in a manner that protects life, property, improves forest health, and enhances the resources valued by its stakeholders. Along with cooperators, the FSC is developing prescriptions for fuel reduction activities in WUI areas. These treatment variations are described below for the 5 different WUI area types that have been established.

---

[22] Alexander, John D., Barton, Daniel C. and Seavy, Nathaniel E. *Local and Regional Trends in Breeding and Migratory Bird Populations in the Klamath and Rogue River Valleys: Monitoring Results for 1993-2003. A report by the Klamath Bird Observatory April 2005*

1. Emergency Access and Escape Routes – Approximately 200 feet above and below road (use number 3 in prescription policy tables).
2. Property Buffers – Approximately 200 foot areas on public property surrounding individual properties, neighborhoods, and towns (Use number 2 in prescription policy tables).
3. Domestic Water Use – Use handpiling in jackpot areas, pullback from leave trees where appropriate, and underburning to achieve fuel reduction and watershed protection. 300 foot Shaded Fuel Breaks on ridge tops to protect watershed from outside fires, where appropriate.
4. 1⁄4 Mile Buffers – On public property surrounding individual properties, neighborhoods, and towns. Use handpiling in jackpot areas, pullback from leave trees where appropriate, and underburning to achieve fuel reduction and watershed protection.

5. Special Areas – These would include areas below properties located high on slopes, as well as culturally or biologically significant areas (Use number 1 in prescription policy tables). CWPP page 30

   Policy also recommends an upper diameter limit of 27 inches. In areas where managers recommend reducing the canopy below 60% or removing trees over 27 inches, the collaborative stewardship group shall review the options. As shown in numbers 2 and 3, proximity to a structure or other high value area would prescribe more vegetative material removed (with higher maintenance) than in outlying areas. The Salmon River CWPP at page 45

   Use Shaded Fuelbreak - this breaks up fuel continuity and the fuel ladder. For Late Seral Stands: leave 70 - 100% Canopy Cover (if available); For Mid Seral Stands (40' - 80'): leave 50 - 80% Canopy Cover (if available); For Early Seral Stands (conifer < 40'): leave 50 - 70% Canopy Cover (if available); For Eary Seral Stands (conifer/hardwood mix < 40'): leave 40 - 60% Canopy cover (if available); For Oak/Hardwood Stands: leave 30 - 80% Canopy cover (if available).

<u>RETAIN ALL LIVING TREES</u>

Within and around high severity patches, green living trees that survived the fire are disproportionally important to wildlife, as seed sources for future regeneration, as biological legacies, and for the development of structural complexity. They are also the most fire resilient portions remaining on the landscape. Many of the commercial project units are located in moderate and lower severity burn areas.

Absolutely no living trees should be felled in the project, unless they have been structurally compromised and are a clear roadside hazard. Rating trees on their predicted probability of mortality will provide little benefit to public safety and will only remove potentially viable, living trees. To remove these trees will also only compound the loss of living forest canopy, reduce future structural complexity, impact wildlife, eliminate potential seed sources for regeneration, and homogenize high severity burn patches. Retention of living green trees, especially trees over 21” DBH, provides opportunities for highly important green trees to remain on site. No matter what level of crown scorch was sustained, these trees have the potential to provide important biological functions in both the short and long term.

There is no ecologically or biologically valid reason for the removal of living, green trees in the planning area, even if these trees will die in 1-10 years. In the short term, they will likely provide additional seed sources in areas void of green, living trees. They will also provide additional heterogeneity, microclimate, habitat, shade, and protection for regenerating forest species. In the long term, any living trees that are retained and continue growing will become highly valuable legacy trees with irreplaceable biological value. Please consider releasing a decision document that clearly retains all living trees in the planning area. Given the high severity, standing replacing fire effects sustained during the fire, it is desirable to maintain any and all living trees, even in matrix lands.

We have documented numerous projects on Pacific Northwest forests that demonstrate a general inability of Forest Service marking crews to accurately predict post-fire mortality rates based on the marking guidelines and protocol from Smith and Cluck. These projects include the 2014 Westside Project, the 2016 Horse Creek Community Protection Project and the 2017 Seiad Creek Hazard tree removal project.

A review of these projects will demonstrate that many live trees marked for removal did not die as predicted and have instead responded to the new habitat conditions with growth and varying levels of canopy recovery. We believe the proximity of these areas to the planning area, the similarities in stand structure and composition and the relatively equal fire severity levels make them important examples or case studies for post-fire conifer mortality and the accuracy of mortality prediction by Forest Service marking crews. Similar examples also exist on the Rogue River-Siskiyou National Forest and must be reviewed to establish the accuracy of marking crews in our local watersheds and on public lands. These include the 2017 Abney Fire Roadside Hazard Tree Removal Project, unlogged portions of the 2017 Chetco bar Fire, and perhaps others.

Significant applicable information can also be acquired from the abundance of recent fire footprints in the region, where many heavily scorched trees are surviving despite significant crown damage or loss. Natural, unmanaged post-fire landscapes clearly demonstrate that many trees with compromised crowns can remain viable and structurally important for decades or longer.

We urge the agency to consider this statistical study, Jacobs, 2015[23], to assess the Probability of Mortality and predictive models on post-fire Douglas fir trees in the Kootenai National Forest. Results found that, of the four different models used to predict mortality, 69% of the trees that were predicted to die survived to at least 7 years post fire. Many of the trees did not put new growth on until 5 years after the fire. Other interesting results:

[23] Michael J. Jacobs. Yaak Valley Forest Council, Douglas Fir Mortality Study 2015

> Trends in vigor and beetle activity were monitored over the course of the study. Vigor improved in trees 5 years after the fires. Even trees that initially exhibited no new growth in 2002 and 2003 showed signs of a strong recovery by 2005. Precipitation levels returned to average in 2003 and 2004 after being at extremely low levels in 2001. Beetle activity was highest in 2002 and 2003 and tapered off during subsequent years. Wood pecker activity was highest 6 years after the fires. Only 5 of the 94 dead trees had fallen as of 2007.

The accuracy of predicted mortality of fire damaged trees is vitally important when considering the scale of fire across this landscape and the scale of post-fire logging and hazard tree operations being proposed annually in the Klamath-Siskiyou Bioregion. We also believe the accuracy and efficacy of mortality prediction is highly questionable in our region. Higher standards are needed to maintain and retain important living tree structures during post-fire operations. We believe this includes retaining all green, living trees. Significant crown scorch does not always translate to fire induced mortality and many trees of many species can recover canopy structure and persist long after fire damage or fire effects occur.

These standards should be informed by regionally appropriate monitoring data on the Rogue River Siskiyou-National Forest, Klamath National Forest and in surrounding watersheds. If this monitoring data does not exist, the agency should conduct independent research to quantify, qualify, and explore the probability of mortality for fire-scorched trees specifically in the region. The information to conduct this research appears readily available and/or discernable by conducting small sample plots. Information from this research would significantly inform this and future projects. Without this predicted probability of mortality rates have little credibility.

SNAG REQUIREMENTS

> "Retain snags with the largest DBH as they tend to last longer and make the best wildlife habitat." LRMP 4-39

We would like to reiterate the need for maintaining snags and accounting for snag recruitment. As per LRMP direction snag retention is based on a per acre requirement, not at a landscape scale.

Snags play an integral role in the ecology of old-growth forests. Indeed, the NFP expressly states:

> Tree mortality is an important and natural process within a forest ecosystem. Diseased and damaged trees and logs are key structural components of late-successional and old-growth forests. Salvage of dead trees affects the development of future stands and habitat quality for a number of organisms. Snag removal may result in long-term influences on forest stands because large snags are not produced in natural stands until trees become large and begin to die from natural mortality. Snags are used extensively by cavity-nesting birds and

> mammals such as woodpeckers, nuthatches, chickadees, squirrels, red tree voles, and American marten. Removal of snags following disturbance may reduce the carrying capacity of these species for many years.

The importance of snags, logs, and other CWD is also recognized in FEMAT (1993) scientific analysis. For example:

> "Because of the important role of dead wood in late-successional and old-growth forest ecosystems, and because there is much to learn about the role of dead wood in the development of forests, only limited salvage is appropriate in Late-Successional Reserves . . . The Final Draft Recovery Plan [for the NSO] would allow removal of small-diameter snags and logs, but would also require retention of snags and logs likely to persist until the new stand begins to contribute significant quantities of coarse woody debris." FEMAT 1993, p. IV-37

> "Snags provide a variety of habitat benefits for a variety of wildlife species associated with late-successional forests. Accordingly, following stand-replacing disturbances, management should focus on retaining snags that are likely to persist until late-successional conditions have developed and the new stand is again producing large snags." FEMAT 1993, p. III-37

Coarse woody debris is a necessary component of forest ecosystems. This wood provides habitat for a broad array of vertebrates, invertebrates, fungi, mosses, vascular plants, and micro-organisms. Arthropods, salamanders, reptiles, and small mammals live in or under logs; woodpeckers forage on them; and vascular plants and fungi grow on rotting logs. Provision for retention of snags and logs normally should be made, at least until the new stand begins to contribute coarse woody debris. Many natural disturbances do not result in complete mortality of stands. The surviving trees are important elements of the new stand. They provide structural diversity and provide a potential source of additional large snags during the development of new stands. Furthermore, trees injured by disturbance may develop cavities, deformed crowns, and limbs, which are habitat components for a variety of wildlife species. Disturbance is an important natural process in late successional reserves, because it allows for a greater range of tree sizes and types than could be achieved through intensive logging.

Coarse woody debris is essential for many species of vascular plants, fungi, liverworts, mosses, lichens, arthropods, salamanders, reptiles and small mammals. Adequate numbers of large snags and green trees are especially critical for bats because these trees are used for maternity roosts, temporary night roosts, day roosts, and hibernacula. Large snags and green trees should be well distributed because bats compete with primary excavators and other species that use cavities. Day and night roosts are often located at different sites, and migrating bats may roost under bark in small groups. Thermal stability within a roost site is important for bats, and large snags and green trees provide that stability. Individual bat colonies may use several roosts during a season as temperature and weather conditions change. Roosting bats may also use large, down logs with loose bark. All large trees should be retained in late successional reserves regardless of whether they are diseased or not because they play important roles while standing, decaying and lying on the forest floor.

In general, the contribution of very large logs (e.g., 20 inches in diameter, or larger) to fire severity and intensity is almost negligible, as they are the fuels least available for combustion. When these large logs do burn, it is because the smaller fuels needed to ignite them and sustain combustion are present. Logs also burn mainly by smoldering combustion, which is not considered in the calculation of fire intensity. This is the reason why relatively high fuel loads comprised primarily of large-diameter woody material can be present without eliciting high intensity fire effects.

At C-40 the NFP informs the Forest Service:

> A renewable supply of large down logs is critical for maintaining populations of fungi, anthropods, bryophytes and various other organisms that use this habitat structure. Provision of coarse woody debris is also a key standard and guideline for American marten, fisher, two amphibians, and two species of vascular plants…Coarse woody debris that is already on the ground needs to be retained and protected from disturbance to the greatest extent possible during logging and other land management activities that might destroy the integrity of the substrate. Scattered green trees will provide a future supply of down woody material as the stand regenerates and are important in providing for the distribution of this substrate through out the managed landscape.

Please be descriptive on current CWD/Snag status in units. CWD/Snags are an essential component of healthy forests and contribute to soil vitality and productivity, in addition to providing quality habitat for predator and prey species. The LRMP instructs the Forest to protect CWD to the fullest extent possible. The Upper South Fork Ecosystem Analysis, at page 71 states, "CWD recruitment and population is below optimum levels…recruitment will continue to be a problem for several years until the riparian vegetation gets to a point it can start contributing to the river system."

Logging as proposed would greatly affect CWD/Snag levels. Please also disclose the effects that activities will have on CWD/Snags. Marking guidelines must reflect the need for considering future snag recruitment. We are concerned about harvesting snags along ridge tops and roads and how that may lead to habitat fragmentation. Please analyze this in the NEPA document.

<u>IMPORTANCE OF LARGE TREES AND SNAGS</u>

Because large snags last much longer than small snags, large snags are disproportionately valuable as wildlife habitat, nutrient and water reservoirs, "nurse logs", soil stabilizers, mycorrhizal mats, habitat and food source for invertebrate species as well as carbon storage and other ecological benefits.

Jerry Franklin, in commenting on the Westside project in 2015 stated:

Large snags and logs are the most important surviving structural elements or biological legacies of a forest disturbance (Franklin et al. 2002), excepting only surviving large live trees. Importance, in this case, refers to the roles of these structures in:

(1) Providing essential habitat for an immense array of species;
(2) Maintaining important ecosystem functions; and
(3) Structurally enriching the young forest stand, making it possible for mid- and late successional species to re-colonize the stand much earlier in its chronological development than would otherwise be the case (Franklin et al. 1987).

The importance of large snags and down wood for a broad array of species is recognized in the EIS document. These structures provide habitat for early as well as late successional species and sustain many important ecosystem processes (e.g., Harmon et al. 1986). However, the long persistence and multiple roles played by the large pulse of snags, logs, and other CWD provided by the stand-replacement event (Harmon et al. 1986; Maser et al. 1988) do not appear to be adequately recognized in the analysis of how much of this wood should be retained. For example, large Douglas-fir logs continue to fulfill important ecological functions, such as habitat for small mammals and salamanders, for 200 to 250 years after their death. Cedar snags can persist for at least as long as 1 1/2 centuries and as logs for over twice that long.

The massive input of large dead wood is characteristic and critical to stand development processes and the ultimate provision of habitat for late-successional species following stand replacement fires (Maser et al., 1988; Franklin et al. 2002). As noted these wood structures may persist and play functional roles for several centuries, particularly in the case of decay resistant species. Large pines may also persist as snags for several decades and additional periods as logs on the forest floor. In fact, the entire recovering forest ecosystem will depend upon this pulse of CWD until it reaches a point in its development where the new stand begins to generate snags and logs of comparable size and heartwood content- generally between 100 and 200 years (Maser et al. 1988; Franklin et al., 2002). Consequently, basing snag and CWD retention following salvage on levels of these structures found in existing mature and old forests is not appropriate; all of this initial pulse of wood is needed to reach those levels one to two centuries from now! Indeed, the use of mature forests as a standard for CWD is particularly inappropriate since this is the period when CWD levels are at their lowest level during the entire natural developmental sequence from stand-replacement fire to old growth (see diagram in paper by Spies in Maser et al. 1988). It certainly does not appear to me that the approach taken in the DEIS reflects an appreciation of the fact that this one-time input of large and decay resistant CWD is all that the recovering forest ecosystem is going to get for the next 100 to 200 years.

The importance of snags, logs, and other CWD is recognized in FEMAT's (1993) scientific analysis. For example (my underlining for emphasis):

> *Because of the important role of dead wood in late-successional and old-growth forest ecosystems, and because there is much to learn about the role of dead wood in the development of forests, only limited salvage is appropriate in Late-Successional Reserves. .. <u>The Final Draft Recovery Plan [for the NSO] would allow removal of small-diameter snags and logs, but would also require retention o[snags and logs likely to persist until the new stand begins to contribute significant quantities of coarse woody debris</u>." FEMAT 1993, p. IV-37.*
>
> *Snags provide a variety of habitat benefits for a variety of wildlife species associated with late-successional forests. <u>Accordingly, follo·wing stand-replacing disturbances. management should focus on retaining snags that are likely to persist until late-successional conditions have developed and the new stand is again producing large snags</u>. FEMAT 1993, p. III-37.*
>
> *Following a stand replacing disturbance, management should retain adequate coarse woody debris quantities in the new stand so that in the.fi1ture it will contain amounts similar to natural regenerated stands. <u>The analysis that determines the amount of coarsewoody debris to leave must account for the filii period of time before the new stand begins to contribute coarse woody debris</u> .... FEMA T 1993, p. III-37.*

In summary, general salvage of large snags and logs is clearly antithetical to the goal of rapid recovery of fully functional late-successional forest habitat and inappropriate within the Late Successional Reserves.

Jerry Franklin. Comments on the Klamath NF, Westside Fires Salvage DEIS. 6 April 2015.

The Siskiyou National Forest's Biscuit Fire FEIS admits that up to 53% of small Douglas-fir snags (10-30" dbh) and up to 85% of large Douglas-fir snags (>30" dbh) are likely to remain standing for 50 years or more. Even after 100 years, up to 63% of the large Douglas-fir snags may remain standing. In a natural ecosystem these snags play critical roles as habitat and microclimate modifiers. If they are logged or knocked down for safety reasons they are not able to fulfill these purposes. Biscuit FEIS Appendix G-9

A study conducted in the Black Hills National Forest found that 1) Wildlife disproportionately forage on large diameter snags; 2) Cavity nesters disproportionately utilized large diameter snags for nesting; 3) Cavity nesters were less abundant (usually absent in this case) in managed forest because of the scarcity of large diameter snags; and 4) Logging and thinning has led to serious shortages of large diameter snags.[24] Note that

[24] D.J. Spiering, R.L. Knight. 2005. Snag density and use by cavity-nesting birds in managed stands of the Black Hills National Forest. Forest Ecology and Management 214 (2005) 40–52.

"large" snags in this study were >19" DBH. The agency should consider the significant implications of this study. Large snags are critically important for species viability, yet further loss of the largest snags would make a bad situation worse.

Snag stands are used by a whole host of wildlife species, include birds, mammals, amphibians and insects. 96 species are known to be associated with snags and 86 species are associated with down wood. Most of these species depend upon or prefer large snags and wood. The agency's snag retention guidelines are based on wildlife needs, but fail to consider the need of large snags and down logs for other resource benefits, including: shade, water storage, disturbance (via falling and sliding), nutrient storage, channel forming, sediment trapping, soil conservation, underground processes, etc. The NEPA analysis should disclose and analyze these significant issues.

The agency often claims that the 1995 Beschta report offered no rationale for the recommendation of retaining all large and old snags and 50% of smaller size classes. Let us offer some rationale for retaining large snags and 50% of the small snags:

1. Retaining large quantities of legacy structures will more closely match the natural historic development of post-fire landscapes.
2. Retaining large numbers of standing trees will preserve an important ecological process, that is falling snags over time that will help to thin and break up the continuity of brush and other reproduction.[25]
3. Retaining snags and dying trees will help provide some level of shade that will help suppress growth and break up the continuity of brush and other reproduction.
4. Retaining large quantities of snags will help provide some hiding cover for deer and elk.
5. Retaining large quantities of tree boles will help to retain water storage mechanisms on site.
6. Retaining large snags would benefit small mammals and important prey species.

In this most recent study addressing the current megafire active management approaches DellaSala et al 2022[26] highlight the importance of high severity burn patches and snags:

> ***High severity burn patches are biologically rich and undervalued***. Reoccurring wildfires are a keystone ecosystem change agent that has shaped the ecology of fire-adapted dry pine and mixed conifer forests in the western USA for millennia. In these forested ecosystems, fires of varied intensity (a measure of heat energy

[25] James A. Lutz And Charles B. Halpern. 2006. *Tree Mortality During Early Forest Development: A Long-Term Study Of Rates, Causes, And Consequences*. Ecological Monographs, 76(2), 2006, pp. 257–275.
[26] Dominick A. DellaSala, Bryant C. Baker, Chad T. Hanson, Luke Ruediger, William Baker. *Have western USA fire suppression and megafire active management approaches become a contemporary Sisyphus*? Biological Conservation 268 (2022) 109499.

from fire) produce mixed-severity effects on vegetation at landscape scales that result in heterogenous patches of tree mortality (patch severities), burn patch sizes, configurations, and arrangements – the "pyrodiversity begets biodiversity" hypothesis (see DellaSala and Hanson, 2015). Pre-contact Indigenous peoples managed ignitions in places for culturally important plants and wildlife, which, in combination with lightning strikes, maintained diverse landscapes, including small and large very high-severity patches (e.g., most trees are killed; Odion et al., 2014a) that by some accounts have not increased in recent decades (DellaSala and Hanson, 2019).

Many plants have specialized adaptations to intense fire such as the thick bark of large diameter fire-resistant ponderosa pine, fire-resistant crowns of old growth giant sequoia (*Sequoiadendron giganteum*), "seed rain" of serotinous cones of lodgepole pine (*Pinus contorta*) and knobcone pine (*Pinus attenuata*), post-fire resprouting of coast redwood (*Sequoia semipervirens*) and many hardwood species, epicormic branching of Douglas-fir, and post-fire needle flushing of pines and firs thought to have been initially killed by fire (Kauffman, 1990; Hanson and North, 2009). Native shrubs and forbs also contain fire adaptations such as sprouting (*Sambucus* spp., *Spiraea betulifolia*) and vigorous fire-mediated germination (*Arctostaphylos* spp., *Ceanothus* spp.), with some species even displaying post-high severity fire endemism (*Eriodictyon parryi*). Numerous birds (e.g., songbirds, cavity nesters), bats, small mammals, and invertebrates have specialized adaptations for nesting and foraging in post-fire landscapes especially within the most severe burn patches (DellaSala and Hanson, 2015). High severity fire can also trigger extensive native wildflower blooms that benefit pollinator species (Galbraith et al., 2019).

High severity burn patches link successional processes. A complete or near-complete lack of conifer recruitment, and type conversion to hardwood forest or shrubland, is often assumed by MegaFire (landscape scale) Active Management Approach (MFAMA) proponents when justifying post-fire logging and reforestation projects (e.g., both the Biscuit (USDA Forest Service, 2003) and Rim fire (USDA Forest Service, 2014) projects included massive postfire logging and tree planting). However, several studies have found relatively abundant levels of natural conifer regeneration in large, severe burn patches (Donato et al., 2009a; Haire and McGarigal, 2010; Owen et al., 2017; DellaSala and Hanson, 2019), with many severe patches regenerating hundreds of meters away from nearest seed sources (Hanson, 2018; DellaSala and Hanson, 2019; Kauffman et al., 2019). Research has also shown that natural conifer regeneration in high severity burn patches may be underreported and conifer failures grossly overstated due to methodological problems with sample plot size and placement (Hanson and Chi, 2021). Importantly, recently burned forests (complex early seral) provide the structure for development of old-growth characteristics over time (Swanson et al., 2011; Donato et al., 2012). Thus, what land managers do to the forest following a natural disturbance has legacy implications throughout forest succession. While conifer regeneration is expected in the years following high severity fire due to naturally high perimeter to area ratios and abundant low/moderate-severity inclusions within large high-severity patches (DellaSala and Hanson, 2019), localized areas of prolonged native shrub and forb cover should also be expected in some cases (Odion et al., 2010). Multi-decadal delays in tree regeneration after fire and type conversion to shrublands or grasslands characterized historical dry forest landscapes (Baker, 2018). Thus, areas with relatively low densities of conifers and/or increased non-conifer cover should be maintained for their contribution to both spatial and temporal heterogeneity at multiple spatio-temporal scales (Swanson et al., 2011; Hanson, 2018), nutrient cycling by typically abundant native N-fixing shrubs (Johnson and Curtis, 2001), and resilience to future climatic changes and disturbances (Baker, 2018; Busby et al., 2020). Despite concern over short intervals between high severity fires, few studies have analyzed whether type conversion is occurring at ecologically, spatially, and temporally meaningful scales or outside historical rates under these circumstances; although, it is anticipated in places due to climate change. Moreover, natural abundant conifer regeneration was even documented in areas that experienced only a 15-year high severity fire interval (Donato et al., 2009b).

Do dead trees contribute to wildfire risks and carbon emissions? Simply put, trees die, forests burn, and these are natural processes that are increasing in places due to climate change (Keyser and Westerling, 2017). For some, this raises concerns about reburn potential (Hessburg et al., 2021). Importantly, dead trees either singularly or in patches act as critically important “biological legacies,” transferring their ecological functions (structure, habitat) and carbon from the pre- to post-disturbed forest (DellaSala, 2020) and providing microclimate conditions (shading) to reduce climate impacts (Kauffman et al., 2019). In contrast, most commercial forestry practices remove legacies, increase heat exposure of regenerating forests, and transfer much of the stored carbon to the atmosphere, declaring instead that burned forests are “unhealthy,” such as the “healthy forest” initiatives of the USFS.

Snags are more than fuels. One way to examine potential fire hazards from large dead tree recruitment pulses is in snag forests where fire concerns have been especially prevalent but biodiversity is exceptional (Swanson et al., 2011; DellaSala and Hanson, 2015). In the San Bernardino Mountains of California, for instance, researchers found pre-fire beetle kill forests were unrelated to subsequent fire severity and that the locations dominated by the largest trees (>60 cm dbh) burned in lower fire severities compared to smaller (28–60 cm dbh) trees that burned more severely (Bond et al., 2009). In the Greater Yellowstone Ecosystem, beetle-killed snag forests had lower canopy and surface fuels, representing reduced fire potential in outbreak stands (Donato et al., 2013). The net effect was to shift stand structures from closed canopy mesic forests toward more open conditions with lower canopy fuels. In other words, the insects did the work for free that foresters would like to see happen and with far less-damaging consequences to ecosystem integrity.

Additionally, researchers found no increase in fire severity during the red (1–3 years post outbreak) or subsequent gray-needle stage (4–14 years post outbreak) in peak wildfire activity years (Hart et al., 2015) while others have further demonstrated that fire severity in post-outbreak forests is driven primarily by weather and topography (Harvey et al., 2016). In a comprehensive review of western forests, insect outbreaks actually decreased live vegetation susceptible to wildfire by reducing subsequent burn severity (Meigs et al., 2016). Consequently, Black et al. (2013) and Meigs et al. (2016) recommended a precautionary approach in forest management intended to reduce wildfire hazard and increase adaptation to climate change. Importantly, surviving young trees in dry pine, mixed conifer forests of western USA may possess genetic adaptations that confer unique adaptations and resilience (Baker and Williams, 2015). However, silviculturists have no way of identifying these trees in the field or in their marking guidelines (Six et al., 2018). Notably, Six et al. (2014) concluded that weakening environmental laws to allow more logging for beetle control is a maladaptive strategy because of uncertainties in efficacy of the treatments, high financial costs, impacts to other values, and the possibility that in the long-run logging may interfere with adaptive resilience to climate change.

Large dead trees are not a major source of fire emissions. Most fires, even the largest and most severe ones, consume only the needles, leaves, twigs, duff, outer bark surface, and ground foliage, which is a small portion of the overall combustible materials in a forest (Mitchell, 2015). Highest combustion factors measured post-fire are mostly in small trees due to their relative fire susceptibility (Mitchell, 2015; Harmon et al., in press). Regarding climate concerns, logging over vast areas to potentially mitigate wildfire effects comes with a substantial emissions costs often grossly underestimated by land managers and some researchers (e.g., Johnston et al., 2021). For instance, Campbell et al. (2012) documented in western USA forests high C losses associated with vegetation treatments to lower fire intensity, only modest differences in the combustive losses associated with high- and low-severity fire that treatments were meant to encourage, and a low likelihood that treated forests would even encounter fire. In general, in order to improve the odds of fire encountering a treated area, ten times more area than the specific site would be needed, which means even more treatment related emissions and co-lateral damages can be expected. Likewise, in a synthesis of emissions estimated from natural disturbances vs. logging, Harris et al. (2016) concluded that logging during 2006–2010 nationwide released up to 10 x more emissions than wildfire and insects combined. Thus, putting more carbon dioxide into the atmosphere in attempts to limit fire effects may create a dangerous feedback loop (or "landscape trap," Lindenmayer et al., 2011) such that logging produces emissions (Harris et al., 2016) that then contribute to climate-related increases in extreme-fire weather and the Sisphean response.

In recent comments concerning the American Conservation and Stewardship "Atlas" pursuant to Section 216(a) Executive Order 14008 (establish first-ever national conservation goal for conserving at least 30 percent of US lands and waters by 2030)

Dellasala further explains the importance of large snags (included in attached references):

> ***Large Dead Trees Standing (Snags) or Downed (logs) Perform Vital Ecosystem Services* -** Logs contribute directly to biodiversity by providing favorable microenvironment for many plants, invertebrates and salamanders; serving as substrate for seedlings and bryophytes; and contributing to complex and prolonged patterns of carbon cycling (Lutz et al. 2020). Chronic wind disturbance in the Pacific Northwest, Alaska, portions of the south and northern forests, for instance, is a defining natural process as the tops of older, taller trees are frequently broken by wind, providing important habitat features especially for nesting raptors. Wood that originates from the tops of larger trees may persist longer on the forest floor than small coarse-woody debris, which is a vital ecosystem service. Large stores of biomass remain stable for long periods in living and dead trees.
>
> Dead trees also are important in water storage balance. For instance, after 8 years of tree decomposition, water entering and then leaching from logs increased 1.3 times while runoff decreased a similar amount in old-growth forests of the Pacific Northwest (Perry and Jones 2016). Logs also are essential in the water balance of ecosystems particularly large ones that can last for over a century (Harmon and Sexton 1995). For instance, large logs intercept 2–5% of the canopy through-fall to the forest floor thereby affecting the hydrological cycle. Average daily streamflow in summer (July through September) in basins with 34- to 43-year-old Douglas-fir was 50% lower than streamflow from reference basins with 150- to 500-year-old trees dominated by Douglas-fir and other conifers. Young trees had higher rates of evapotranspiration, especially during dry summers. Thus, large trees, dead or alive, are clearly anchoring the watershed benefits noted for older forests.

Dr. Beverly Law, Emeritus Professor of Global Change Biology & Terrestrial Systems Sci., College of Forestry, Oregon State University and associates assembled this paper in March of 2022 outlining- *The Status of Science on Forest Carbon Management to Mitigate Climate Change and Protect Water and Biodiversity*, which states:

> **Post-fire cutting versus natural regeneration**.
> Many western US forest fires are mixed-severity, meaning that a large portion of the fire burns in patches of low to moderate severity and a smaller portion burns at high severity where a majority of trees are killed (Law & Waring 2015[27]). After fires, the remaining live and dead trees in the burn area and those on the periphery provide seed sources for natural regeneration (Donato et al. 2009[28]). Allowing natural regeneration to occur ensures that the genetic and species diversity that

[27] Law, B.E., R.H. Waring. 2015. Carbon implications of current and future effects of drought, fire and management on Pacific Northwest forests. *Forest Ecology & Management* 355:4-14. dx.doi.org/10.1016/j.foreco.2014.11.023

[28] Donato, D.C., J.B. Fontaine, J.L. Campbell, W.D. Robinson, J.B. Kauffman, B.E. Law. 2009. Conifer regeneration in stand-replacement portions of a large mixed-severity wildfire in the Klamath–Siskiyou Mountains. *Canadian Journal of Forest Research* 39(4):823-838.

existed prior to the fire will continue, and the diversity increases the resilience of the ecosystem to future disturbance.

The complex early seral forest habitat that develops in high severity burns is important to a broad range of wildlife associated with these conditions (Fontaine et al. 2009[29]). Both early- and late-successional forests can support complex functioning and biodiversity. Post-fire harvest and felling of live and dead trees can negatively affect soil integrity, hydrology, natural regeneration, slope stability, and wildlife habitat (Beschta et al. 1995[30]). Large standing dead, live yet possibly dying, and downed trees help forests recover and provide habitat for more than 150 vertebrates in the Pacific Northwest.

By adding another stressor to burned watersheds, post-fire logging worsens degraded conditions that have accumulated from a century of human activity (Thorn et al. 2018[31], Karr et al. 2004[32]). In sum, the current body of research indicates that the loss of ecosystem services that can result from post-fire treatments is significant (Beschta et al. 2004[33]).

Decades of near endless research have documented the importance of large snags and the harm of post-fire logging. Old trees are interconnected through grafted roots and mycorrhizal fungi, forming a community that has been interacting and collaborating for centuries. Large snags will stand for decades and deteriorate slowly over time, while continuing to store carbon and provide multiple ecosystem benefits.

Post-fire landscapes are not in need of "restoration" because fire itself is a restorative agent for a myriad of species that colonize shortly after large intense burns. Biological legacies are a forests ecological "memory," joining seral stages across a continuum, removing them impacts the new forest and its myriad benefits for generations to come. The forthcoming NEPA document must acknowledge the important biological role of these mature snag forests and analyze and disclose the negative ecological impacts of the proposed treatments within the Taylor/Carter Meadows LSR.

[29] Fontaine, J.B., D.C. Donato, W.D. Robinson, B.E. Law, J.B. Kauffman. 2009. Bird communities following high-severity fire: Response to single and repeat fires in a mixed-evergreen forest, Oregon, USA. *Forest Ecology and Management* 257:1496-1504.

[30] Beschta, R., Rhodes, J., Kaufmann, J., Gresswell, R., Minshall, G., Karr, J., Perry, D., Hauer, F., and Frissell, C., Conservation Biology, Postfire Management on Forested Public Lands of the Western United States. *Conservation Biology 1*8:957- 967

[31] Thorn, S., C. Bassler, R. Brandl, et al. 2018. Impacts of salvage logging on biodiversity: A meta-analysis. *Journal of Applied Ecology* 55:279-289. https://doi.org/10.1111/1365-2664.12945

[32] Karr, J., J. Rhodes, J. Minshall, et al.. 2004. The Effects of Postfire Salvage Logging on Aquatic Ecosystems in the American West, *BioScience*, Volume 54, Issue 11, November 2004, Pages 1029–1033,

[33] Beschta, R., Rhodes, J., Kaufmann, J., Gresswell, R., Minshall, G., Karr, J., Perry, D., Hauer, F., and Frissell, C., Conservation Biology, Postfire Management on Forested Public Lands of the Western United States. *Conservation Biology 2004 1*8:957- 967

ECOLOGICAL CONSEQUENCES AND INCREASED FUEL LOADS

After years of mismanaged forest, road building and overcut stands, the River Complex restarted the ecological succession to the earliest stages of plant growth and interactions of biological communities, including primary seral stages of tree seedlings, woody plants, wildflowers, lichens, bryophytes, fungi, and wildlife. The forest community that experienced the wildfire was not “lost,” but rapidly disturbed (temporarily) in extent while a new forest has begun to develop on burned areas that support this reset forest ecosystem. Legacies of snags, dead and dying trees, mycorrhizal fungi and other species are present in sufficient abundance to regenerate the forest ecosystem without intervention (e.g. treatments, logging, road and landing construction et).

Roads, planting, and salvage logging and machine piling would impede the severely stressed system from natural ecological recovery.

> An intense debate exists on the effects of post-fire salvage logging on plant community regeneration, but scant data are available derived from experimental studies. We analyzed the effects of salvage logging on plant community regeneration in terms of species richness, diversity, cover, and composition by experimentally managing a burnt forest on a Mediterranean mountain (Sierra Nevada, S Spain)…Post-fire salvage logging was associated with reduced species richness, Shannon diversity, and total plant cover. Moreover, salvaged sites hosted different species assemblages and 25% lower cover of seeder species (but equal cover of resprouters) compared to the other treatments. Cover of trees and shrubs was also lowest in salvage logging, which could suggest a potential slow-down of forest regeneration. Most of these results were consistent among the three plots despite plots hosting different plant communities. Concluding, our study suggests that salvage logging may reduce species richness and diversity, as well as the recruitment of woody species, which could delay the natural regeneration of the ecosystem.[34]

In the western USA, typically, the argument is that post-fire logging and subsequent conifer plantings are needed to leap-frog over successional stages to a “forest” even though those actions degrade one of the most biologically diverse seral stages – complex early seral forest—and post-fire logging does not create a diverse forest ecosystem but, rather, a biologically diminished and impoverished one. Post-fire logging is a tax on ecological recovery.

Post-fire logging disrupts fire affected ecosystem processes and inhibits development and longevity of complex early seral forests (Lindenmayer et al. 2008[35], Donato et al. 2012[36],

---

[34] Alexandro B. Leverkus, Juan Lorite, Francisco B. Navarro, Enrique P. Sánchez-Cañete, Jorge Castro. Post-fire salvage logging alters species composition and reduces cover, richness, and diversity in Mediterranean plant communities. Journal of Environmental Management 133 (2014) 323e331

[35] Lindenmayer, D.B., P.J. Burton, and J.F. Franklin. 2008. Salvage logging and its ecological consequences. Island Press: Washington, DC.

[36] Donato, D.C., J.L. Campbell, and J.F. Franklin. 2012. Multiple successional pathways and precocity in forest development: can some forests be born complex? J. Vegetation Science 23:576-584.

DellaSala et al. 2015[37], Thorn et al. 2018[38]) along with keystone biological legacies. Post-fire logging impacts are documented across a broad range of taxa and geographic regions and typically include soil compaction, aquatic and terrestrial habitat degradation (particularly rare and imperiled species), spread of invasive species, increased fine fuels, and conifer seedling mortality among others (Beschta et al. 2004[39], Karr et al. 2004[40], Lindenmayer et al. 2008[41], Lindenmayer and Noss 2006[42], DellaSala et al. 2015[43], Thorn et al. 2018[44]).

Context and scale matter in ecology and is especially relevant in the project area considering cumulative impacts of adjacent large-scale post-fire logging projects across the region in addition to extensive logging proposed in the Bear Country project.

Nothing in a forest is wasted, especially after a fire, as biological legacies link pre- and post disturbance conditions, life and death in the forest, and aquatic and terrestrial ecosystems. Biological legacies such as large snags and downed logs typically have long "residence" times, persisting for decades to centuries and spanning successional stages. They include predisturbance elements (large live and dead trees, shrubs) that survive, persist, or regenerate in the burn area and are an important seed source for recolonization of plants in the new forest. They perform vital ecosystem functions such as anchoring soils (e.g., large root-wads of live and dead trees), recycling nutrients (e.g., downed logs decomposed by detritovores), storing carbon long-term (given slow rates of decomposition) and sequestering it, providing microsites for recolonizing plants and wildlife (e.g., so called "nurse-logs" that are substrate for conifer seedlings, large snags that provide shade for seedlings), and acting as refugia for numerous species (e.g., downed logs as moisture sites for salamanders, fungi, and invertebrates).When large snags along streams eventually topple into the riverbed they become hiding cover for fish, and pulses of post-fire sedimentation create spawning grounds for native fish, linking aquatic and terrestrial ecosystems. Snags are utilized by hundreds of wildlife species for foraging (as they harbor numerous insects, particularly the larval stages), nesting, hiding, roosting, perching, and denning (examples include cavity nesting birds,

[37] DellaSala, D.A., and C.T. Hanson. 2015. The ecological importance of mixed-severity fires: nature's phoenix. Elsevier: United Kingdom.
[38] Thorn, S.,et al. 2018. Impacts of salvage logging on biodiversity: a meta-analysis. Journal of Applied Ecology 55:279-289.
[39] Beschta, R, Frissell, R. Gresswell, R. Hauer, J. Karr, G. Minshall, D. Perry, J. Rhodes. 1995. Wildfire and salvage logging. Recommendations for Ecologically Sound Post-Fire Salvage Management and Other Post-Fire Treatments on Federal Lands in the West.
[40] Karr, J.R., J.J. Rhodes, G.W. Minshall, F.R. Hauer, R.L. Beschta, C.A. Frissell, and D.A. Perry. 2004. The effects of postifre salvage logging on aquatic ecosystems in the American West. Bioscience 54:1029-1033.
[41] Lindenmayer, D.B., P.J. Burton, and J.F. Franklin. 2008. Salvage logging and its ecological consequences. Island Press: Washington, DC.
[42] Lindenmayer, D.B., and R.F. Noss. 2006. Salvage logging, ecosystem processes, and biodiversity conservation. Conservation Biology 20:949-958
[43] DellaSala, D.A., and C.T. Hanson. 2015. The ecological importance of mixed-severity fires: nature's phoenix. Elsevier: United Kingdom.
[44] Thorn, S.,et al. 2018. Impacts of salvage logging on biodiversity: a meta-analysis. Journal of Applied Ecology 55:279-289.

bats, mammals, including many rare species). Many insectivorous species that use snags, in turn, perform vital trophic functions that help keep insects in check post-fire.

Based on the extensive literature provided herein, the USFS cannot claim that post-fire logging will make LSRs or any other part of the forest more "resilient to large scale stand replacement fire" nor "provide for future habitat" when in fact it is proposing to remove the very essential components (legacies) that are necessary for forest development. These components are produced only by a natural disturbance in a mature forest already having structure and provided for the structural characteristics and related functions in those forests for decades to centuries. Simply stated, biological legacies cannot be replaced by timber harvest and tree planting given the long time lines for development.

Additionally, the response of fire-adapted species and communities to post-fire logging depends on the scale, intensity, degree of biological legacies removed (McIver and Starr 2000, Lindenmayer et al. 2006, 2008), disturbance history of the site (Reeves et al. 2006a[45] and b[46], Hutto 2008), and species-specific tolerances to logging. Impacts can be summarized as follows:

- Alteration of stand structure and function;
- Loss of soil nutrients;
- Chronic sedimentation and erosion;
- Reduction in carbon storage;
- Increased fine fuel loads and re-burn severity (Donato et al.2006[47]);
- Degradation of habitat for threatened, endangered, and sensitive species;
- Reduced habitat and prey for apex predators and forest carnivores;
- Reduced snag densities for cavity nesting birds and mammals;
- Exotic species invasions, and lowered resistance; and
- Reduced resilience of post-fire landscapes to future disturbances, among other alterations.

High intensity burns within fire complexes are governed mainly by extreme fire weather, rendering forest thinning and related treatments ineffectual (Kalies and Kent 2016[48], Bowman et al. 2017[49]). The proposed action is not likely to reduce future high severity events but would instead increase future fire risk, damage ecosystem processes and ecological integrity.

The Klamath National Forest proposes a highly controversial and ecologically inappropriate logging project that would accumulate impacts in space and time to- NSO,

---

[45] Reeves, G.H., J.E. Williams, K. Gallo, and K.M. Burnett. 2006a. The aquatic conservation strategy of the Northwest Forest Plan. *Conservation Biology* 20: 319-329.

[46] Reeves, G.H, P.A. Bisson, B.E. Reiman, and L.E. Benda. 2006b. Postfire logging in riparian areas. *Conservation Biology* 20:994-1004.

[47] Donato, D.C., J.B. Fontaine, J.L. Campbell, W.D. Robinson, J.B. Kauffman, and B.E. Law. 2006. Post-wildfire logging hinders regeneration and increases fire risks. Science, January 20, 2006 Vol. 311 p. 352.

[48] Kalies, E.I., and L.L. Yocom Kent. 2016. Tamm Review: Are fuel treatments effective at achieving ecological and social objectives? A systematic review. Forest Ecology and Management 375-84-95.

[49] Bowman, D.M.J.S., G.J. Williamson, J.T. Abatzoglou, C.A. Kolden, M.A. Cochrane, and A.M.S. Smith. 2017. Human exposure and sensitivity to globally extreme wildfire events. Nature Ecology & Evolution 1:1-6.

established and recognized landscape connectivity, late seral and complex early seral conditions, water quality, ecological integrity and resilience.

Together with the Mendocino, Shasta-Trinity, Six Rivers and Rogue River Siskiyou National Forests and beyond, post-fire logging timber sales are massive and controversial and would setback ecosystem processes for decades if not longer. As it stands, it is likely that the combined effects of post-fire logging and other management disturbances would result in widespread ecological damage and result in a mortality sink for spotted owls moving the Klamath Provinces toward a landscape trap where fire regimes and biodiversity are flipped to a novel state (Paine et al. 1998[50], Lindenmayer et al. 2011[51]).

Increasing temperatures, increased variability in precipitation, and climate change may increase the intensity of forest fires, however the solution is not post-fire logging. Indeed, post-fire logging can increase future fire intensity by removing critical large-diameter snags that are known to mitigate conditions that lead to high-intensity fires. "[C]ommercially extracting fire-killed trees via logging causes significant short- and long-term adverse effects on forest ecosystem structures, functions and processes."[52] There is growing and ever expanding evidence that logging fire-affected forests "exacerbates the short-term adverse effects of fire, causes significant long-term environmental damage and ecological degradation of burned watersheds."[53] It also results in decreased forest resilience and increased vulnerability to intense fires.[54]

The Thompson et al. study looked at the reburn on the 2002 Biscuit Fire:

> We used satellite data, government agency records, and aerial photography to examine a forest landscape in southwest Oregon that burned in 1987 and then was subject, in part, to salvage logging and conifer planting before it reburned during the 2002 Biscuit Fire. Areas that burned severely in 1987 tended to reburn at high severity in 2002, after controlling for the influence of several topographical and biophysical covariates. Areas unaffected by the initial fire tended to burn at the lowest severities in 2002. Areas that were salvage-logged and planted after the initial fire burned more severely than comparable unmanaged areas, suggesting that fuel conditions in conifer plantations can increase fire severity despite removal of large woody fuels.[55]

---

[50] Paine R.T, M.J. Tegner MJ, and E.A. Johnson. 1998. Compounded perturbations yield ecological surprises. Ecosystems 1: 535–545.

[51] Lindenmayer, D.B., R.J. Hobbs, G.E. Likens, C. J. Krebs, and S.C. Banks. 2011. Newly discovered landscape traps produce regime shifts in wet forests. PNAS

[52] Timothy Ingalsbee, Ph.D. SALVAGING TIMBER; SCUTTLING FORESTS-The Ecological Effects of Post-Fire Salvage Logging. Western Fire Ecology Center American Lands Alliance

[53] McIver, J.; and L. Starr. 2000. Environmental Effects of Postfire Logging: Literature Review and Annotated Bibliography. Gen. Tech. Rep. PNW-GTR-486. USDA-Forest Service, Pacific Northwest Research Station. 72p.

[54] Nourished by Wildfire. The Ecological Benefits of the Rim Fire and the Threat of Salvage Logging. Center For Biological Diversity_2014

[55] Thompson, J.R., Spies, T.A., and Ganio, L.M. 2007. Reburn severity in managed and 338 unmanaged vegetation in a large wildfire. Proceedings of the National Academy of Sciences 339 of the United States of America 104: 10743–10748. https://www.fs.usda.gov/treesearch/pubs/29686

The best available science and evidence suggests that post-fire logging may worsen fuel conditions in logging areas, thereby requiring more careful study through an EIS. As the Ninth Circuit has elsewhere recognized, there is a "substantial body of research" concerning the effects of vegetation removal on fuels and fire. *Bark v. USFS*, 958 F.3d 865, 871 (2020).

Authors Dunn et al. 2015[56] suggest modifying post-fire logging prescriptions to retain more snags, which would help retain fine fuels in the canopy longer and reduce the amount of fine fuels that are moved from the canopy to the ground. Their modeling looked at 7 fires in the eastern slopes of the Oregon Cascades.

> Salvage logging immediately increased surface fine woody fuel loadings by 160–237% above maximum loadings observed in unmanipulated stands, and were higher during the initial 18–22 years post-fire … [O]ur modeling results suggest salvage logging has mixed effects on reducing hazardous fuel conditions since it increases fine woody fuel loadings and decreases coarse woody fuel loadings. … [P]rescriptions can be altered. For example, [to] retain a higher abundance of snags which would reduce the magnitude of difference in fine woody fuels between salvaged and unmanipulated stands during early in post-fire succession …. Although salvage logging reduces coarse woody fuel loadings, alone it does not mitigate re-burn hazard because it increases fine woody fuel loadings …. Additionally, intensive reforestation typically substitutes conifer biomass for shrub biomass, limiting hazardous fuels reduction unless additional efforts are employed … Understory woody vegetation reestablishes rapidly in these dry-mixed conifer forests (Dunn and Bailey, in press) and can be a highly-flammable fuel layer (Weatherspoon and Skinner, 1995), as well as a source of post-fire fine woody fuels when shrub crowns die (Table 4). This suggests salvage logging alone will not mitigate contributions to re-burn hazard from dead biological legacies when the temporal dynamics of multiple fuelbeds (e.g. fine woody fuels, coarse woody fuels, and regenerating vegetation) are evaluated. R … Salvage logging to enhance ecosystem resilience may not be appropriate if multiple ecosystem functions and resources are considered, including; coarse wood use by wildlife (Cahall and Hayes, 2009; Hutto, 1995; Fontaine et al., 2009; Saab et al., 2005), functional attributes of early seral vegetation (Swanson et al., 2010), compounding effects on soil and nutrient pools (Brais et al., 2000; Triska and Cromack, 1980) and reduced water and carbon storage (Harmon et al., 1986).

A study of the portions of the Biscuit fire that were previously burned by wildfire, reveals that logging did not reduce the severity of subsequent fires, and in fact post-fire logging appeared to increase the severity of subsequent wildfires.[57] In places that burned with

---

[56] Christopher J. Dunn, John D. Bailey 2015. Modeling the direct effects of salvage logging on long-term temporal fuel dynamics in dry-mixed conifer forests. Forest Ecology and Management 341 (2015) 93–109.
[57] Jonathan R. Thompson, Thomas A. Spies, and Lisa M. Ganio. 2007. Reburn severity in managed and unmanaged vegetation in a large wildfire. Proceedings of the National Academy of Sciences. *PNAS* published online Jun 11, 2007.

high severity in the Silver Fire, areas that were salvage-logged and planted burned with even higher severity than comparable unmanaged areas. Some, including forest scientists, would have expected fire severity to be lower in the logged and planted sites, where large wood was removed, broadcast burning done to reduce fine surface fuels, and some vegetation management conducted possibly reducing the cover of flammable shrubs. Large diameter wood is not a major factor in flammability.

A scientific study of post-fire logging, McIver and Ottmar 2007[58], showed that post-fire logging causes a four-fold increase in fine fuels and that increase can last for 15 years. Fine fuels tend to cause wildfires to rapidly spread which is more likely to kill young trees and set back forest recovery. Unlogged fire areas (the controls) had lower levels of fine fuels but had higher levels of large fuels. Large fuels do not tend to exacerbate the spread of fire but they can heat the soil. However, soil heating is a patchy phenomenon that forests have evolved with and can tolerate. Retaining the large wood is also important for wildlife habitat and soil conservation. The scientific consensus in the fuel management literature is that it is more important to control small fuels.

Donato 2006[59] looked at the effects of logging after the Biscuit fire and found that:

> Post-fire logging significantly increased both fine and coarse downed woody fuel loads (Fig. 1B). This pulse was comprised of unmerchantable material (e.g., branches), and far exceeded expectations for post-fire logging-generated fuel loads (5, 6). In terms of short-term fire risk, a reburn in logged stands would likely exhibit elevated rates of fire spread, fireline intensity and soil heating impacts (7). Post-fire logging alone was notably incongruent with fuel reduction goals. Fuel reduction treatments (prescribed burning or mechanical removal) are frequently intended following post-fire logging, including in the Biscuit plan, but resources are often not allocated to complete them (8). Our study underscores that, after logging, mitigation of short-term fire risk is not possible without subsequent fuel reduction treatments.

Where large numbers of standing snags were present in bug-killed areas burned by the Hayman fire in Colorado, Graham 2003[60], fire was generally less severe compared to other areas where large numbers of dead trees were absent.

> In addition to wildfires, the Hayman Fire burned over another type of natural fuel modification: an area affected by a spruce budworm outbreak. Most Douglas-fir in the area between points 47 and 48 on figure 63 were killed by spruce budworm in the early 1990s with subsequent mortality in remaining trees from Douglas-fir beetle. Surface fuel loads were not excessive, since most of the Douglas-fir snags

[58] J.D. McIver, and R. Ottmar. 2006. Fuel mass and stand structure after post-fire logging of a severely burned ponderosa pine forest in northeastern Oregon. Forest Ecology and Management. Volume 238, Issues 1-3, 30 January 2007, Pages 268-279.
[59] D. C. Donato, J. B. Fontaine, J. L. Campbell, W. D. Robinson, J. B. Kauffman, B. E. Law. Post-Wildfire Logging Hinders Regeneration and Increases Fire Risk. 5 January 2006.
[60] Graham, Russell. 2003. Hayman Fire Case Study. Rocky Mountain Research Station Report RMRS-GTR-114. p 144.

> remained standing. The only live trees remaining prior to the Hayman fire were scattered ponderosa pine and the reduction in crown cover due to insect mortality seemed to affect fire behavior. The fire spread towards the southeast through this area during the relatively inactive period between the runs of June 9 and 17. The fire burned mostly as a surface fire on both sides of West Creek, with small patches of crown fire activity. From the air, the burn appeared less severe than in areas outside the budworm affected area (fig. 70).

Post-fire logging typically removes the largest logs that act as water "reservoirs" and are least prone to drying[61]. These authors recommended preventing large accumulations of "woody residue" (described as very small diameter material--branches, twigs, etc.), and recommended leaving down logs after fires to prevent future fire severity. They concluded that, "When forest managers are analyzing for fire risk, they should take into account the high water content of fallen logs during the period in which wildfire potential is greatest... Fallen trees, in a range of decay classes, therefore provide a long-term reservoir of moisture. A continuous supply of woody material left on the forest floor, not only protects the productive potential of the forest soil, but also provides a sanctuary for ectomycorrhizae and a significant source of moisture in the event of prolonged drought or wildfire." The study was conducted in the Klamath region in an area with roughly 40 inches of annual rainfall.

Bitterroot NF Burned Area Recovery DEIS, p.3-12: "The slash created by the harvest and fuels treatments that is left on the ground for site protection and future site productivity, would create a short term (zero - eight years) fire hazard. The fuel-bed created by these treatments would be, in large part, comprised of material in the smaller size classes. These fuels would contribute to the flammability and continuity of fuels on a local level, as well as across the landscape. Under good burning conditions, fires burning in these slash fuel types have the potential to spread rapidly and extensively."

The Biscuit Fire in southern Oregon was the largest fire in Oregon's history in terms of acreage. A large part of this fire area had burned 15 years earlier in 1987. Researchers found that areas that had been logged after the Silver Fire burned with much higher severity than those that were unlogged. While only 28% of the unlogged portions of the Silver Fire burned with high severity in the Biscuit Fire, 68% of the logged portion burned severe. The unlogged portion of the Silver Fire area experienced relatively equal amounts of land burning as high, moderate, low and unburned. The vegetation mortality in the logged units stands out in sharp contrast to the conditions in the unlogged land that was also affected by the 1987 Silver Fire.[62]

---

[61] Amaranthus, M.P.; Parrish, D.S.; and D.A. Perry. 1989. Decaying Logs as Moisture Reservoirs After Drought and Wildfire. In: Alexander, E.B. (ed.) Proceedings of Watershed '89: Conference on the Stewardship of Soil, Air, and Water Resources. USDA-FS Alaska Region. RIO-MB-77. p. 191-194.

[62] Kristen Harma and Peter Morrison. Analysis of Vegetation Mortality and Prior Landscape Condition, 2002 Biscuit Fire Complex. Pacific Biodiversity Institute February 14, 2003

The NEPA document should disclose that natural recovery has countervailing benefits in terms of fire risk and reburn potential, including: (a) large logs store water, (b) standing snags provide shade and cooler micro climates, (c) regrowth tends to be more patchy and less dense and continuous, (d) fuels in the form of branches and dead trees fall to the ground slowly over time and have a chance to decay as they added, (e) falling snags over time tend to break up the continuity of fuels in the form of brush and reproduction.

The forthcoming NEPA document must acknowledge the fire risks associated with post-fire logging including: (a) logging most often removes most of the largest logs that least prone to burn (because large logs hold the most water the longest and they have relatively high ratios of volume to surface area), (b) logging leaves behind almost all of the smallest material which is most prone to drying and burning (e.g., relatively low ratio of volume to surface area), (c) the proposed action may lop and scatter the tops of large trees that are too big for the ground-based harvest machinery, (d) logging equipment and workers could start fires, (e) increased human access increases the risk of human caused ignition, (f) the replanting will create a fuel load that is dense, uniform, extensive, volatile, and close to the ground (During an extreme weather conditions this is one of the most extreme fire hazards in the forest).

The agencies' NEPA should not lump all sizes of woody material together for purposes of estimating fire hazard. This leads to arbitrary and capricious decision-making because the availability of fuel to combustion is inversely related to size. Small fuels are hazardous, while large fuels pose little or no hazard. Fuel models do not generally consider fuels larger than 8" in diameter. Commercial logging removes primarily (sometimes exclusively) wood that does not contribute to fire hazard. Large amounts of fuels >8" can be retained on a given site without detrimental effect. Lumping fuel sizes together prevents the decision-maker from accurately understanding the actual magnitude of the risk from logging or not logging.

The important scientific question of the reburn hypothesis remains unsolved.[63] If fuels must be removed, the agency should treat the smaller fuels that are most hazardous and leave the largest logs that are least flammable and most valuable for habitat and all other ecological services. Pound-for-pound small fuel is more hazardous than large fuel.

Planting for Regeneration is Not Needed

The Forest Service is proposing activities to facilitate the artificial planting of trees on over 2,000 acres in the fire area, implying that natural conifer regeneration would not effectively or adequately occur in the absence of artificial planting.

On August 1, 2006, a letter from nearly 600 American scientists opposed post-fire snag removal and subsequent artificial replanting, finding that such activities do not represent

---

[63] Nemens, Deborah G.; Varner, J. Morgan; Johnson, Morris C. 2019. Environmental effects of postfire logging: an updated literature review and annotated bibliography. Gen. Tech. Rep. PNW-GTR-975. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 35 p.

the current state of scientific knowledge and "would actually slow the natural recovery of forests and of streams and the creatures within them…" The scientists concluded that "no substantive evidence supports the idea that fire-adapted forests might be improved by logging after a fire."[64]

Impacts of Postfire Management Are Unjustified in Spotted Owl Habitat:

> Abstract excerpts: In mixed-conifer forests inhabited by California spotted owls, land managers hypothesize that without human intervention natural conifer regeneration will take many decades or longer to begin within interior areas of large high-severity fire patches, due to long distances from live tree seed sources. As a result, widespread post-fire logging…and planting of conifer seedlings, are used to create tree plantations. These are activities routinely conducted in spotted owl territories following fires, despite current data that indicate this approach has adverse impacts on spotted owl occupancy. Land managers acknowledge such impacts, but continue these forest management practices, assuming they are a necessary harm, one that is warranted to ensure the later return of mature conifer forests used by spotted owls for nesting and roosting. However, few data have been gathered to test this hypothesis. At 5 years post-fire, we surveyed field plots on a grid within large high-severity fire patches in spotted owl habitat within the Rim fire of 2013 in the Sierra Nevada, California. In our analysis the percentage of plots lacking conifer regeneration decreased significantly with larger plot sizes, a finding contrary to previous studies, which assumed vast "deforested" areas in wildland fires, a bias created by small plot size. We found higher conifer regeneration closer to live-tree edges, but we consistently found natural post-fire conifer regeneration at all distances into interior spaces of large high-severity fire patches, including > 300m from the nearest live trees. Distance from live-tree edges did not affect pine dominance in post-fire regeneration. The post-fire natural conifer regeneration reported in our results suggests that the adverse effects of current post-fire management in spotted owl habitat are not necessary practices that can be justified.
>
> Our results indicate that well-documented harm to spotted owl occupancy from current post-fire management practices is not a necessary impact to which the owls must be subjected in order to restore or recover forests following large, intense wildland fires, and that forest types primarily selected by spotted owls naturally regenerate after such fires. We believe the current evidence warrants a reevaluation of past and ongoing post-fire management in spotted owl habitat.[65]

Brown et al. 2013[66] found that natural regeneration was generally abundant and rapid,

---

[64] Chad Hanson, Ph.D. The Myth of "Catastrophic" Wildfire: A New Ecological Paradigm of Forest Health. John Muir Project Technical Report 1 • Winter 2010.

[65] Hanson CT and Chi TY (2021) Impacts of Postfire Management Are Unjustified in Spotted Owl Habitat. Front. Ecol. Evol. 9:596282.doi: 10.3389/fevo.2021.596282

[66] Brown, Martin J.; Kertis, Jane; Huff, Mark H. 2013. Natural tree regeneration and coarse woody debris dynamics after a forest fire in the western Cascade Range. Res. Pap. PNW-RP-592. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 50 p.

although extremely variable in space, both within and among stands. This abundance occurred while other vegetation, notably the shrub Ceanothus, was regenerating profusely as well.

Tepley et al. 2018[67], found that, "planting seedlings of Douglas-fir and the major shade-tolerant species following wildfire at low to mid elevations in the western Cascades may be unnecessary where management objectives focus more on ecological outcomes associated with closed canopy forests than high yield timber production."

These forests are quite resilient with respect to intense natural disturbances. Abundant conifer regeneration has been recorded to occur throughout the Klamath region shortly after stand replacing fires and continues to occur decades post-fire. Aspect has also been shown to play an incredibly important role in re-vegetation[68]. Much of the commercial logging is on north facing slopes, which have a tendency to regenerate naturally. Managed planting post-fire has been shown to be more homogenous. The forthcoming NEPA document should forgo replanting across the project area due to the natural re-vegetation that will occur particularly on north facing slopes and areas near green tree seed sources.

Key finding and implications from the *Predicting Post-Fire Regeneration Needs: Spatial and Temporal Variation in Natural Regeneration in Northern California and Southwest Oregon,* a report done for the Joint Fire Science Program Project[69] conclude:

- On most sites, natural regeneration of conifers was abundant 10 to 20 years after high severity forest fire in the Klamath-Siskiyou region of northern California and southwest Oregon.
- Natural regeneration was most limited on the drier, hotter sites (low elevation, eastern Klamath Mountains).
- Natural regeneration of conifers was usually abundant up to 450m from living trees. It was difficult to find places more than 450m from living trees.
- Conifers continued regenerating 10-15 years after the fire.
- While most conifers were still within the shrub matrix, many were already well above the shrub layer. Even those still within the shrub canopy had reasonable height growth and good live crown ratios (average 68%) suggesting they would survive and grow above the competing vegetation.
- Nine to 19 years after high severity wildfire, average conifer density varied among forest types, for example, the True Fir zone 2,454 trees/ac. (median 2,104), Douglas-fir/Tanoak zone 1038.4 trees/ac. (median 725.4) and lowest in the mixed conifer zone at 775.3 trees/ac (median 223.5).

---

[67] Tepley, A. J., F. J. Swanson, and T. A. Spies. 2014. Post-fire tree establishment and early cohort development in conifer forests of the western Cascades of Oregon, USA. Ecosphere 5(7):80.
[68] Maria J. Lopez Ortiz, Terry Marcey, Melissa S. Lucash, David Hibbs, Jeffrey P.A. Shatford, Jonathan R. Thompson. Post-fire management affects species composition but not Douglas-fir regeneration in the Klamath Mountains. Forest Ecology and Management 432 (2019) 1030–1040.
[69] Shatford, Jeffrey P.A. and Hibbs, David E. *Predicting Post-Fire Regeneration Needs: Spatial and Temporal Variation in Natural Regeneration in Northern California and Southwest Oregon*. Final Report, 11/22/2007. Joint Fire Science Program Project

• Shrub cover was always dense.
• Hardwood regeneration as stump sprouts was also abundant except at higher elevations.
• Most post-fire areas in the Klamath Mountains are well stocked with successful regeneration within 10 to 20 years of a fire so planting is not required to assure a future forest.
• The hottest, driest sites in the region require planting to either assure stocking or to secure a pine component to the forest.

The agency should reconsider the “need” to log fire-affected forests for replanting. As show and as can be seen in fire-affected landscapes throughout the region, natural regeneration will happen if forests are allowed to recover naturally. Fire killed trees will not hamper the growth of a new forest but logging would. Campgrounds and other infrastructure cleared of hazard trees may benefit from replanting.

High-density tree plantations contribute to tree mortality and create a future wildfire hazard, as seen from the plantations in the project area that experienced high severity fire effects. Forest ecologists now recommend that foresters work with natural recruitment near live seed trees, plant a combination of clustered and regularly spaced seedlings that vary with micro-site water availability and potential fire behavior, and limit reforestation efforts in steep terrain.[70] Existing plantations, despite the best-made plans for thinning, undoubtedly contribute to the intensity and spread of the wildfire.

Complex Early Seral Habitat

Please disclose and consider the importance of intact complex early seral forests in the forthcoming NEPA document. Replanting may not be necessary where birds and other wildlife serve essential roles in post-disturbance seed dispersal.

> Seed dispersal mutualisms with scatter-hoarders play a crucial role in population dynamics of temperate large-seeded trees. These behaviors shape seed dispersal patterns, which can be applied to conservation of populations, communities, and even ecosystems dominated by large-seeded trees. We draw on a growing body of literature to describe the ecological context and consequences of scatter-hoarding as a seed dispersal mechanism. We synthesize the quantitative literature on the interaction between members of the avian family Corvidae (crows, ravens, jays, magpies, and nutcrackers) and nut-bearing trees such as pines (Pinus spp.) and oaks (Quercus spp.) to examine unique aspects of avian scatter-hoarders as seed dispersers. During the scatter-hoarding process, seed selectivity, transportation distance, hoarding frequency, and cache placement affect seed dispersal effectiveness, a measure of the quantity and quality of dispersal. Case studies from around the world highlight the role of corvid seed dispersal in population

[70] Malcolm North, et al. Reforestation for resilience in dry western U.S. forests. Forest Ecology and Management, Vol. 432, Jan.2019.

> dynamics of trees, and how the birds' scatter-hoarding behavior can be facilitated for the restoration of oak- and pine-dominated habitats.[71]

Jerry Franklin points out that the more diverse forests that develop from natural regeneration are more resilient to climate change. In the 2007 Early Seral Forest Workshop, Jerry Franklin pointed out an important reason to rely on natural regeneration, saying[72] —

> Naturally-regenerated ESFCs are likely to be more resilient under climate change due to
>
> - greater species diversity
> - tree genotypes selected by nature (i.e., environmental stresses)
>
> …
>
> Reforestation will usually:
>
> o Reduce the duration of ESFCs
> o Reduce heterogeneity of the process by which closed forest canopy is re-established
> o Alter genotype of planted species (less selection by environment)
> o Homogenize composition of forest

There is extensive literature on the importance of early seral forest habitats. As proposed the project would hamper natural regeneration by removing habitat that is likely already inhabited by multiple species of birds and small mammals that will spread seed throughout the watersheds. Please honestly consider this when analyzing the no action alternative.

LANDSCAPE CONNECTIVITY

The National Fish, Wildlife and Plant Climate Adaption Strategy makes landscape connectivity the #1 strategy for species survival and adaption. Many species depend on connectivity for refuge and dispersal, including the Gray wolf. Climate-wise connectivity is essential to provide species with access to suitable habitats in the future.

Connectivity that allows plants and animals to move to cooler places is particularly important in rugged terrain, where microclimates drive temperature gradients. Realizing climate-wise connectivity on the ground requires both identifying and securing habitat linkages that provide climate resilience. Project level planning must consider the role of these watersheds in habitat connectivity.

---

[71] Mario B. Pesendorfer, T. Scott Sillett, Walter D. Koenig, and Scott A. Morrison (2016) Scatter-hoarding corvids as seed dispersers for oaks and pines: A review of a widely distributed mutualism and its utility to habitat restoration. The Condor: February 2016, Vol. 118, No. 2, pp. 215-237.

[72] Jerry Franklin, 2002, Early Successional Forests power point presentation.

Climate Change Refugia for Biodiversity in the Klamath-Siskiyou Ecoregion from Olsen et al. 2012[73] delineates Taylor Creek and Carter Meadows ridge system (map and full study provided) as a high priority microrefugia area and explains…

> This provisional network of priority climate change microrefugia outside the existing reserve system should be targeted for immediate protection and restoration.
>
> The priority areas identified here would not, by themselves, constitute a comprehensive conservation strategy as they are intended primarily to buffer a good portion of the Klamath Siskiyou Ecoregion biota from extinction and extirpation due to changing climate, and they would not necessarily address a wide range of other conservation goals and objectives.
>
> Waiting decades for formal "gazettement" of large protected areas without securing microrefugia now may allow continued degradation of these critical refuges.

The "reserve" systems, adopted by the NWFP, were designated to maintain landscape connectivity yet continue to be threatened by US Forest Service timber sales and habitat removal and degradation across the region.

When detailing the NWFP revision process, DellaSalla 2006[74] states, "NWFP architects aptly recognized that LSRs, Riparian Reserves, and Key Watersheds fit together in a cohesive manner to maintain long-term benefits to terrestrial and aquatic ecosystems. Reducing protections to reserves would create cumulative impacts across ecosystems. With new stressors like climate change and ongoing land-uses, reserve synergies and integrated strategies are even more important." "…Attempts to revise the plan have been bogged down by ongoing controversy over timber vs. biodiversity values that has led to a perpetual tug-of-war between decision makers... If this trend continues, federal land management may regress and recreate many of the problems the NWFP was implemented to correct, including… loss of ecological integrity that underpins the region's ecosystem services and their adaptive capacity to climate change."

Habitat loss, spatial and temporal distribution and fragmentation may be affecting the dispersal, viability and diversity of wildlife species of concern in these watersheds. Within the watersheds there is a need to identify dispersal corridors because much habitat fragmentation has already occurred. Widespread logging would negatively effect dispersal options in the Taylor Creek watershed.

---

[73] Olson, David, DellaSala, Dominick A., Noss, Reed F., Strittholt, James R., Kass, Jamie, Koopman, Marni E. and Allnutt, Thomas F. *Climate Change Refugia for Biodiversity in the Klamath-Siskiyou Ecoregion.* Natural Areas Journal, 32(1):65-74. 2012.

[74] Dominick A. DellaSala, Rowan Baker, Doug Heiken, Chris A. Frissell, James R. Karr, S. Kim Nelson, Barry R. Noon, David Olson and James Strittholt. Building on Two Decades of Ecosystem Management and Biodiversity Conservation under the Northwest Forest Plan, USA. Forests 2015, 6, 3326-3352; doi:10.3390/f6093326.

CUMULATIVE IMPACTS

Please disclose and analyze the cumulative impacts of the proposed post-fire logging in conjunction with prior and foreseeable management activities. Clearly address the cumulative impacts on soil health, hydrology, botany, water quality and wildlife. Please disclose the connected and cumulative impacts of the fires themselves and fire suppression activities. The many severe impacts from timber sale activities including, "temporary" road and landing and skid trail construction in this planning area must be analyzed in a NEPA document such that:

A proper consideration of the cumulative impacts of a project requires "some quantified or detailed information;…general statements about possible effects and some risk do not constitute a hard look absent a justifications regarding why more definitive information could not be provided." Ocean Advocates, 361 F.3d at 1128 (quoting Neighbors of Cuddy Mountainv. US Forest Service, 137 F.3d 1372, 1379-80 (9th Cir. 1998)). The analysis "must be more than perfunctory; it must provide a useful analysis of the cumulative impacts of past, present, and future projects." Id.
-KS Wild v. BLM, 387 F 3d., 15269 (9th Cir. 2004).

As discussed in the Ninth Circuit's ruling of July 24, 2007, NEPA requires disclose of the cumulative impacts of multiple actions:

> "One of the specific requirements under NEPA is that an agency must consider the effects of the proposed action in the context of all relevant circumstances, such that where "several actions have a cumulative…environmental effect, this consequence must be considered in an EIS." Neighbors of Cutty Mountain, 137 F3d 1372, 1378 (9th Cir. 1998) quoting City of Tenakee Springs v. Clough, 915 F.2d 1308, 1312 (9th Cir. 1990)). A cumulative effect is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or persons undertakes such other actions." 40 CFR § 1508.7.
>
> Our cases firmly establish that a cumulative effects analysis "must be more than perfunctory; it must provide a useful analysis of the cumulative impacts of past, present, and future projects." Klamath Siskiyou Wildlands Center v. BLM, 387, F.3d 989, 993 (9th Cir. 2004). To this end, we have recently noted two critical features of a cumulative effects analysis. First, it must not only describe related projects but also enumerate the environmental effects of those projects. See Lands Council v. Powell, 395 F.3d 1019, 1028 (9th Cir. 2005) (holding a cumulative effects analysis violated NEPA because it failed to provide adequate data of the time, place, and scale" and did not explain in detail "how different project plans and harvest methods affects the environment"). Second, it must consider the interaction of multiple activities and cannot focus exclusively on the environmental impacts of an individual project. See Klamath Siskiyou Wildlands Center, 387 F 3d at 996 (finding a cumulative effects analysis inadequate when "it

> only considers the effects of the very project at issue" and does not "take into account the combined effects that can be expected as a result of undertaking" multiple projects).
> -Oregon Natural Resources Council et al. v. Brong, 9th Circuit, July 24, 2007.

It is not sufficient to simply conclude that there are no direct or indirect effects that would cumulate from other projects. This is the kind of conclusory statement, based on 'vague and uncertain analysis,' that is insufficient to satisfy NEPA's requirements." *Bark v. USFS*, 958 F.3d 865, 871 (2020)

Given the impacts of past Forest Service logging and road activities on the hydrological and terrestrial health of the project area, it is vital that the agency analyzes and discloses the cumulative impacts of past activities, fire and fire suppression impacts and its future plans, particularly the intensive amount of roads and trails proposed in the Region 5 Post Disturbance project.

<u>INVASIVE NON-NATIVE PLANTS</u>

Please address how the proposed logging, landing and road construction will likely increase non-native plant species as research has documented. See Merriam 2007[75]:

> We found that fuel breaks have the potential to promote the establishment and spread of nonnative plants. However, fuel breaks with more canopy and ground cover may be less likely to be invaded. Varying construction methods to retain more litter cover, minimize the exposure of bare ground, and retain some canopy cover might reduce nonnative germination and establishment on fuel breaks.
>
> The 24 fuel breaks we sampled had unique histories, including various dates of construction, different construction and maintenance regimes, varying fire histories, and different land use histories. Despite this variation, we found that 19 of the 24 sites had significantly higher relative nonnative cover within fuel breaks than in adjacent wildland areas.

Invasive Non-Native Weeds are one of the four primary threats to our nation's forests and grasslands. In the USDA Forest Service Strategic Plan for fiscal years 2007-2012, one of the objectives under the primary goal is to, "restore, sustain and enhance the nation's forests and grasslands" and to "reduce adverse impacts from invasive species." One of the requirements contained in the FSM 2900 is for a determination of "the risk of introducing, establishing or spreading invasive species associated with any proposed action, as an integral component of project planning and analysis, and where necessary provide for alternatives or mitigation measures to **reduce or eliminate** that risk prior to project approval."

---

[75] Merriam, K.E., Keeley, J.E., and Beyers, J.L., 2007, *The role of fuel breaks in the invasion of nonnative plants:* U.S. Geological Survey Scientific Investigations Report 2006-5185, 69 p.

SIGNIFICANCE AND THE NATIONAL ENVIRONMENTAL POLICY ACT

Section §1508.27 of NEPA describes "Significantly". Below are significant issues that we believe trigger a detailed Environmental Impact Statement for this project. We ask you to recognize the extraordinary circumstances involved with the proposed project.

(4) The degree to which the effects on the quality of human environment are likely to be highly controversial.

(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small components.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined critical under the Endangered Species Act of 1973.

(10) Whether the action threatens a violation of Federal, State or local law or requirements imposed for the protection of the environment.

The River Complex project contains significant issues and cumulatively with other KNF projects, presents extraordinary circumstances that require the completion of an EIS. Please address the significant issues in the forthcoming NEPA document.

ADDRESS SCIENTIFIC CONTROVERSY

There is almost no end to the scientific literature that dissects the negative ecological consequences of post-fire logging. The agencies own literature acknowledges the extreme controversy surrounding post-fire logging. Attached to these scoping comments is a 2013 letter to congress signed by 250 scientists asking that decision makers "consider what the science is telling us: that post-fire habitats created by fire, including patches of severe fire, are ecological treasures rather than ecological catastrophes, and that post-fire logging does far more harm than good to the nations public lands." Public controversy and uncertainty function as a trigger necessitating the development of an EIS. *See* 40 C.F.R. § 1508.27(b)(4)&(5). We believe that there are considerable areas of public controversy, particularly regarding post-fire logging sufficient to require a full EIS. *Bark v. USFS*, 958 F.3d 865, 869 (2020).

Salvage logging does not necessarily prevent subsequent disturbances, and sometimes it may increase disturbance likelihood and magnitude.[76] Salvage logging has been proposed to reduce post-fire hazardous fuels and mitigate re-burn effects, but debate remains about

[76] Leverkus, A.B., Buma, B., Wagenbrenner, J., Burton, P.J., Lingua, E., Marzano, R. and Thorn, S., 2021. Tamm review: Does salvage logging mitigate subsequent forest disturbances? *Forest Ecology and Management*, *481*, p.118721.

its effectiveness when considering fuel loadings are dynamic, and re-burn occurrence is stochastic, in time. Although salvage logging reduces coarse woody fuel loadings, alone it does not mitigate re-burn hazard because it increases fine woody fuel loadings and has little direct effect on reestablishing vegetation.[77]

Please take a hard look at the proposed project's impacts on the likelihood and severity of future fires and the scientific controversy surrounding the issue. Because "fire management is a crucial issue that has wide-ranging ecological impacts and affects human life," the controversy around the effects of post-fire logging on future fire severity obligates the Forest Service to conduct an EIS. *Bark v. United States Forest Serv.*, 958 F.3d 865, 871 (9th Cir. 2020) (holding Forest Service must conduct EIS where impacts of project on future fire severity are controversial).

The very existence of the controversy is enough to require an EIS in this scenario. There is "evidence from numerous experts" that "undermines the agency's conclusions." *Bark v. United States Forest Serv.*, 958 F.3d 865, 870 (9th Cir. 2020). This is enough "to demonstrate a substantial dispute" and because the potential implications of this controversy for the project's impacts are so large, it is enough on its own to require the agency prepare an EIS. *Id.*

BEST MANAGEMENT PRACTICES

Resource protection measures (RPMs) and Best Management Practices (BMPs) are developed to reduce environmental effects and ensure project activities are implemented to comply with standards and guidelines. The agency cannot rely on Best Management Practices to protect soil and watershed resources. Despite much improved best management practices, contemporary timber harvest can trigger serious cumulative watershed effects when too much of a watershed is harvested over too short a time period (Klein et al 2011[78]).

The analysis must disclose and analyze impacts of the proposed logging, yarding, road construction and reconstruction, road use and maintenance, landing construction, tractor piling and other treatments on the environment. The agency cannot rely on RPMs and BMPs to eliminate impacts. Please be aware that the National Marine Fisheries Service (NMFS) criticizes the use of BMPs and mitigation as poor surrogates for addressing cumulative watershed effects because BMPs are addressed to individual actions and fail to do limit the totality of individual actions within a watershed. In a 1997 Position Paper on the Oregon Forest Practices Act, NMFS points out that:

> Cumulative effects of forest practices may include changes in sediment, temperature, and hydrological regimes, resulting in direct, indirect or eventual loss of key habitat components (e.g., clean gravel interstices, large woody debris, low temperature

[77] Christopher J. Dunn, John D. Bailey. Modeling the direct effects of salvage logging on long-term temporal fuel dynamics in dry-mixed conifer forests. Forest Ecology and Management 341 (2015) 93–109
[78] Klein, Randy D., Jack Lewis, Matthew S. Buffleben. *Logging and turbidity in the coastal watersheds of northern California.* Geomorphology. In press 2011.

> holding pools, and protected off-channel rearing areas) necessary for spawning and rearing of anadromous salmonids. These changes often are not expressed "immediately" at the project site, but instead may occur subsequent to triggering events (fire, floods, storms) or are manifested off-site (downstream) of where the effects are initiated.

Please note that the prevention of potentially adverse impacts at the project site is indeed necessary, but not sufficient to avoid cumulative effects (CEQ 1971). As Reid (1993)[79] states:

> The BMP approach is based on the premise that if on-site effects of a project are held to an acceptable level, then the project is acceptable, regardless of activities going on around it. Interactions between projects are beyond the scope of BMP analysis, and operational controls are applied only to individual projects.
>
> However useful site specific BMPs are in minimizing effects of individual actions, they still do not address the cumulative effects of multiple actions occurring in the watershed which, though individually "minimized" through application of site-specific BMPs, may still be significant, in their totality, and have undesirable consequences for beneficial uses such as salmon populations and salmon habitat.

The argument that applying a BMP while conducting a specific forest practice minimizes site-specific effects and thus also minimizes cumulative effects is logically flawed. Every BMP is an action and has an effect ... thus generally, the more the BMPs are applied the greater the cumulative effect. Only by minimizing the number of actions, i.e., the number of individual applications of BMPs would cumulative effects by minimized. This is precisely why a cumulative effects assessment is needed—to establish the watershed-specific limits and excesses of BMP applications.

TRIBAL CONSULTATION

Decision makers must have **regular, meaningful and robust consultation** with affected Tribes. Please see this January 26, 2021, Memorandum concerning Tribal Consultation and Strengthening Nation-to-Nation Relationships.

Executive Order 13175 of November 6, 2000 (Consultation and Coordination With Indian Tribal Governments), charges all executive departments and agencies with engaging in regular, meaningful, and robust consultation with Tribal officials in the development of Federal policies that have Tribal implications. Tribal consultation under this order strengthens the Nation-to-Nation relationship between the United States and Tribal Nations. The Presidential Memorandum of November 5, 2009 (Tribal Consultation), requires each agency to prepare and periodically update a detailed plan of action to implement the policies and directives of Executive Order 13175.

---

[79] Reid, Leslie M. 1993. Research and cumulative watershed effects. Gen. Tech. Rep. PSW-GTR- 141. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 118 p.

CLIMATE AND BIODIVERSITY CRISIS

Please make an honest attempt at calculating carbon dioxide emissions and carbon loss as a result of heavy ground based-logging, helicopter and skyline logging, piling, log hauling et. in these impaired, post-fire affected watersheds. Please do not use the timber industry rhetoric that carbon is stored in wood products.

"The ability of the Region's forestlands to sequester and store carbon has become a matter of national and international significance. Human additions of greenhouse gases to the atmosphere are altering the climate, and federal land management agencies like the Forest Service are expected to play a major role in U.S. adaptation and mitigation responses to global warming. Mitigation responses revolve around the maintenance and enhancement of carbon sequestration processes on forestlands."[80]

"Ensure the retention and sustainability of forests, forest resources, and forest carbon over the long term, even as climates changes."[81]

"Habitat loss and climate change are the two greatest threats to biodiversity. The Pacific Northwest region represents some of the highest carbon density forests in the world, which can store carbon in trees for 800 years or more. GHG reduction must happen quickly to avoid surpassing a 2 °C increase in temperature since preindustrial times. Alterations in forest management can contribute to increasing the land sink and decreasing emissions by keeping carbon in high biomass forests, extending harvest cycles, reforestation, and afforestation. Forests are carbon-ready and do not require new technologies or infrastructure for immediate mitigation of climate change. Here, we demonstrate this approach in a high biomass region, and found that reforestation, afforestation, lengthened harvest cycles on private lands, and restricting harvest on public lands increased net ecosystem carbon balance by 56% by 2100, with the latter two actions contributing the most. Storing more carbon in ecosystems will help mitigate climate effects, although land managers often prioritize generating revenue from commercial sales over carbon storage."[82]

In 2010, the Forest Service produced a National Roadmap for Responding to Climate Change (attached). This roadmap provides guidance to the agency to: (1) Assess vulnerability of species and ecosystems to climate change, (2) Restore resilience, (3) Promote carbon sequestration, and (4) Connect habitats, restore important corridors for fish and wildlife, decrease fragmentation and remove impediments to species migration.

The key challenge for biodiversity conservation in the Anthropocene is counteracting the accelerating rate of species extinctions resulting from habitat loss and fragmentation,

---

[80] R5 Ecological Restoration Implementation Plan
[81] R5 Ecological Restoration Implementation Plan
[82] Law, Beverly E., et al. "Land use strategies to mitigate climate change in carbon dense temperate forests." *Proceedings of the National Academy of Sciences* 115.14 (2018): 3663-3668.

climate change, and invasive species.[83] As we face the climate and biodiversity crisis, we urge the Klamath National Forest to work towards species recovery, habitat connectivity and maintaining climate refuge. This would best be achieved by decommission unneeded, closed, high risk roads that the agency cannot afford to maintain and dropping commercial logging and focusing the project to small diameter fuels reduction.

GHG Impacts Must Be Considered as Part of the NEPA Process

On January 20th, 2021, President Biden ordered an "Executive Order on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis". The order instructed The Council on Environmental Quality to "rescind its draft guidance entitled, "Draft National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions," 84 Fed. Reg. 30097 (June 26, 2019)" and instead "review, revise, and update its final guidance entitled, "Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews," 81 Fed. Reg. 51866 (August 5, 2016)." This change was recorded in the Federal Register on February 19, 2021. The 2016 guidance recommends that agencies "quantify a proposed agency action's projected direct and indirect GHG emissions, taking into account available data and GHG quantification tools that are suitable for the proposed agency action" and that "use projected GHG emissions (to include, where applicable, carbon sequestration implications associated with the proposed agency action) as a proxy for assessing potential climate change effects when preparing a NEPA analysis for a proposed agency action." In addition, the guidance recommends that, where GHG emissions are too difficult to quantify, agencies explain why and analyze estimated emissions qualitatively instead.[84] When conducting the environmental review for this project, the Forest Service must consider the project's impacts to GHGs in line with the 2016 guidance. This means quantifying direct and indirect impacts as well as short term and long-term impacts.

Post-Fire Logging Increases GHG Impacts

Research on the impacts of post-fire logging on GHG emissions highlights the negative impacts of this practice. Boone et al. (2019)[85] directly compared the total aboveground biomass (TAGB) of salvage logged sites and sites that were not logged 15 years and 29 years after the Apple and Warner Creek Fires. They found that "land use (salvage logging and plantations) resulted in significantly lower TAGB than the burned late successional natural forests" that were not logged. In particular, they found that the total aboveground carbon at the logged sites was 49% and 42% that of the high severity sites 29 years post-

---

[83] Alexander K. Fremier, Michael Kiparsky, Stephan Gmur, Jocelyn Aycrigg, Robin Kundis Craig, Leona K. Svancara, Dale D. Goble, Barbara Cosens, Frank W. Davis, J. Michael Scott. A riparian conservation network for ecological resilience. Biological Conservation 191 (2015) 29–37. http://dx.doi.org/10.1016/j.biocon.2015.06.029 0006-3207/

[84] Council of Envtl. Quality, Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews (Aug. 1, 2016) p. 4

[85] Kauffman, J. Boone, et al. "Forest structure and biomass reflects the variable effects of fire and land use 15 and 29 years following fire in the western Cascades, Oregon." Forest Ecology and Management 453 (2019): 117570.

fire. That means that after 29 years of growth there is about half as much carbon in post fire logged sites as those that regenerate naturally. Powers et al. found a similar reduction in stored carbon following post-fire logging.[86] This is particularly harmful because the carbon in wood harvested during salvage logging is typically released into the atmosphere during that 30 year period.[87] Ingerson et al (2009)[88] found that "[a]s a result of wood waste and decomposition, the carbon stored long-term in harvested wood products may be a small proportion of that originally stored in the standing trees—across the United States approximately 1% may remain in products in use and 13% in landfills at 100 years post-harvest." Post-fire logging expedites the release of carbon into the atmosphere and directly exacerbates climate change. The forthcoming NEPA should contend with these impacts by quantifying them and analyzing their expected impacts to the environment.

Logging in an Attempt to Reduce the Severity of Future Fires Increases Carbon Emissions

One of the stated purposes of this project is to decrease the severity of future wildfires. Attempting to do so would not reduce carbon emissions and will in fact increase them. First, the amount of carbon harvested necessary to change fire behavior is often far larger than that saved by changing fire behavior.[89] Second, there is a very low likelihood that a forest will burn again before carbons stocks naturally regenerate. This eliminates any GHG benefit that logging could have theoretically conferred.[90] After conducting a literature review of studies on this subject, Law & Harmon (2011)[91] concluded that "[t]hinning forests to reduce potential carbon losses due to wildfire is in direct conflict with carbon sequestration goals, and, if implemented, would result in a net emission of CO2 to the atmosphere because the amount of carbon removed to change fire behavior is often far larger than that saved by changing fire behavior, and more area has to be harvested than will ultimately burn over the period of effectiveness of the thinning treatment."

This is not merely a minor amount of carbon released during logging. Campbell, Harmon, & Mitchell (2012)[92] found that "protection of one unit of C[arbon] from wildfire

---

[86] Powers, Elizabeth M., et al. "Post-fire management regimes affect carbon sequestration and storage in a Sierra Nevada mixed conifer forest." Forest Ecology and Management 291 (2013): 268-277.
[87] Law, Beverly E., et al. "Land use strategies to mitigate climate change in carbon dense temperate forests." *Proceedings of the National Academy of Sciences* 115.14 (2018): 3663-3668.
[88] Ingerson, Ann. "Carbon storage potential of harvested wood: summary and policy implications." *Mitigation and Adaptation Strategies for Global Change* 16.3 (2011): 307-323.
[89] Mitchell S, Harmon ME, O'Connell KB. Forest fuel reduction reduces both fire severity and long-term carbon storage in three Pacific Northwest ecosystems. Ecological Application. 19, 643–655 (2009)
[90] John L Campbell, Mark E Harmon & Stephen R Mitchell, *Can fuel-reduction treatments really increase forest carbon storage in the western US by reducing future fire emissions?* Frontiers in Ecology and the Environment 83-90 (2011); Chiono, Lindsay 2011. Balancing the Carbon Costs and Benefits of Fuels Management. Research Synthesis for Resource Managers. Joint Fire Science Program Knowledge
[91] Law, Beverly Elizabeth, and Mark E. Harmon. "Forest sector carbon management, measurement and verification, and discussion of policy related to climate change." *Carbon Management* 2.1 (2011): 73-84.
[92] John L Campbell, Stephen R. Mitchell, Mark E. Harmon. *Can fuel-reduction treatments really increase forest carbon storage in the western US by reducing future fire emissions?* March 2012. Frontiers in Ecology and the Environment. 10(2):83-90. DOI:10.2307/41480005

combustion comes at the cost of removing three units of C[arbon] in fuel treatments. The NEPA analysis should acknowledge the vast array of scientific literature that has found that logging to reduce wildfires would increase carbon emissions. Climate impacts are real impacts that will harm this watershed as well as the planet.

Importance of Charcoal

> Charcoal represents a super-passive form of carbon (C) that is generated during fire events and is one of the few legacies of fire recorded in the soil profile; however, the importance of this material as a form of C storage has received only limited scientific attention. Here, we review the formation of charcoal in temperate and boreal forest ecosystems, discuss some of its desirable properties, and estimate the potential contribution of charcoal to long-term C sequestration in forest ecosystems. Charcoal deposition over the course of several millennia probably accounts for a substantial proportion of the total soil C pool in fire-maintained forest ecosystems. Forest management processes that interfere with natural fire processes eliminate the formation of this passive form of C. We recommend that charcoal be considered in C storage budgets and modeling of forest ecosystems, especially in light of climate change and increasing occurrence of wildfire.
>
> In a nutshell:
>
> - Charcoal produced during wildfire events represents an important form of long-term C storage in forest ecosystems.
> - Charcoal has numerous desirable properties that improve soil physical and biochemical conditions.
> - Charcoal may account for 15-20% of total C in temperate, coniferous mineral soils.
> - Forest management practices, such as salvage logging or thinning without prescribed fire, may reduce soil charcoal content and, thus, long-term C storage in mineral soils.[93]

The importance of charcoal for carbon storage, its contribution to soil health and forest regeneration should be considered in the project analysis.

The Truth About Wood Products

Post-fire logging hinders the re-establishment of forests, increases the risk of forest loss, and results in a loss of C storage. When we use active forest

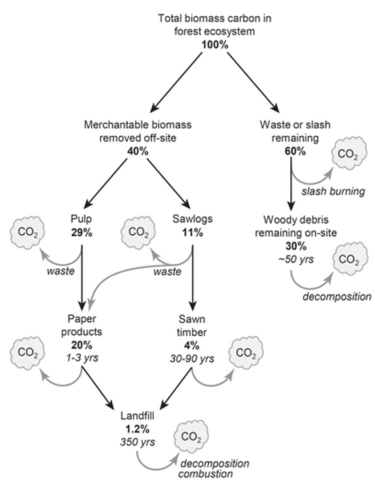
---

[93] Thomas H. DeLuca and Gregory H Aplet. Charcoal and carbon storage in forest soils of the Rocky Mountain West. Frontiers in Ecology 2008; 6(1): 18-24,doi:10.1890/070070

management, which is ecologically unsound and unnecessary, we run the risk of "creating new problems before we solve the old ones."[94]

The large amount of emissions caused by cutting, logging, hauling and milling is a factor. Much of the carbon-storing biomass from trees is contained within the tops and branches, which are often burned or left to deteriorate. Then, a significant portion of the tree is lost during milling. Then the carbon emissions of hauling lumber to outlets and then manufacturing is another addition in the total emissions. Then include the actual lifespan of the product that is made from the wood that often ends up in a landfill. The myth —concerning wood products storing carbon in the long-term— that is perpetuated by the agency and timber industry needs to stop and take into account the reality of the and carbon lost and emissions cast into the atmosphere to make wood products.

Transferring C from forest biomass to wood product carbon pools is inefficient and leads to an overall loss of C storage. C is lost when forests are harvested compared to old growth forests, "even when storage in wood products and landfill are included."[95] Additionally, C stocks are younger and have less longevity in logged forests compared to old growth forests."[96]



"Transfer of biomass carbon during harvesting and processing of wood products. Numbers in bold represent the proportion of the total biomass carbon in the forest that remains in each component. Numbers in italics are the average lifetime of the carbon pool (see data sources in Appendix E: Table E1)."[97]

Harvesting trees, even snags, for wood products results in net emissions and is not an energy-neutral process.[98] Post-fire logging as a way to mitigate climate change and shift C storage to wood products is erroneous and misguided.[99]

---

[94] Beschta et al. Wildfire and Salvage Logging. Recommendations for Ecologically Sound Post-Fire Salvage Management and Other Post-Fire Treatments On Federal Lands in the West 1995.
[95] Keith, H., D. Lindenmayer, B. Mackey, D. Blair, L. Carter, L. McBurney, S. Okada, and T. Konishi-Nagano. 2014.Managing temperate forests for carbon storage: impacts of logging versus forest protection on carbon stocks. Ecosphere 5(6):75. http://dx.doi.org/10.1890/ES14-00051.1
[96] Ibid.
[97] Ibid.

ALTERNATIVES, RECOMMENDATIONS AND CONCLUSION

The River Complex project as proposed, in addition to the Region 5 Post Disturbance project would significantly alter this landscape for centuries. As noted throughout these comments the project may well increase fire risk in the future. The Klamath National Forest is so much more than a "timber forest". To survive the climate and biodiversity emergency this outdated concept must change. It is crucial to retain large-diameter and old-growth legacy trees and snags in this Late Successional Reserve. Wildlife and wild salmon are struggling to survive in these watersheds and throughout the Klamath Mountains. Please consider an alternative that would:

- Focus removal of hazard trees on main roads.
- Focus on small diameter fuels reduction.
- Retain all live trees, except in plantations.
- Retain all snags over 21" and leave 3-5 of the largest snags on per acre.
- Follow roadside and target buffer width of 1.5x the length of a site potential tree uphill.
- Limit removal of snags on downhill side of the road to the first 50' only or retain all snags >20" DBH 50' or more on the downhill side of the road.
- Fell and leave danger and hazard trees that are 36" inches and larger.
- Decommission roads and remove from the transportation system.
- Complete wildlife surveys.
- Forgo replanting.

Burned forests teem with life. Restoration begins with natural recovery**.** The reflex reaction to log after forest fires directly contradicts decades of scientific research showing both the immense ecological importance of post-fire landscapes and the significant harm that can occur when such areas are logged. If the agency chooses to move forward with the project as proposed, the impacts of highly controversial post-fire logging in Taylor/Carter Meadows LSR, Critical Habitat, world renowned Salmon River and recognized priority refuge and wildlife connectivity corridor — it must be analyzed in an environmental impact statement.

Wildfires are our future. As we face this change together, planning and preparing for tomorrow should include **a prioritized fire strategy that is managible, maintainable and compatible with clean water, carbon storage and species conservation.** We urge project planners to work with the Western Klamath Restoration Partnership and other stakeholders. In this climate and biodiversity emergency, allowing natural recovery and

---

[98] Domke, G., C. A. Williams, R. Birdsey, J. Coulston, A. Finzi, C. Gough, B. Haight, J. Hicke, M. Janowiak, B. de Jong, W. A. Kurz, M. Lucash, S. Ogle, M. Olguín-Álvarez, Y. Pan, M. Skutsch, C. Smyth, C. Swanston, P. Templer, D. Wear, and C. W. Woodall, 2018: Chapter 9: Forests. In Second State of the Carbon Cycle Report (SOCCR2): A Sustained Assessment Report [Cavallaro, N., G. Shrestha, R. Birdsey, M. A. Mayes, R. G. Najjar, S. C. Reed, P. Romero-Lankao, and Z. Zhu (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 365-398, https://doi.org/10.7930/SOCCR2.2018.Ch9.

[99] Philippe Leturcq. GHG displacement factors of harvested wood products: the myth of substitution. Scientific Reports. (2020) 10:20752

retaining biological legacies across the broader landscape would better protect water quality, fisheries, visual quality, wildlife and recovering forests, while meeting the purpose and need of the project.

Please send a hardcopy of the forthcoming NEPA analysis to the EPIC office.
On behalf of wildlife, wild places and the thousands of people who care about the Salmon and Scott Rivers, we appreciate your time and consideration.

Sincerely,

Kimberly Baker
Executive Director
Klamath Forest Alliance

Public Land Advocate
EPIC-Environmental Protection Information Center
145 G. St., Suite A
Arcata, CA 95521
Office: 707-822-7711
kimberly@wildcalifornia.org