OBJECTOR'S NOTICE OF OBJECTION, STATEMENT OF ISSUES AND LAWS, AND REQUESTED REMEDIES

NOTICE OF OBJECTION

June 24th, 2022

Forest Supervisor, (Reviewing Officer)
Deschutes National Forest Supervisor's Office
Attn: Sasha Bertel
63095 Deschutes Market Road
Bend, Oregon 97701
Email: objections-pnw-deschutes@usda.gov

RE: Blue Mountains Biodiversity Project's objection to the Deschutes National Forest Draft Decision Notice and Finding of No Significant Impact and Final Environmental Assessment for the Green Ridge Landscape Restoration Project

Dear Objection Reviewing Officer,

This is an addendum to Blue Mountains Biodiversity Project's objection, submitted by Karen Coulter, to the Deschutes National Forest Green Ridge Landscape Restoration Project (the "Green Ridge project" or "Green Ridge sale") Final Environmental Assessment and Draft Decision Notice.

I am submitting the following objection addendum on behalf of Blue Mountains Biodiversity Project (BMBP), Western Watershed Project (WWP), and Marilyn Miller of Miller Consulting. This objection addendum is being submitted in addition to Karen Coulter's objection to the Green Ridge project Final EA and Draft Decision Notice. Western Watersheds Project and Marilyn Miller are also signing on to Blue Mountains Biodiversity Project's objection submitted by Karen Coulter. Collectively, our groups are referred to as "Blue Mountains Biodiversity Project" or "BMBP" in our objections.

BMBP has secured the right to submit objections and thereby participate in the pre-decisional administrative review process for this project. BMBP has submitted timely written scoping comments regarding this project and extensive comments on the Draft Environmental Assessment, including field survey sheets and photographs from our surveying the affected area for weeks.

Decision Document
Green Ridge Landscape Restoration Project Environmental Assessment and Draft Decision Notice and Finding of No Significant Impact

Date Decision published
May 10th, 2022

Responsible Official
Ian Reid, District Ranger, Sisters Ranger District, Deschutes National Forest

Description of the Project
The Deschutes National Forest Service has selected a modified version of Alternative 3, including the following proposed management actions. Therefore, this objection focuses on modified Alternative 3, as specified in the Draft Decision Notice. Modified Alternative 3 includes:

- 620 acres of Accelerated Forest Recovery—Site Preparation [not clear if this still includes commercial logging and is planned in recent post-fire stand conditions]
- 38 acres of Aspen/Hardwood Enhancement [commercial conifer logging, apparently with no size limit]
- 1,103 acres [Northern Spotted owl] Dispersal Habitat Maintenance [commercial logging up to 21" dbh (see Draft Decision Notice, p. 7 specifying "small and medium trees" as "<21"dbh") and small tree thinning]; (PST) ["Persistent Shade Tolerant" forest type]; Min. 40% Canopy Cover Retained
- 297 acres of Dispersal Habitat Maintenance [commercial logging up to 21" dbh and small tree thinning] (PST); Min. 50% Canopy Cover Retained
- 85 acres of Dispersal Habitat Maintenance [commercial logging up to 21" dbh and small tree thinning] (RGF) ["Recent Grand fir" forest type]; Min. 50% Canopy Cover Retained
- 2,818 acres of Dispersal Habitat Maintenance [commercial logging up to 21"dbh and small tree thinning] (RGF/RDF) ["Recent Grand fir/Recent Douglas fir" forest type]
- 107 acres of Future Dispersal Habitat UMZ [Upper Management Zone] Treatment [commercial logging up to 21"dbh and small tree thinning] (PST) ["Persistent Shade Tolerant" forest type] Min. 40% Canopy Cover Retained
- 94 acres of Future Dispersal Habitat UMZ Treatment [commercial logging up to 21" dbh and small tree thinning] (RGF) ["Recent Grand fir" forest type] Min. 35% Canopy Cover Retained
- 314 acres of Green Ridge Trail [management unspecified in the Draft Decision Notice]
- 263 acres of Hand Thin
- 2,283 acres of Mixed Conifer Restoration [commercial logging with no size limit as logging would apparently include "large" (>21"dbh) , and "very large" trees (>30" dbh) as well as small tree thinning] (RGF) ["Recent Grand fir" forest type]
- 1,898 acres of Plantation Restoration [commercial logging with a 21" dbh limit (as "thinning small and medium trees" Draft Decision Notice, p. 4) and small tree thinning] (PP/RDF) ["Ponderosa pine/Recent Douglas fir" forest type]
- 3,893 acres of Plantation Restoration [commercial logging with a size limit of <21" dbh and small tree thinning] (RGF/PST) ["Recent Grand fir/Persistent Shade Tolerant" forest type]

- 1,088 acres of Plantation Restoration [commercial logging up to 21" dbh and small tree thinning] (PST) ["Persistent Shade Tolerant" forest type]; Min. 40% Canopy Cover Retained
- 15 acres of Plantation Restoration [commercial logging up to 21" dbh and small tree thinning] (PST) ["Persistent Shade Tolerant" forest type]; Min. 50% Canopy Cover Retained
- 3,122 acres of Ponderosa Pine Restoration [commercial logging, apparently with no size limit and small tree thinning] (PP/RDF) ["Ponderosa pine/Recent Douglas fir" forest type]
- 37 acres of Prairie Farm Restoration [management unspecified in the Draft Decision Notice]
- 1,349 acres of [Fire] Risk Reduction (Ladder fuel reduction) [not specified in the Draft Decision Notice if this is only small tree thinning or commercial size logging]
- The Green Ridge Landscape Restoration Project (aka "Green Ridge timber sale") would produce an estimated timber volume of 5.25 MMBF and include management activities over 19,437 acres.

All words in brackets were inserted by the objector group in an attempt to make it easier for a lay person to understand what kind of management is planned under euphemisms such as "Restoration" and what the acronyms mean. Please let us know if we misinterpreted any planned management above.

Location

The Green Ridge project area is located in T11S, R10E, sections 7-10, 15-17, 20-22, 27-30, 31-34; T12S, R10E, sections 1-21, 29-32; T13S, R09E, section 1, Willamette Meridian. The project area is about nine air miles north of Sisters, Oregon (Map 1). The primary access routes are Forest Roads 1100 and 1190. The project area is about 25,000 acres in size and composed entirely of National Forest System lands. (Environmental Assessment (EA), p. 2)

Appellant's Interests

Blue Mountains Biodiversity Project has a specific interest in this decision, which has been expressed through participation throughout the NEPA process. BMBP supporters visit much of the affected area for hiking; camping; relaxing; bird, wildlife, and wild flower viewing; photography; hunting; and more. The value of the activities engaged in by BMBP volunteers, supporters, and staff would be damaged by the implementation of this project.

BMBP is a non-profit organization that works to protect Eastern and Central Oregon National Forests. Staff, volunteers, and supporters of BMBP live in various communities surrounding the Deschutes National Forest and use and enjoy the Forest for camping; hiking; bird watching; hunting; fishing; general aesthetic enjoyment; gatherings; viewing wild flowers, large trees, and wildlife; gathering forest products; and other purposes.

Western Watersheds Project (WWP) is a non-profit organization based in Hailey, ID dedicated to protecting sensitive ecosystems and native wildlife across the American West. WWP has over 12,000 members and supporters, many of whom reside in the state of Oregon and frequent the Green Ridge project area. WWP advocates that the Forest Service use this opportunity to

rewild Green Ridge and focus any logging activity in tree plantation areas. We would also like to see road densities greatly reduced and no new temporary roads built outside of tree plantations. WWP refutes the industry supported narrative that logging precludes wildfire. Many actions proposed by the Forest Service would do great harm to the remaining wild character of Green Ridge and the sensitive species that call it home.

Marilyn Miller of Miller Conservation Consulting lives in Bend, Oregon. She has been working to protect birds and wildlife in Eastern Oregon for over two decades. Marilyn is a certified naturalist through the Siskiyou Field Institute, and a certified Master Woodland Manager through OSU. She has been engaged with the planning process for this and other projects in the Deschutes National Forest. She regularly participates in Forest Service meetings and field trips, collaborative meetings, and other public engagement processes on timber sales. Marilyn has been a supporter of Blue Mountains Biodiversity Project for over 20 years. She is an avid birder.

Request for meeting

Karen Coulter at BMBP has requested a meeting with the Forest Service to discuss issues in this objection and seek resolution of concerns through negotiation before the Deschutes Forest Service makes a final decision on the Green Ridge Project.

National Environmental Policy Act (NEPA)

We are concerned that the Green Ridge project has violated NEPA, due to issues such as failure to conduct an EIS analysis; inadequate direct, indirect, and cumulative impacts analyses; failure to take a hard look at environmental impacts; use of inappropriate scales of analyses and improper switching of scales of analyses; and failure to use a full range of best available science.

We are deeply concerned about the logging, road building, and prescribed fire in ecologically inappropriate situations proposed in the Green Ridge FEA. The Forest Service should drop all logging within mixed-conifer areas outside of even-aged, homogenous, and young plantations. This includes dropping all logging within Riparian Reserves; in moist mixed-conifer forests; in Late Successional Reserves; on steep slopes and sensitive soils; in and near meadow complexes; in Northern spotted owl habitat (such as dispersal habitat); in core or source habitat areas for American marten and Pileated woodpeckers; in important habitat for Northern Goshawk and Great grey owls; and in important hiding or thermal cover for deer and elk. Prescribed fire should not occur in areas such as very moist forests, source habitat for marten and Pileated woodpeckers, important habitat for species such as Northern goshawk and Northern spotted owls; areas with concentrations of legacy snags and downed wood; and other areas providing high-quality wildlife habitat that may be at risk of destruction or degradation with prescribed fire.

The Green Ridge project area provides unique and important habitat for species such as Northern spotted owls, Northern goshawks, Great grey owls, Flammulated owls, Black-backed

woodpeckers, Three-toed woodpeckers, Williamson's sapsucker, osprey, mountain lions, black bear, elk, deer, Sierra Nevada foxes, American martens, bats, gray wolves and numerous other species, including Survey and Manage species. Many of the species within the Green Ridge project area rely on the complex canopy structure, denser forests with more closed canopies, mature and old multi-story structure provided within these forests. Many areas in and nearby the project area have experienced fire in recent years as well as over the past several decades. The relatively intact mature and old mixed-conifer forests within the Green Ridge area are providing some of the best remaining habitat of this kind for species in the Metolius Basin and the Deschutes National Forest as a whole. The FEA did not adequately consider or disclose the loss and degradation of habitat due to proposed activities, particularly in the context of other projects and recent wildfires. In addition, the effects analyses failed to adequately consider issues such as the importance of climate and fire refugia, and ensuring adequate terrestrial and aquatic connectivity and core habitats as strategies to helps species survive and adapt to climate change.

We are particularly worried about the effect the green ridge project will have on wolves, their prey, their habitat, and their vulnerability to poaching and human conflict.

In addition to aquatics issues we focus on in this objection, we are deeply concerned about the likely negative impacts from logging and road-related activities on numerous native terrestrial species, including imperiled and special-status species. In particular, logging, burning, and road-related activities proposed in the Green Ridge project pose serious threats to species such as Northern spotted owls, Northern Goshawk, and wolves. The Green Ridge project area supports documented nesting Northern spotted owl pairs. We are very concerned that the nesting, roosting, foraging, and dispersing spotted owls and their habitat will be negatively harmed by 'fuels reduction' and other logging and proposed activities. We have similar concerns about Northern goshawk. Wolves have recently been confirmed within the Green Ridge area. Proposed logging and roading will affect their movements and prey availability, as well as make them vulnerable to conflicts with people and poaching. We raised these issues in both our DEA comments and other sections of our objection, but want to highlight our concern for them here.

Large trees, downed wood, and legacy snags are important components of these mature and older complex mixed-conifer forests. We are very concerned about the logging of large trees, and the associated loss of key habitat for wildlife. This includes inadvertent but widespread loss of snags, as well as large downed wood recruitment for logs and in streams. For example, legacy snags and snag habitats such as the 'stove pipe' snags (large hollow snags) that are the preferred habitat for Great grey owls, should be buffered. Clumps of snags and areas of important downed wood habitat should also be buffered. The Forest Service should not log or target for logging incense cedars. During BMBP's field surveys of the area, we found numerous old growth stands of incense cedars, and legacy large and old incense cedars with fire scars and wildlife use. The incense cedars within the project area seem to occur primarily as singular trees or in small clumps, though there were occasionally mature and old stands of cedars. The somewhat frequent occurrence of incense cedar, particularly mature and old cedar, is relatively unique and uncommon, and should be protected. Incense cedars should be buffered and protected, not logged.

We are also concerned about the lack of diameter limits for logging large trees; lack of estimate for the number of large trees that would be logged, felled as "hazards", or cut down in relation to roads or haul or transport corridors; the lack of a cap on the number of large trees proposed for logging; and the inadequate effects analyses related to these issues.

Riparian corridors provide particularly important habitat that is used at disproportionately high rates by many species of wildlife. The negative ecological impacts associated with logging in mature and old mixed-conifer forests, multi-story and complex habitat, and the logging of large trees are particularly concerning in relation to riparian forests and the streams they protect. Streams and riparian forests are impacted by what occurs in the uplands as well as within riparian corridors, and can be affected by actions in neighboring creeks and waterbodies. We are concerned about the effects to streams and riparian corridors from upland logging and roading, in addition to being very concerned about such activities within Riparian Reserves.

A full EIS should be conducted for the Green Ridge project, and include adequate analyses of direct, indirect, and cumulative effects because the proposed action would significantly affect the environment 40 C.F.R. § 1508.27. The Final EA has not provided adequate analyses of potential direct, indirect, and cumulative effects on aquatics-related issues such as altered hydrology; soil disturbance and compaction; negative effects to groundwater storage and flows; peak and base flows; stream temperatures; excess fine sediment in streams; and stream morphology. These inadequate analyses led to unsubstantiated conclusions within the FEA, such as the FEA's determinations that there would be no effects to Threatened or at-risk species including Bull trout.

The Green Ridge FEA failed to conduct adequate cumulative effects analyses for numerous species. For example, the FEA repeatedly made the claim that *"[b]ecause this project impacts a proportionately negligible amount of suitable habitat across the Forest, the overall direct, indirect and cumulative effects would result in a small positive trend of habitat and/or increase in disturbance. The gain of habitat and/or increase in disturbance would be insignificant at the scale of the Forest."* This statement was made as part of the effects analyses for species such as: MIS; Lewis' and White-headed woodpecker; bats (including Pallid bat, Townsend's big-eared bat, spotted bat, and fringed myotis); Great grey owl; Peregrine falcon; Accipiters (Northern goshawk, Cooper's hawk, Sharp-shinned hawk); Red-tailed hawks; Mule deer; American marten; Black-backed and Three-toed woodpeckers; and other woodpeckers and cavity nesters. However, the DEA failed to take into account the sum of affected habitat, and completely and inappropriately omitted all other projects at the forest scale. NEPA establishes that federal agencies must take such a comprehensive "hard look" by evaluating in a single EIS all actions that are "connected" or "similar"—meaning they have "common timing or geography"—or when they may have "cumulatively significant" impacts. See 40 C.F.R. § 1508.25(a)(2)-(3), § 1508.27(b)(7) & § 1508.7.

What is, for example, the sum total of suitable and occupied habitat affected by all projects across the Deschutes NF for the past 10 years for species such as American marten? In addition, the FS failed to examine the *quality* of available habitat and the potential cumulative effects to

the *quality* of the habitat. For example, how much high-quality and source habitat for marten is available in the project area, and how much of that habitat will be affected by proposed logging, burning, and roading activities? To what degree will it be degraded, and for how long? What is the total amount of high-quality and source habitat for marten that will be cumulatively impacted by this and other projects across the forest? Do martin have enough habitat with adequate downed wood to meet their needs? What percentage would still be appropriate for denning and source habitat? All of these questions should also be answered at scales relevant to the life histories of species—for example what percentage of Northern goshawk habitat would be affected by this project in combination with other projects and recent fires at the watershed scale? We have similar concerns for other terrestrial and avian species, including wolves, as well as for aquatic species such as Bull trout and Redband trout regarding the FS's inadequate cumulative impacts analyses and the agency's failure to appropriately choose scales of analyses, failure to include fundamental information about other projects in looking at cumulative effects, and failure to provide rationales for their choices and determinations.

The FEA notes that numerous wildfires have burned within the project area in recent years. BMBP field surveyed the Green Ridge project, and we noted in our surveys that many forests within proposed timber sale units had obvious signs of recent wildfire. Some areas have very open canopies; other areas have been left as fire refugia. Areas that have experienced wildfire should be dropped, as logging in post-fire forests is overwhelmingly ecologically damaging. The remaining areas that were relatively unaffected by wildfires are providing important habitat for species that rely on those more complex and dense forest canopies, and mature and old multi-story forests. Because so much of the project area and surrounding areas have experienced wildfire, how much of the area is unaffected by recent wildfires? Does the FS have maps, including GIS layers, for recent wildfires? If so, we request copies of those maps/GIS layers. How do past wildfires overlap with current timber sale units? Recent wildfires have created a heterogenous diversity of habitats on the landscape that should be protected and left alone.

The FEA also notes that *"[m]uch of the project area was selectively harvested during the first half of the 20th century when small mobile mills were present. Formal harvest activity under thinning (HTH), salvage (HSV), and overstory removal (HOR) prescriptions recorded in the Deschutes National Forest FACTS activity data base occurred between 1968 and 2005. These entries include the Six Creek Cull (1968); Green Ridge Salvage (1970); Spring Creek (1973); Big Rattler (1977); Six Creek HOR (1977); Meadow Creek (1980); Big Bench (1980); Six Creek HOR (1981); North Fuel Break HOR (1983); South Fork (1985); Whiskey Spring (1988); Street Creek (1989); Lookout (1990); Castle Rock HOR (1990); Big Bear (2003); Bear Garden (2002); and Eyerly Salvage (2005) sales. Some of the proposed treatment units have had previous mechanical entries from sales and, although most of the past activities do not overlap each other, there are some areas that have seen multiple entries."* Please provide BMBP with the GIS layers with the maps of these sales and the information discussed here.

The FEA goes on to note that "[t]he Eyerly and Bridge 99 fire scars in the northern portion of the project area are evidence of this, as fire severity data shows predominantly large blocks of moderate severity fire with areas of high severity effects." Since so much of the project area has either been burned or logged within the past 70-80 years, is it not time to let the remaining

forest recover, and to leave the remaining fire refugia and unfragmented habitat blocks unlogged in order to provide key wildlife habitat and ecological benefits?

In another example, the FEA notes (pg. 234) that the logging and prescribed fire would cause a reduction in the density of snags in the project area, though claims that these reductions would be short-term. The FEA also acknowledges that *"[t]his would degrade already-deficient habitat conditions (e.g., 2-9% of the ponderosa-pine Douglas fir wildlife habitat type in the analysis area and approximately 2-19% of the east-side mixed-conifer habitat type provide sufficient snags for about half the population of woodpeckers, regardless of species)".* The FEA claims that this loss of snags and the degradation of already deficient habitat, which would affect about half the population of woodpeckers, would only be short term because prescribed fire would create snags and because logging would accelerate the growth of larger trees (and eventual snag recruitment). This ignores peer-reviewed evidence that managed stands have fewer snags than unmanaged stands (Cline 1997) and that prescribed fire can cause lasting, long-term negative reductions in snags, logs, and dead wood habitats (Arkle and Pilliod, 2010; Pilliod et al. 2006) The FEA also does not provide a timeline for what is considered "short-term" in relation to snag recruitment or when this ostensible increase in snags would be seen. The combined effects of logging and prescribed fire can be severe for sapling recruitment. In addition, logging down to very low basal areas (such as 40%, as proposed in many areas within the sale), followed by prescribed burning, may end up with severely open canopies-- especially if burns run larger or hotter than intended. Apparently it is not uncommon for prescribed burns to go ~20% over target. Opening up forest canopies to this degree can cause forests to be substantially drier and hotter, and cause habitat loss for species that rely on multi-layered and dense canopies. Shrubs such as ceanothus may extensively colonize such open areas, making it difficult for forests to recover from logging. Also missing from the FS's cumulative effects analyses are the past and possibly ongoing/future effects from fire lines, backburns, and other fire suppression efforts.

Additionally, has the FS calculated the percentage of the project area, including the plantations, that will have undergone management that preferentially selects for Ponderosa pine, once the Green Ridge project has been implemented? If the FS has done this calculation, please let us know and share this information with the public.

The FEA uses unproven speculations about future increases in snag numbers to dismiss the much more certain and immediate negative impacts to already deficient dead wood in the effects analyses. Instead, the FEA repeatedly asserts for woodpeckers and other cavity nesting species that *"[b]ecause this project impacts a proportionately negligible amount of suitable habitat across the Forest, the overall direct, indirect and cumulative effects would result in a small negative trend of habitat and/or increase in disturbance. The loss of habitat and/or increase in disturbance would be insignificant at the scale of the Forest."*

The FEA (Pg. 234) also notes that *"[d]ozens of species of wildlife across all taxonomic classes (e.g., Aves, Reptilia) use down logs and woody debris for one or more parts of their life cycles*" including amphibians, frogs, tightcoil species, marten, black bears, and many others. The FEA also acknowledges that *"[t]he project area is deficit in logs and down wood (see Appendix C),*

which provides important nesting, roosting, and foraging microhabitat for species associated with logs and down wood." Again, managed forests are notoriously deficient in dead wood habitats, including downed logs (Science Findings 1999). Prescribed fire can cause significant and long-term reductions in downed wood and logs. Yet the FEA ignores such evidence and claims that species dependent on these downed logs and woody debris will benefit from proposed logging and associated activities. The FEA instead claims, yet again, that "*[b]ecause this project impacts a proportionately negligible amount of suitable habitat across the Forest, the overall direct, indirect and cumulative effects would result in a small negative trend of habitat and/or increase in disturbance. The loss of habitat and/or increase in disturbance would be insignificant at the scale of the Forest."*

Snags, logs, and dead wood are eventually recruited for large wood in creeks, and are of crucial importance for stream habitats and aquatic species. The loss of terrestrial dead wood habitat has, in turn, severe negative implications for aquatic ecosystems. The DEA fails to give adequate or genuine consideration to the well-documented negative effects of logging, prescribed burning, and roading to dead wood habitats, or the resulting long-term consequences to terrestrial and aquatic systems. (Richardson and Béraud 2014) In addition, riparian corridors are crucial for many of the terrestrial species and habitats discussed above, and provide important connectivity on the landscape. The FS also failed to consider natural mortality of large trees in combination with the loss of large trees due to logging, which would result in even lower basal areas and more impacted mature and old growth habitats. Potential negative effects as discussed above may have heightened consequences in riparian corridors due to their disproportionate importance for species and because they have been comparatively less managed than upland forests in recent decades.

The FEA (pg. 271) asserts that the only ongoing or future foreseeable activities in the Green Ridge Project hydrology analysis area: "[t]he only on-going or future foreseeable project that overlaps the Green Ridge hydrology analysis area is the Lower Fly Creek Project (Flymon Stewardship)." The FEA also acknowledges, for some cumulative impacts analyses, that ongoing and future impacts include the Green Ride Danger Tree project, the implementation of the Travel Management Rule, and invasive plant management. Does the FS plan to conduct repeat future entries into the Green Ridge project area once brush and small trees regrow? If so, what is the timeframe for the next entry and what would treatment rotations be? It is our understanding that 'treatments' are only effective up to approximately 15 years after logging. If repeated entries are planned, then the cumulative impacts of those repeated entries need to be analyzed and disclosed. If the Forest Service is not planning repeat entries, then the trade-offs regarding the negative ecological impacts associated with logging and roading for such a short-term supposed benefit should be disclosed within the analyses. In addition, (Rhodes, Baker 2008) examined the probability of a wildfire encountering a thinned stand within the narrow window of time for which the 'treatment' remains effective and found the probability to be extremely low.

The FEA, Fish BE Report, and Hydrology Specialist Report failed to take a hard look at potential impacts to key components of aquatic habitats and water quality parameters. The cumulative effects assessment is ignoring likely cumulative effects from a grossly high road

density (which will remain far higher than the FS's own guidelines after the project is completed); likely increases in fine sediment and stream temperatures; loss of large wood and large wood recruitment for streams; and other central issues. The FS has also neglected to adequately quantify potential effects, or to take a hard look at the quality of the habitats and parameters that may be affected. The FS has chosen to arbitrarily ignore a myriad of well-documented negative effects to aquatic habitats and water quality in order to myopically focus on speculative and controversial benefits that will ostensibly result from logging. Please also see our DEA comments and addendum materials on these issues.

Violations of Clean Water Act, Aquatics Conservation Strategy, and NEPA:

Watershed hydrology, water quality, and fine sediments:

The Green Ridge FEA proposes logging (including thinning) on approximately 1,354 acres within Riparian Reserves. This includes approximately 732 acres of logging of trees >8" dbh under the preferred alternative. Riparian Reserves, under the Northwest Forest Plan, are meant to *"maintain and restore riparian structures and functions of [perennial and] intermittent streams, confer benefits to riparian-dependent and associated species other than fish, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants, and provide for greater connectivity of the watershed."* They also provide essential connectivity corridors among the Late-Successional Reserves. Unfortunately, logging and roading proposed in the Green Ridge project is contrary to these and other directives under the NWFP and the ACS.

The Final EA's emphasis on extensive logging and roading, including logging large trees and in riparian reserves, to address forest health is not in line with the actual impacts, threats, and stressors to listed and at-risk riparian and aquatic species. High road densities, hydrologically connected roads, fish passage barriers, lack of downed wood and loss of large wood recruitment, and past and ongoing logging are the primary threats to water quality and imperiled aquatic species in the Green Ridge project area.

Studies have found selective logging may be associated with increases of instream fine sediments (Kreutzweiser et al. 2005, Miserendino and Masi 2010), changes in macroinvertebrate community structure or metrics (Flaspohler et al. 2002, Kreutzweiser et al. 2005), alterations in nutrient cycling and leaf litter decomposition rates (Lecerf and Richardson 2010), and increases in stream temperatures (Guenther et al. 2012; McCullough et al. 2009). Flaspohler et al. (2002) noted that changes to biota associated with selective logging were found decades after logging. Zhang et al (2009) found long-term impacts to macroinvertebrate communities and streambed substrates (Zhang et al. 2009). These impacts lasted for up to 40 years due to excess fine sediments associated with logging. Effects, such as changes to sediment loading and stream morphology, may not show up for many years after logging (Beechie 2001; Benda & Dunne 1997; Madej & Ozaki 1996). These studies suggest that alterations caused by

logging in both uplands and within riparian buffer zones may result in significant changes in water quality parameters and stream biota in many areas.

Excess fine sediment loading, particularly in combination with the alteration of flow regimes and hydrologic processes, may negatively impact stream channel stability, limit hyporheic exchange, and alter groundwater inputs, potentially degrading conditions for stream organisms by further increasing sediment loading, decreasing necessary physical habitat, and altering stream water volume which can affect temperature and dissolved oxygen, and limit resources (Croke and Hairsine 2006, Moore and Wondzell 2005, Nietch et al. 2005, USEPA 2006).

The Draft Forest Plan Revision for the Blue Mountains (2014) also includes discussion on some of the potential impacts from logging on aquatic ecosystems: *"[t]imber harvest can influence aquatic ecological condition via such activities as removal of trees in the riparian zone, removal of upslope trees, and associated understory or slash burning (Hicks et al. 1991). These activities can affect wood recruitment, stream temperatures, erosion potential, stream flow regime, and nutrient runoff, among others (Hicks et al. 1991). Effects of harvest are likely to be different at different scales. Hemstad and Newman (2006) found few effects of harvest at the site or reach scale, but found that harvest five to eight years earlier resulted in losses of habitat quality and species diversity at the scale of a stream segment (larger than a reach) or at the subwatershed level. Those losses were revealed in terms of increases in bank instability and fine sediment throughout the watershed and increased water temperatures and sediment problems throughout the channel segment. The cumulative effects of widespread harvest within a single drainage in a short period of time resulted in deterioration of the aquatic and riparian habitats, but evidence of effects lagged harvest by several years and different evidence of deterioration showed up at different spatial scales within the watershed".* (Also: Kreutzweiser & Capell 2001; Lewis et al. 2001; Pierce & Meyer 2008).

The road building and maintenance, in addition to proposed logging, also pose threats to water quality and stream ecosystems. As discussed in the roads section of our DEA comments and our objection to the FEA, road networks and proposed road-related actions within the Green Ridge sale are likely to alter watershed hydrology, increase peak flows, negatively impact groundwater stores and flows, and decrease base flows. Logging as proposed in the Green Ridge project is also very likely to negatively affect these aspects of water flow and hydrology. The alteration of watershed hydrology can have cascading effects on erosion, sediment regimes, stream morphology, pool and riffle habitats, and stream temperatures.

The Hydrology Specialist Report (pg. 22) acknowledges that *"[r]oads in the project area continue to be a source for increasing overland flow in the project area, particularly when roads are located in areas that store large quantities of water*". The Specialist report also discusses the importance of subterranean and groundwater flows in the project area. For example, the Specialist Report notes: *"[r]oads increase the volume of flow during large storm events through overland flow generated by the interception of precipitation on compacted road surfaces with low infiltration capacity. Roads can also intercept subsurface flow and convert it to rapid surface runoff, extending channel networks and increasing watershed efficiency (Wemple et al. 1996). Slope position of roads is a critical factor in the interaction between roads and streams. Ridge-top roads can influence watershed hydrology by channeling flow into*

small headwater swales, accelerating channel development. Mid-slope roads can intercept subsurface flow, extend channel networks, and accelerate erosion (Gucinski et al. 2001). Roads adjacent to and crossing streams, or hydrologically connected to streams have the greatest influence on streamflow, streamside shade, sedimentation, and channel morphology" (Hydrology Specialist Report pg. 22).

The FEAalso acknowledges that Six Creek, a perennial fish-bearing stream almost entirely within the project area, exceeds the 20% instream fine sediment standard. The FEA (pg. 277) notes: *"pebble count data from 2018 indicates amounts of fine sediments within Six Creek is high 54 % for particles <5.7mm."*

However, despite these acknowledgements by the Hydrologist Specialist Report, the Green Ridge analyses fail to recognize the well-documented resulting consequences of these issues on water quality and stream habitats. Issues such as decreased infiltration capacity, rapid surface runoff, and the artificial extension of channel networks can and often do result in problems including: increased erosion; increased fine sediments in streams; decreased groundwater storage and flow; warmer water entering streams; and altered stream morphology which can sometimes result in fewer pools, downcutting, and warmer stream temperatures (please see discussion throughout our DEA comments and our objection to the FEA).

Excess fine sediments generated by road-related erosion or logging-related soil compaction may be carried farther across the landscape because of decreases in water infiltration or runoff rates over damaged soils, which in turn can cause an increase in the distance of overland flow transporting the sediments. Thus, the sediments generated by management activity may be more likely to reach streams (Croke & Hairsine 2006; Wemple et al. 2001). In addition, improper road drainage can cause gullies, landslides, and other erosional features, which in turn lead to sediment generation, increased runoff, and more direct and rapid transport of runoff and sediment to streams (Reid et al. 2010). Furthermore, the distance of travel required for sediments to enter streams may be shortened by the artificial extension of stream networks by roads and culverts (Wemple et al. 1996). Increases in the efficiency of delivery of water and sediment to streams due to road networks and changes to soil infiltration and groundwater inputs can affect the timing, magnitude, duration, and frequency of sediment inputs." Roads increase peak flows by intercepting surface and subsurface flow, and diverting it into culverts and ditches that drain into streams (Wemple et al. 1996). Instream sediment dynamics such as timing and placement of fine sediment deposition, embeddedness, and scour are affected by stream power and flow regimes (Moore & Wondzell 2005; Wood & Armitage 1997; Wondzell et al. 2005).

Additionally, logging on thin soils, ash soils, and in rain-on-snow zones greatly increases the risk of soil damage, erosion, and excess fine sediments in streams. The Forest Service did not adequately consider risks associated with locations within rain-on-snow zones. For example, ashy soils typically hold more moisture than sandy or poor soils. As a result, they are often associated with mixed-conifer forests. Many of the mixed-conifer forests, including those on ashy soils, are targeted for logging as part of the Green Ridge project. These areas may be at risk of soil damage, compaction, and displacement, should this proposal be implemented. The Upper Touchet FEA (pg. 47) notes that the "*[e]ffects of ashy soil displacement and compaction*

by ground-based and cable activities on soil productivity is immediate and will persist on the landscape for up to 20 years or more (Giest, 1989)" (USFS 2020). The Upper Touchet FEA also states: "*Ashy soils have low bearing strength and are susceptible to increased soil displacement and compaction by logging activities. When non-mixed ashy soils are disturbed, erosion is greater due to fine particle size and lack of cohesiveness between ash particles*." The Green Ridge FEA fails to adqueatly analyze and avoid these important issues.

As logging is increasingly occurring within stream buffers across Eastern Oregon, the agency has, in practice, been shrinking the size of protective riparian buffers across the landscape. This is putting water quality and imperiled fish and aquatic species at risk. In addition, headwater streams and small intermittent streams do not have buffer widths that are sufficient to protect water quality and stream habitats. Wider buffers are needed in order to prevent excess fine sediments and nutrients from entering waterways (Freeman et al. 2007; Gomi et al. 2002; Nieber et al. 2011). Logging proposed in the DEA area would degrade water quality, stream habitats, and riparian forests. Many special-status, at-risk and imperiled aquatic species rely on clean, cold water to survive.

Stream temperatures

The most common water quality impairment in National Forest System lands is stream temperature. Elevated stream temperatures are known to negatively impact fish stocks on National Forest lands in Eastern Oregon, including anadromous fish, and listed and at-risk fish such as Bull trout. Water quality standards for temperature, sediment, and other water quality parameters are not being met on hundreds of miles of streams on National Forest lands. TMDLs and WQRPs have not been developed in a timely fashion for many 303(d) listed basins. BMPs have not been adequately re-evaluated or adjusted to assure compliance with water quality parameters such as temperature. WQRPs plans and TMDLs often do not adequately deal with forest management activities, and monitoring is not always followed through on and lacks public transparency.

Unfortunately in the Green Ridge project area, the FS lacks adequate baseline data for stream temperature and fine sediments in streams. Perennial stretches of Prairie and Fly Creeks, and any other perennial and some intermittent creeks, should be monitored for temperature. The FS simply has not prioritized collecting stream data, such as taking the simple step of deploying stream temperature monitoring probes. Stream temperature data for major drainages that become partly dry during the warmest summer months can be monitored before they go dry during the lowest base flows. It is possible and necessary to collect sediment-related and habitat data from such streams when they have flow.

The FEA (Pg. 242) states that *"[n]one of the streams in the Green Ridge Landscape Restoration project area are on the 2018 Oregon 303(d) list (ODEQ 2020b).* The Forest Service has not been particularly transparent with the public or with ODEQ with regard to their data. For example, BMBP submitted a FOIA to the Forest Service in 2018 for stream temperature, embeddedness, and turbidity data for streams in the Green Ridge project including: Prairie Farm, Meadow, Six, and Alder Spring Creeks, Bean Creek, the North & South Forks of Bean Creek, and the North, Middle, and South Forks of Street Creek. In the FOIA response from the

Deschutes National Forest, we were told that *"no records were located on the Deschutes National Forest due to the fact that most of the streams in the Green Ridge project are intermittent and non-fish bearing, there is limited data related to temperature, sediment, or habitat"*. Upon appeal of the FS's FOIA response, we finally received stream temperature data for Six Creek. The FS was clearly not interested in sharing their stream temperature data with the public, nor with being transparent with the public about the stream temperature data they have. We had similar experiences with stream temperature FOIA responses across other eastside Forests for numerous streams.

The FEA (pg. 247) notes that *"[t]he Upper Deschutes River Subbasin Total Maximum Daily Load and Water Quality Management Plans are in the planning stages and would cover all the subwatersheds in the Green Ridge Landscape Restoration Project boundary.*" It is concerning that the FS would proceed with such large-scale intensive logging and roading in the Green Ridge project before TMDL development.

The FS dismisses the possibility that proposed logging and roading may impact stream temperatures either within the project area or downstream in the Metolius River. However, upstream catchments, headwater streams, and intermittent streams have been shown to have effects on downstream temperatures (please see discussion in our DEA comments, throughout our objection, and in our addendum materials).

The Green Ridge FEA acknowledges that downstream reaches of the Metolius River are violating stream temperature standards. Despite this acknowledgement, the FS fails to adequately consider the importance of upstream and headwater reaches in supporting downstream temperatures. The Green Ridge FEA (pg. 242) notes: *[t]he Metolius River from the headwaters to the Metolius Arm, which is approximately 1.5 to 3.5 miles downstream of the project area (depending on which stream drainage), is listed for water temperature exceedences above the State standards for bull trout spawning and juvenile rearing (12°C) (ODEQ 2020b). In addition, the Metolius Arm of Lake Billy Chinook Reservoir, which is approximately 4 to 6.5 miles downstream of the project area (depending on which stream drainage), is listed for chlorophyll a and harmful algae blooms (ODEQ 2020b)."*

The Green Ridge project is located within Tier 1 and Key watersheds, which were selected specifically because they were recognized as important watersheds for helping to protect Bull trout. The Hydrology Report notes that "Tier 1 Key watersheds under the NWFP contribute directly to the conservation of the threatened bull trout, anadromous fish populations, and resident fish populations" (Pg. 3). By definition, actions within a Tier 1 Key watershed can and do affect Bull trout habitat. Clearly, the NWFP recognized that the conditions and actions within this watershed affect downstream water quality and stream habitats in the Metolius River. The Green Ridge FEA should recognize this as well.

Logging in uplands and Riparian Reserves is likely to result in increased stream temperatures. High stream temperatures are already impacting at-risk and special status aquatic species in nearby areas. Stream temperature increases are especially dangerous to ESA-listed Threatened Bull trout, especially in streams which provide important cold-water inputs to downstream Bull trout habitat. In the case of the Metolius River, this is especially crucial given that the Metolius

River has stream temperatures that exceed state standards. Cold water inputs are crucial for keeping downstream temperatures as cool as possible, and eventually recovering those waters to within standards for Bull trout and other sensitive aquatic species. Even localized increases at the subwatershed or reach scale can jeopardize sensitive and listed fish—especially if the problem is repeated in multiple stream reaches across the landscape.

Increased logging of large trees in upland and riparian forests as proposed in the Green Ridge sale is likely to cause additional increases in stream temperatures across the landscape. High stream temperatures are already a limiting factor for at-risk and special status aquatic species in many areas, and occur in the Metolius River. Threatened fish stocks are struggling due to high stream temperatures and increased fine sediments. Stream temperature increases, especially in areas that are already in violation of state and Forest Plan stream temperature standards, are especially dangerous to ESA-listed Threatened Bull trout and steelhead populations. Even localized increases at the subwatershed or reach scale can jeopardize already ESA-listed fish—especially if the problem is repeated in multiple stream reaches across the landscape.

At-risk aquatic species such as Bull trout and Redband trout are already suffering from small and fragmented populations. Creating additional negative impacts across the landscape as a result of increased logging is extremely risky at best. Small and isolated populations make for fragile populations (that are subject to declines due to localized events, genetic drift, and other factors). Reiman et al. (2001) noted that: "*...vulnerable aquatic species could be impacted in the short term in ways from which they could not easily recover...*" even in cases where the management actions resulted in long-term benefits in later years. The negative effects on water quality parameters such as stream temperature from ongoing logging throughout the region are already putting Bull trout and Redband trout at risk. The increased stream temperatures that would result from the increased logging of large trees in this project would exacerbate the already widespread and dire situation for water quality and imperiled aquatic species across eastside Forests.

Logging in upland areas, especially logging of large trees, will increase surface runoff and overland flow, which delivers warmer water (and excess sediments) into streams quickly and can affect peak flows and increase stream temperatures. In addition, increased surface runoff and faster delivery of water into streams also means that less water becomes groundwater. This decreases groundwater storage, groundwater flows, and hyporheic flows (Coutant 1999; Croke & Hairsine 2006; Jones & Grant 2006). Logging, including upland logging, can cause decreases in summer baseflows in the long-term. Decreased canopy cover due to logging can cause more snow to accumulate in these more open areas, which alters the timing and magnitude of runoff from snow melt. This can also cause changes to peak flows (Harr & Coffin 1992). Should this proposal to increase logging of large trees be implemented, it would create more open canopies across the landscape, which will then increase solar radiation inputs in watersheds, and as a result may increase the amount of early snow melt. This, in turn, may further alter peak flows and groundwater recharge and the hyporheic cold water delivery downstream, including to perennial streams (Caissie 2006). Logging alters microclimates, creating hotter, drier, and windier conditions that stretch beyond forests directly affected and into adjacent forests, sometimes for distances of hundreds of feet. Such microclimate edge

effects could extend into the entirety of riparian buffers, especially in smaller headwater streams (Chen et al. 1995; Brosofske et al. 1997; Chen et al. 1992).

Protecting groundwater storage, groundwater flows, and hyporheic flows associated with intermittent streams is crucial for protecting temperatures in larger downstream perennial streams. Cold water inputs from intermittent streams to downstream reaches are essential providing cold water refugia for special-status and imperiled aquatic organisms, including ESA- listed fish (Caissie 2006; Ebersole et al. 2015; Grant & Swanson 1990; Groom et al. 2011 (a); Groom et al. 2011 (b); Jones & Grant 1996; Pollock et al. 2009). Patches of cold water refugia are crucial for fish. Shallow groundwater patterns can be important for influencing stream temperatures (Poole et al. 2008), and so are likely vulnerable to upslope logging (Caissie 2006). In research in eastern Oregon, Ebersole 2015 found that dry streams supplied cold water to downstream reaches at confluence sites. Such cold water refugia habitats are important for fish, which were observed at these locations. In the Green Ridge area, this is particularly relevant to the many intermittent streams and draws present throughout the project.

Headwater streams and non-fish bearing streams are particularly at risk and need more, not less, protection. In order to protect downstream fish bearing reaches, headwater streams need at least as much protection as larger downstream reaches (Rhodes et al. 1994; Erman et al. 1996; Espinosa et al. 1997). Negative impacts to upstream reaches, such as higher temperatures, increased sediment loading, down-cutting, and altered hydrographs also negatively affect downstream reaches.

Logging within Riparian Reserves or forest wetlands can magnify water quality and hydrology impacts from upland logging (Hicks et al. 1991; Moore & Wondzell 2005). Janisch et al. (2011 and 2012) and Buttle et al. (2009) found that wetlands associated with headwater and low order streams are more common and influential on stream hydrology and water quality than previously realized. Many of the wetlands associated with first order streams are small and fall below the size requirements for protection in relation to timber sales (Janisch et al. 2011; Janisch et al. 2012; Buttle et al. 2009). (Janisch et al. 2012) found streams in headwater catchments with wetlands had larger and more consistent increases in temperature in relation to adjacent logging than did the catchments that did not contain wetlands (Janisch et al. 2012). The authors found that streams with wetlands present in their catchments tended to have streams with finer sediments in their substrates.

The Hydrology Specialist Report states that there are *"…numerous small wet meadows or riparian areas often associated with stream drainages in the project area*" and notes that *"there are two larger ones located in the hydrologic landscape areas: 1) near the northeastern project boundary at the headwaters of a tributary to Alder Springs Creek, and 2) the headwaters of Prairie Farm Creek. The one by Alder Springs Creek is within the "variable source area adjacent to stream drainages" and supports abundant riparian vegetation. Prairie Farm Meadow is a large meadow that is fed by two headwater streams of Prairie Farm Creek. The inundated area is an important breeding area for amphibians and is part of a long-term study by the US Forest Service Pacific Northwest Research Station."* These sensitive areas should be dropped from logging in order to protect water storage, groundwater flows, downstream temperatures, and meadow and stream habitats. Important breeding habitat for amphibians

should not be logged and should have large buffers, in particular in long-term study areas. Meadow systems near ridgetops that are important for elk and deer should have no thinning or only hand-thinning of very small diameter trees. Due to poacher activity in these high meadows, additional access to these areas should not be created-- i.e., the FS should not build or reopen roads. Roads should be decommissioned rather than closed, and road decommissioning should be expanded in these areas.

The FEA states that *"[i]ncreases in stream temperature or changes to riparian vegetation are not expected as a result of the Green Ridge Landscape Restoration Project as no cut buffers would be used to protect waterbodies".* However, we note that logging is taking place within Riparian Reserves, and that these "no cut" buffers are a small fraction of the width needed to protect stream habitats and water quality. Logging, thinning, burning, and road-related activities will be taking place adjacent to streams—as near as 30' in some cases, and often within 100'. Also, "temporary" road construction will occur across intermittent headwater channels in numerous cases.

We also note that Guenther et al. (2012) also found increases in stream temperature in relation to selective logging. The Guenther study found increases in bed temperatures and in stream daily maximum temperatures in relation to 50% removal of basal area in both upland and riparian areas. Increases in daily maximum temperatures varied within the harvest area from 1.6 to 3 degrees Celsius. Pollock et al. 2009 found that stream temperature was more closely associated with degree of logging within catchments than with streamside vegetation (Pollock et al. 2012). Yet, the FS consistently ignores these and other peer-reviewed findings in order to downplay negative effects on streams and water quality that are associated with logging.

Even in situations where logging within Riparian Reserves is limited to thinning of smaller diameter trees, logging may compromise the ability of the riparian buffer to protect streams or ameliorate the negative impacts from upland logging, including increased stream temperatures and the delivery of sediment and nutrients into waterways. Logging of large trees, particularly within Riparian Reserves will substantially worsen these ecologically damaging dynamics. Small streams are particularly vulnerable to temperature, even with limited selective logging. There is evidence to suggest that wider buffer widths may be necessary to protect stream temperatures, particularly in intermittent and headwater streams, and particularly when logging within 100' of streams. Parameters that influence stream temperatures include, stream shade, overland flow, groundwater and hyporheic flows, and groundwater storage. Alteration of these parameters can increase stream temperatures, especially in small streams. Logging alters these parameters, and degrades the ability of these parameters to support cold water, and is likely to increase stream temperatures. (Caissie 2006; Davies & Nelson 1994; DeWalle 2010; Kiffney et al. 2003; Groom et al. 2011 (a); Groom et al. 2011 (b); Jones et al. 2006; Sweeney & Newbold 2014; Pollock et al. 2009; Wigington et al. 2006; Poole et al., 2008; Ebersole et al. 2015; Poole & Berman 2001; Newcombe & Jensen 1996).

Should this project be implemented, logging is likely to shift current baseline conditions in stream temperatures, including diurnal temperature patterns (as well as loss of shade, increase in stream temperature and sediment, loss of biomass, loss of wildlife habitat). Road-related activities associated with logging, and logging on steep slopes above creeks will negatively

affect stream temperatures and stream temperature variability, and will pose large risks to the continued viability of Bull trout and other listed and imperiled aquatic species.

The FEA (pg. 254) acknowledges that climate change could affect streams: "*[t]he vulnerability assessment shows that the effects of climate change on hydrology in south-central Oregon will be highly significant. Decreased snowpack and earlier snowmelt will shift the timing and magnitude of streamflow; peak flows will be higher, and summer low flows will be lower.*" However, the FEA did not include a hard look at the negative effects from climate change combined with logging when considering cumulative impacts to parameters such as watershed hydrology, stream flows, sediment, or stream temperatures.

The FEA insists that the proposed action alternative within the Green Ridge sale will not impact water temperatures. The agency ignores peer reviewed studies providing evidence and documentation showing that a variety of logging and road related activities are associated with negative impacts to stream temperatures—such activities are not limited to the removal of primary shade producing trees within a narrow strip within the Riparian Reserve, as discussed throughout this document, our DEA comments, and our addendum materials. Despite evidence to the contrary, the FEA (pg. *266) notes that "[t]Action Alternatives would not adversely affect water temperature because minimal activities would occur within the primary shade zone of perennial streams; however, beneficial effects of thinning, designed to meet Aquatic Conservation Strategy Objectives, would occur. For the same reasons, there would be no effect to the 303(d) listing status of streams within the project area."* The FEA goes on to note that *"the primary shade zone would be approximately 50 feet on the south side of the stream and less than this on the north side."* And To erroneously state that *"[o]nly activities within the shade producing area of perennial streams, have the potential to affect shade and associated stream temperature. Intermittent streams in the project area do not contribute to high temperatures because they are dry during the hottest period of the year. No felling of primary shade producing trees would occur within 150 feet of perennial streams in the Action Alternatives. The only exception is within hardwood restoration areas. There is approximately 0.3 miles of Six Creek (all Action Alternatives) and approximately a 0.2 miles of Prairie Farm Creek (Alt. 2 & 3) where conifers within 10 feet of the stream could be harvested to release hardwoods and help restore the stand. The streamside extent of the hardwood restoration units and the minimal amount of conifers treated within them would have a negligible effect on stream shade."* The FEA has cherry-picked the science and failed to take a hard look environmental impacts to stream temperatures.

Large wood in streams

We are very concerned that the increased logging of large trees in uplands and Riparian Reserves would negatively impact the availability of large wood and future large wood recruitment for LWD in streams. Large wood recruitment and delivery to streams is a crucial cornerstone of ecological integrity for streams, essential for the viability of many native and imperiled aquatic species, and a driving force of recovery for stream morphology. Hyporheic flows and groundwater storage and movement depend in part on large wood and future large wood recruitment, and are important for maintaining cold water in perennial streams.

Groundwater movement and storage is interconnected with a number of complex watershed processes and forest components.

The FEA (pg. 270) notes that "*[i]nstream large wood recruitment (LWD) could potentially be reduced under the Action Alternatives because between 523 and 764 acres of trees greater than 8" dbh could be treated within 100 ft of a stream. The primary wood recruitment areas in the Green Ridge project area was estimated to be approximately 100 ft on each side of intermittent and perennial streams. Although some trees within 31% to 45% of the LWD recruitment area could be removed, treatments would only thin trees and many of the trees would not be classified as instream LWD because they might not meet size requirement, or they might not fall towards the stream. In addition, existing snags would be retained. Therefore, treatments appear to leave enough trees to provide adequate future LWD recruitment.*"

Large wood recruitment should not be reduced for any streams. "*Treatments appear to leave enough trees to provide adequate future LWD recruitment*" is an entirely inadequate assessment of potential effects to instream large wood. Logging within Riparian Reserves should be dropped. Logging of trees over 8" in diameter within Riparian Reserves is especially egregious and concerning, especially within the LWD recruitment zone and within 100' of streams. Trees not meeting size requirements for LWD now, or because "*they might not fall towards the stream*" are not sufficient reasons to reduce large wood and large wood recruitment for streams. In addition, even though snags are not targeted for felling, many snags are lost due to "hazard" tree designation, road and haul corridors, heavy equipment use during logging implementation, etc.

Logging of large trees would also have negative effects on streams and water quality. Aquatic ecosystems include complex and interdependent interactions. The loss of large woody debris in streams negatively affects stream morphology, including pools. The reduction of LWD and smaller wood for streams, as well as future recruitment for these components, has already occurred through repeated past logging. Logging of large trees will greatly exacerbate this issue, negatively affect aquatic ecosystems, and potentially violate the ACS.

It is important to highlight that small intermittent streams, as well as perennial streams, would also be negatively affected by the loss of large wood, and that those effects are felt downstream. Loss of large wood in small intermittent streams will negatively impact recruitment of large wood in downstream reaches. This, in turn, will negatively impact instream habitats and water quality for aquatic species including imperiled salmon and trout. Loss of large wood in intermittent streams in small catchments will result in less large wood in perennial streams, and thus result in fewer large pools and habitat complexity. Large wood is very important for protecting underground water storage and movement of small intermittent streams. Small streams are crucial to maintaining cold water for downstream perennial waterways, and to creating and ensuring cold water refugia for fish (Benda et al. 2005; Caissie 2006; Kaufmann & Faustin 2011).

The August 2017 "Science Findings" from the PNW Research Station discussed the importance of snags and wildfire, and found that many more snags are needed than current regulations or standards provide for. Riparian forests are disproportionately used by wildlife and birds, and so

these findings are particularly relevant to Riparian Reserves. The Science Findings note: *"Currently, the best solution we can recommend is to provide large numbers of snags for the birds, which can be difficult without fire," According to the researchers' calculations, if one of every 20 snags (approximately 4 percent) has suitable wood, and there are five to seven species of woodpeckers nesting in a given patch, approximately 100 snags may be needed each year for nesting sites alone. This does not account for other nuances, like the fact that most species are territorial and will not tolerate close neighbors while nesting, or the fact that species like the black-backed woodpecker need more foraging options. Overall, more snags are needed than other studies have previously recommended. Based on their results, Lorenz and her colleagues see the critical role that mixed-severity fires play in providing enough snags for cavity-dependent species. Low-severity prescribed fires often do not kill trees and create snags for the birds. "I think humans find low-severity fires a more palatable idea. Unfortunately or fortunately, these birds are all attracted to high-severity burns," Lorenz says. "The devastating fires that we sometimes have in the West almost always attract these species of birds in relatively large numbers."*

Roads:

We remain concerned about road-related issues in the Green Ridge project FEA. We raised numerous road related issues in our DEA comments, and all of which remain relevant to our objection to the Green Ridge FEA.

We remain concerned about the threat to Bull trout from road-related activities and overly high road densities, particularly within a Tier 1 Key Watershed which should be managed to prioritize Bull trout recovery. As noted in our DEA comments, despite their Tier 1 and Key Watershed designations, the open road densities within the watersheds in the project area are extremely high, and will remain so even if the road closures and decommissioning proposed under the Green Ridge project take place. The proposed changes include the open road density being reduced from 5.0 mi/sq mi to 3.9 mi/sq mi. The suggested outcome of 3.9 mi/sq mi still far exceeds the target open road density of 2.5 mi/sq mi recommended by the Metolius WA (Hydrology Specialist Report Pg. 7), and far exceeds safe levels or thresholds for Bull trout and other sensitive aquatic organisms (Al-Chockhachy et al. 2010; Carnefix and Frissell 2009; NOAA 2009; NOAA 2011; USFWS 2010).

The Green Ridge FEA continues to omit closed roads from the road density calculations, despite clear evidence that closed roads can and do have long-term, negative effects on landscapes and despite ongoing effects from the road network within the project area, such as increased overland flows (Hydrology Specialist Report Pg. 22). Closed roads should have been included in the FEA road density calculations, including in the 'Watershed Condition Framework' analyses and the Road Density Risk Rating. "Temporary" roads, road beds or prisms still on the landscape, and user-created roads should also have been included in road density and related analyses.

We are very concerned that the omission of true road densities resulted in the agency underestimating risks to the watersheds within the Green Ridge project area. In addition, Upper Fly Creek and Lower Fly Creek Watersheds scored as 'High' and 'Moderate' risk ratings (Hydrology Specialist Report pg. 24), even when only taking into consideration open road densities. Despite having 'moderate' and 'high' risk ratings, these watersheds nevertheless include the majority of proposed logging—together these watersheds contain approximately 13,115 acres of proposed silvicultural 'treatments', or approximately 67% of treatment acreages (Hydrology Specialist Report Pgs. 11-12). Lower Fly Creek, which is listed as 'Impaired' for both proximity to water and open road risk ratings, and is considered 'Functioning at Risk' has the highest number of proposed acreages for logging at 7,209 acres. In addition to the agency's underestimation of risk, we are also very concerned that the cumulative effects of widespread logging in these high and moderate risk areas, in combination with road-related existing risks and proposed road-related activities, will have severe negative impacts to watershed hydrology, water quality, and stream habitats.

We are supportive of efforts to address the ubiquitously high road densities across the Deschutes NF and other National Forests. Out-of-control, bloated roads networks on National Forests, including the Deschutes NF and in the project area, are one of—if not *the*-- primary threats to water quality and imperiled fish. Unfortunately, even though the Forest Service has had decades to address the excessively high road densities in this area, the agency simply has not prioritized road density reductions within these designated Key and Tier 1 watersheds-- despite clear directive from the ACS, Watershed Analyses, and the Forest Plan to do just that. For example, the Metolius Watershed Analysis (WA), published in 1996, provided the following guidance: *"[c]lose roads to reduce and maintain open road densities at 2.5 miles of road per square mile or lower" (*Hydrology Specialist Report Pg. 7). Though the Metolius WA was published 25 years ago, the Key and Tier 1 watersheds within the project area currently contain approximately double the road density suggested in the WA, and would remain well in excess of the WA recommendation even if the closures and decommissioning proposals in the Green Ridge project are implemented.

The Deschutes National Forest LRMP, which has been in place for 31 years, includes the RP-17 standard: *"Roads and trails will be at the lowest density which meets long-term resource needs. Where existing roads or trails are inhibiting the achievement of fisheries or water quality objectives, measures shall be taken to eliminate the problem*" (Hydrology Specialist Report Pg. 2; emphasis added). An open road density of 5 mi/sq mi—or even 3.9 mi/sq mi, as is proposed in Alt. 3 (FEA pg. 326)-- is clearly well beyond "the lowest density which meets long-term resource needs, particularly for Tier 1 and Key watersheds. In addition, road networks in the project area are currently having negative effects on watershed hydrology, and so are not meeting this Forest Plan standard. For example, the Hydrology Specialist Report acknowledges that: *"[r]oads in the project area continue to be a source for increasing overland flow in the project area, particularly when roads are located in areas that store large quantities of water*" (Hydrology Specialist Report pg. 22). The area does not meet Forest Plan standards, nor would it meet them after implementation of the Green Ridge project. The Hydrology Specialist Report goes on to note well-documented effects of roads, particularly in relation to increase overland

flows: "*Roads increase the volume of flow during large storm events through overland flow generated by the interception of precipitation on compacted road surfaces with low infiltration capacity. Roads can also intercept subsurface flow and convert it to rapid surface runoff, extending channel networks and increasing watershed efficiency (Wemple et al. 1996). Slope position of roads is a critical factor in the interaction between roads and streams. Ridge-top roads can influence watershed hydrology by channeling flow into small headwater swales, accelerating channel development. Mid-slope roads can intercept subsurface flow, extend channel networks, and accelerate erosion (Gucinski et al. 2001). Roads adjacent to and crossing streams, or hydrologically connected to streams have the greatest influence on streamflow, streamside shade, sedimentation, and channel morphology".* Roads within the project area, and the increased overland flows due to the current road network, are very likely causing effects to other water quality and stream habitat parameters such as peak flows, subsurface water flow and storage, fine sediments, and channel morphology. Given that road density will remain well beyond recommended limits after the project is completed, roads will almost certainly continue to have negative effects after the project, in addition to the negative effects associated with project activities.

The FEA map 10 depicting road related activities for Alt. 3 appears to show "temporary" roads proposed within areas of highwater storage, including adjacent to Prairie Farm Creek and Alder Spring Creek, and North Fork Bean Creek. These areas were identified in the Hydrology Specialist Report as areas important for groundwater flow, and able to store large quantities of water. Areas that store large quantities of water were also identified as potential sources for the ongoing increased overland flows due to roads. Proposals for "temporary roads" or reopening closed roads in these areas should be dropped in order to avoid further contributing to the road-related impacts in these areas. Similarly, logging is likely to exacerbate the existing road-related negative effects on streams and aquatic resources. We are also extremely concerned about the many road crossings proposed across stream channels and draws, such as the extensive crossings proposed to cross the headwaters of the North, Middle, and South Forks of Street Creek, including those located mid-slope on steep slopes.

In addition, the ACS Objective 6 states: *"Maintain and restore in-stream flows sufficient to create and restore riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration and spatial distribution of peak, high, and low flows must be protected"* (Hydrology Specialist Report Pg. 19). The DEA's acknowledgement that roads in the project area are increasing overland flows, in addition to the mountain of evidence documenting negative effects from high road densities to peak flows, sediments, and other watershed hydrology and water quality parameters (Hydrology Specialist Report Pg. 22) and the extremely high open road densities within the project area (including after Green Ridge project implementation), suggest that ACS objectives are not being met.

Despite having had decades to comply with Forest Plan standards, Watershed Analysis guidance, and ACS objectives, the Forest Service does not appear to have a plan to decrease road densities to levels suggested in their own Plans and regulations, or to meet thresholds that are safe for water quality, imperiled fish, or sensitive aquatic organisms. While we are supportive of the road closures and decommissioning proposed in the Green Ridge project, we

are very concerned that the agency has continued, for decades, to de-prioritize addressing the bloated road network in this and other areas, particularly given that roads are one of the primary drivers of water quality impairment (if not *the* primary driver).

It remains unclear in discussion in the FEA if funding has already been secured for road closures, decommissioning, and "temporary" road rehabilitation work proposed as part of the Green Ridge project. For example, the FEA states, under 'Closing and Decommissioning Forest System Roads' under Alternatives 2 and 3: *"If a road prism has naturally grown in with vegetation (trees, brush, native grasses) a determination will be made between closing/decommissioning the road by mechanical means or leaving the road in its current state. The timeline of proposed treatments will depend on funding opportunities in the future"* (FEA pg. 325). If funding is not secured, or if the timeline for these activities is uncertain due to possible delays in funding, then these road closures and decommissioning should not be treated as a certainty in the effects analyses, as is currently the case. In addition, the effects analyses do not take into account possible ongoing, long-term effects to the project area and aquatic resources due to roads and road-related activities in the Green Ridge project.

Approximately 10.8 miles of "temporary" roads are proposed under the preferred alternative (FEA pg. 326). In addition, the FEA notes (Pg. 327) that *"[a]t a possible minimum, 69 miles of system roads would require maintenance during the lifetime of the entire project."* This equates to 79.8 miles of road-related impacts. While we support the 25.5 miles of road decommissioning proposed in Alt. 3, the FEA's proposed miles of road construction, road re-opening, and road re-construction create a much greater impact on the environment than the FS is including in their effects analyses. The FS is being disingenuous in obfuscating and downplaying these impacts. In addition, it is not even clear when or if funding will become available for road rehabilitation after the project is complete.

Particularly given the high road density across the project area, proposed "temporary" roads should be dropped, and all alternatives should include the maximum miles of road decommissioning and closures possible. In order to meet ACS objectives, such as directives for "*minimizing road and landing locations in Riparian Reserves*" and "*minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow*", then all "temporary" roads with stream crossings, riparian reserves, those proposed within high water storage areas, and those on steep slopes above creeks and drainages should be dropped. At a minimum, they should be drastically scaled back.

Road construction (including "temporary" road construction) and road maintenance activities are well-documented to be likely to generate excess fine sediments that may reach creeks, and so pose risks to water quality (Cederholm et al. 1980; Tague and Band 2001). The negative impacts of road-related activities proposed under the Green Ridge project are inappropriately downplayed and ignored by the FEA. We are very concerned about the large scale and intensity of these road-related impacts to the landscape. We are also concerned about risks to specific streams, springs, water storage areas, and watershed hydrology and dynamics. For example, the Green Ridge FEA proposes to build "temporary" roads that cross perennial and intermittent streams; headwater streams and draws; and steep areas above streams, draws, and headwaters.

Some examples include "temporary" roads that cross Alder Spring Creek; Middle Fork Street Creek; the intermittent headwaters of North Fork Street Creek; and the intermittent headwaters immediately upstream of South Fork Bean Creek; and numerous unnamed channels. Proposed "temporary" roads also run up to and along the riparian corridor adjacent to North Fork Spring Creek at two locations, In addition, road construction would include extensive changes to slopes and hydrology in some instances.

The road-related construction, rebuilding, and maintenance activities proposed in the Green Ridge project pose a direct threat to the water quality and stream habitats of these creeks. It is also important to note that stream channels which are dry for part of the year, including those that may not be running when roads are built across or along their channels, are still very much at risk of altered hydrology and increased fine sediments once they are transporting and holding water during wetter months (Gomi 2005). In addition, groundwater dynamics can be negatively affected by road-related activities and logging. How many stream crossings, including on intermittent or ephemeral streams would be created by "temporary" road construction? How many "temporary" road segments would be hydrologically connected to streams?

"Temporary" roads are not temporary. Decommissioned roads (including "temporary" roads) contain disturbed soils and are present on the landscape for decades-- and are reused and reopened by the agency with the claim that building new roads would not increase disturbance on these old road beds. Unfortunately, the reality is that the compaction, disturbance, displacement, erosion, disruption to hydrology, and other similar effects associated with roads (including "temporary" roads) are present for years if not decades to come (Trombulak 2000). The Green Ridge FEA, for example, differentiates between road beds created in the past (including decommissioned roads) vs. 'previously undisturbed' ground. The FEA (pg. 317) asserts that building roads on old road beds would not increase the total acreage of detrimentally disturbed soils, but that roads created on undisturbed ground would increase soil disturbance: *"Creation on old road beds or newly created skid trails would not increase the total acreage of detrimentally disturbed soil within an activity area. However, temporary roads created on currently undisturbed ground within some activity areas would temporarily increase soil disturbance levels until they were rehabilitated."* The admission that these previous road beds, which are not included in open road density calculations, contain such disturbed soils that apparently new roads building on them would not increase the amount of disturbance, is in direct contradiction to Forest Service assertions that the effects of these roads are "temporary" and "short-term".

The FEA (Pg. 317) also notes that *"[p]roposed temporary roads would be located on decommissioned roads (Units 65, 70, 102, 116, 117, 164, 168, 173, 186, 229, and 248); existing road surfaces created during previous entries and never incorporated into the open road system (Units 40, 67, 85, 101, 226, 248, 324, 343, 344, 379, 426, 434, 448, 449, and 454); on administratively closed Level 1 roads (Unit 398); or on previously undisturbed ground (Units 6, 343, 429, and 433).* It should be recognized that once a road is created, the negative effects of the road are long-term. The FS continues to use the existence of these old road beds (including decommissioned roads) and their ongoing disturbance on the landscape as a rationale to claim that there will be little to no 'new' disturbance if they rebuild/reconstruct roads on top

of them. The Forest Service can't have it both ways— if temporary roads are actually temporary, then there wouldn't be a ubiquitous and extensive network of already existing road beds that the FS repeatedly uses to claim that they won't be disturbing new soils. How can the FS, with each new project, to acknowledge that there is an extensive network of road prisms, unrehabilitated roads, and roads which were created for projects but never incorporated into the official road system—but then turn around and pretend that all new road construction and reopening will be rehabilitated to pre-project conditions (with currently unknown funding?)? Such disingenuousness undermines the public's trust in the agency.

Another issue with constructing "temporary" roads, conducting extensive road maintenance, and creating skid trails, cable corridors, and haul routes is the potentially massive amount of felling and logging of large trees as "danger" trees, and for construction of these road and haul related corridors. The Green Ridge DEA notes (Pg. 28*): "Roads may require pre-haul maintenance including roadside brushing, spot surfacing, restoring drainage, blading and shaping roadways, felling danger trees, and cleaning lead-outs."* The DEA also notes (Pg. 80) that ongoing logging of "danger" trees will take place as part of the Green Ridge Tree Abatement project, and states that there will be *"[c]utting and removal of the danger trees along roadside corridors from the Green Ridge Danger Tree Abatement."* Will "hazard" tree felling along roads that are not major routes, closed or overgrown roads, or temporary roads?

BMBP's recent post-logging field surveys in the Malheur NF suggest that the felling of large and old trees in relation to hazard trees and clearing road beds, skid trails, haul corridors, etc. can be very extensive. For example, dozens of large mature and old Ponderosa pines were felled in the Big Mosquito and Camp Lick sales, including many that were sold at the mill. Please see photos included in our addendum materials, as well as photos and discussion in our DEA comments. Please see photos included in our addendum materials, as well as photos and discussion in our DEA comments.

NEPA analyses for the Green Ridge sale, and for all timber sales on the Eastside, should include an estimate and cap of how many large trees and legacy snags may be felled, and the effect of losing those trees for wildlife, water quality, and stream habitats. We request that the Forest Service commit to buffering large and old trees and legacy snags so that they do not have to be felled as 'hazard' trees or for skid, haul, and road routes within the Green Ridge project? Please inform the public of the maximum number of large and old trees that can be felled as 'hazards' or for skid or transport-related corridors. Please also inform BMBP and the public of the Forest Service's estimate of the number of large trees (over 21" dbh) that will be logged for this project. Even though this project is outside of the area covered by the Eastside Screens, large trees nevertheless provide crucial habitat for many species within the Green Ridge project area. Effects analyses regarding related logging and large tree felling should be included in the Green Ridge NEPA analyses. The FS should drop all logging on steep slopes; drop tether-assist, suspension, and partial suspension logging. The FS should drop all proposed logging of large trees. At the very least the FS needs to disclose an estimate and cap for logging of large trees. The FS should also buffer all legacy snags, clumps of snags, and clumps of downed wood providing habitat for species such as marten.


Big Mosquito sale (Malheur NF)


Photo credit: Daniel Howland 2021; all other pics from BMBP
Big Mosquito sale (Malheur NF)

36 CFR § 212 Subpart A directs each national forest to conduct "a science-based roads analysis," generally referred to as the "travel analysis process." The FS Washington Office, through a series of directive memoranda, instructed forests to use the Subpart A process to "maintain an appropriately sized and environmentally sustainable road system that is responsive to ecological, economic, and social concerns." These memoranda also outline core elements that must be included in each Travel Analysis Report.

The Washington Office memorandum dated March 29, 2012 (USDA Forest Service, 2012d) directed the following:

• A TAP must analyze all roads (maintenance levels 1 through 5);
• The Travel Analysis Report must include a map displaying roads that will inform the Minimum Road System pursuant to 36 C.F.R. § 212.5(b), and an explanation of the underlying analysis;
• The TAP and Watershed Condition Framework process should inform one another so that they can be integrated and updated with new information or where conditions change.

The December 17, 2013 Washington Office memorandum (USDA Forest Service, 2013b) clarifies that by the September 30, 2015 deadline each forest must:
• Produce a Travel Analysis Report summarizing the travel analysis;
• Produce a list of roads likely not needed for future use; and
• Synthesize the results in a map displaying roads that are likely needed and likely not needed in the future that conforms to the provided template.

The Subpart A analysis is intended to account for benefits and risks of each road, and especially to account for affordability. The TAP must account for the cost of maintaining roads to standard, including costs required to comply with Best Management Practices related to road maintenance.

The Travel Management Regulations at 36 CFR § 212.5 state:
(b) Road system—(1) Identification of road system. For each national forest, national grassland, experimental forest, and any other units of the National Forest System (§ 212.1), the responsible official must identify the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of National Forest System lands. In determining the minimum road system, the responsible official must incorporate a science-based roads analysis at the appropriate scale and, to the degree practicable, involve a broad spectrum of interested and affected citizens, other state and federal agencies, and tribal governments. The minimum system is the road system determined to be needed to meet resource and other management objectives adopted in the relevant land and resource management plan (36 CFR part 219), to meet applicable statutory and regulatory requirements, to reflect long-term funding expectations, to ensure that the identified system minimizes adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance.

The huge estimated annual maintenance costs for roads on the Deschutes National Forest far exceed all published estimates of road maintenance funding the Forest has received annually for decades. And although the FS never likes to conduct an analysis of or disclose the forest-wide ecological impacts of its road maintenance funding shortfalls, projecting from discussion in Gucinski et al. 2001 helps to start imagining the scale of the impacts.

It is also important to recognize the ongoing ecological damage of roads—regardless of the adequacy of maintenance funding. Undesirable consequences include adverse effects on hydrology and geomorphic features (such as debris slides and sedimentation), habitat fragmentation, predation, road kill, invasion by exotic species, dispersal of pathogens, degraded water quality and chemical contamination, degraded aquatic habitat, use conflicts, destructive human actions (for example, trash dumping, illegal hunting, fires), lost solitude, depressed local economies, loss of soil productivity, and decline in biodiversity. (Gucinski et al., 2001)

Endangered Species Act (ESA)

FEA (pg. 283) claims, for Bull trout, that for all action alternatives:

"[n]o direct effects to bull trout or critical habitat would occur as no in-channel work or work in Riparian Reserves would occur in areas known to contain bull trout. There would be no direct effects to bull trout from the project because they are found 1.5 miles downstream of the project and because effects on Riparian Reserves and intermittent streams within the project area are expected to be very minimal. Therefore there would be no detrimental effects that carry downstream that could directly affect bull trout or their critical habitat.

Indirect effects would not occur to bull trout as they are currently found only in the lower reaches of Street Creek and the lower Metolius River, about 1.5 miles away from where project work is expected to occur. PDCs and BMPs would protect intermittent waterways. It is possible but unlikely small amounts of fine sediments above background levels could be generated into waterways. Depending on future storms and precipitation some fine sediments could be transported to areas in Street Creek or the Metolius River where bull trout and critical habitat are located. However this is not anticipated would be in very small quantities if at all. Since there is no spawning in Street Creek and likely only infrequent spawning in the lower Metolius River effects to reproduction would not occur. Also these small amounts of fine sediment would not impact water quality, algae or aquatic insect populations where bull trout reside or critical habitat is located. There are no anticipated indirect effects to bull trout or critical habitat."

We note that the FEA is ignoring ample and well-documented evidence showing that logging and road-related activities on upstream and headwater stream reaches are likely have harmful effects on downstream stream habitats, especially those supporting Bull trout. Even according to the FS and USFWS's own documents, comparatively minimal activities can harm downstream Bull trout and their habitats. Please see our discussion below in this section, as well as throughout this document and within our DEA comments and addendum materials for more details and citations. The activities proposed in the Green Ridge project go well beyond minimal—the project proposes extensive logging, road building and road-related activities, throughout the project area including upstream of Bull trout occupied habitat. We also note that the North and Middle Forks of Street Creek in particular are unfortunately slated for extensive "temporary" road building that includes stream crossings throughout their headwaters, as well heavy and widespread logging throughout their subwatersheds.

The FS has not given a sound rationale for their determination that extensive logging and road-related activities would have no effect on stream habitats or water quality parameters. The FEA's cumulative effects analyses for Bull trout (and other aquatic species) are based entirely on their flawed direct and indirect effects analyses. The FEA claims (pg. 283) *"No cumulative effects are expected to occur to bull trout or critical habitat because no direct or indirect effects are expected to occur as a result of the Green Ridge Project."* The FEA goes on to determine that *"[t]here would be **No Effect (NE)** to bull trout critical habitat or bull trout populations."*

It's important to note that the Hydrology Specialist Report acknowledges (pg. 3) that the *"Key watersheds under the NWFP contribute directly to the conservation of resident fish and ESA-listed Threatened bull trout populations. They also have the highest priority for watershed restoration and watershed analysis is required to set priorities for restoration. Tier 1 Key watersheds under the NWFP contribute directly to the conservation of the threatened bull trout, anadromous fish populations, and resident fish populations. Tier 2 Key Watersheds may not contain at risk fish stocks but are important sources of high quality water."* By designating the watersheds within the Green Ridge project area Tier 1 and Key watersheds, the NWFP has specifically recognized the importance of the area for the recovery and restoration of Bull trout. Yet, the Green Ridge Draft EA repeatedly discounts the possibility that activities such as logging and roading may affect the nearby Bull trout habitat just downstream of the project area.

Even though the FS tries to ignore the importance of the Green Ridge project area to Bull trout and their habitat, the NWFP recognizes that streams within this watershed can and do impact downstream Bull trout habitats, and protection of these streams is needed in order to provide for Bull trout recovery. Protecting clean, cold waters within the Green Ridge project area is especially important in light of the downstream water quality impairments, such as elevated stream temperatures in the Metolius River. It is also important to reiterate, as discussed in more detail above in these comments, that intermittent and headwater streams can and do influence stream temperatures in downstream perennial streams. The FEA does not adequately consider or protect the influence on headwater and intermittent streams on downstream waters, and inappropriately discounts the potential influence of actions within the Green Ridge project area on Metolius River. In addition, in order to provide for Bull trout recovery, it is imperative that Bull trout are able to recolonize past occupied habitat.

The FEA's effects determination also fails to adequately consider the effects from road-related activities (both ongoing and after project completion); the high likelihood that logging and roading would increase stream temperatures and fine sediments, and alter watershed hydrology and stream morphology.

Fish stocks are stronger and better distributed in areas of little or no management and low road densities, even in fire suppressed areas, and even if severe fires occur. Numerous studies and reports show that many benefits are gained by leaving forests unroaded, and to their own ecological processes (including processes involving fire, insects, and disease). (Bader 2000; Bradley et al. 2002; DellaSala et al. 2011; Frissell and Carnefix 2007; Reiman and Clayton 1997, Reiman et al. 2000, Thurow et al. 2001; Public Lands Initiative/Trout Unlimited 2004; Western Native Trout Campaign 2001).

The project area currently has road densities at levels that are recognized as threats to water quality, fish, and watershed health (Carnefix and Frissell 2009; Cederholm et al. 1980; Frissell and Carnefix 2007; NOAA 1996; Ripley et al. 2005; USFS 2018). The bloated road networks on National Forests lands, including the Deschutes NF, threaten the long-term viability of Bull trout, steelhead, and other ESA-listed fish and aquatic species. The Forest Service notes (USFS 2015) that "*[t]he most important road related environmental issue is the effects of roads on aquatic resources in general, and specifically Threatened, Endangered and Sensitive aquatic species (bull trout, mid-Columbia steelhead, and Columbia spotted frog).*" High road densities have been correlated with low population levels and declines in bull trout and other aquatic species that rely on clean, cold waters (USFWS 2010a). In addition, current standards may not be sufficiently protective to provide for the recovery of species such as Bull trout (USFWS 2010b). Of particular concern are roads that interact with stream channels. Such roads are likely to have disproportionately negative effects on water quality and sensitive fish (USFS 2018). Sedimentation from roads is known to be one of the largest contributors for degradation to water quality as well as a source of degradation to fish habitat and spawning areas. Roads in disrepair create safety issues and conflicts with protection for natural resources, especially for those such as water quality, aquatic species, and functioning wetland processes. The ongoing violations of road density standards within the Green Ridge project area, and the pervasive state of disrepair

of many roads, are harmful to aquatic habitats as well as to terrestrial and avian species that are sensitive to forest fragmentation and road-related disturbances.

The Federal Registrar, Department of the Interior Fish and Wildlife Service 50 CFR part 17 (2010) Final Rule for Revised Designation of Critical Habitat for Bull Trout states: *"Sedimentation negatively affects bull trout embryo survival and juvenile bull trout rearing densities (Shepard et al. 1984, p. 6; Pratt 1992, p. 6). "An assessment of the interior Columbia Basin ecosystem revealed that increasing road densities were associated with declines in four nonanadromous salmonid species (bull trout, Yellowstone cutthroat trout (Oncorhyncus clarkii bouvieri), westslope cutthroat trout (O. c. lewisi), and redband trout (O. mykiss spp.)) within the Columbia River basin, likely through a variety of factors associated with roads. Bull trout were less likely to use highly roaded basins for spawning and rearing and, if present in such areas, were likely to be at lower population levels (Quigley and Arbelbide 1997, p. 1183). These activities can directly and immediately threaten the integrity of the essential physical or biological features…"* (USFWS 2010).

The NOAA 5-Year Review of Snake River Salmonids notes the synergistic negative effects of both logging and roads occurring in watersheds: *"Information from the [PACFISH Biological Opinion Monitoring Program] PIBO monitoring program indicates that unmanaged or reference reaches (streams in watersheds with little or no impact from road building grazing, timber harvest, and mining) on Federal lands in the Interior Columbia basin (including the Snake River basin) are in better condition than managed streams (Al- Chockhachy et al. 2010b). In particular, managed watersheds with high road densities or livestock grazing tend to have stream reaches with worse habitat conditions than streams in reference watersheds.*"

Carnefix and Frissell (2009) discussed impacts from roads, and show that significant negative impacts to sensitive aquatic species are present at road densities greater than one mile per square mile: *"Multiple, convergent lines of empirical evidence summarized herein support two robust conclusions: 1) no truly "safe" threshold for road density exists, but rather negative impacts begin to accrue and be expressed with incursion of the very first road segment; and 2) highly significant impacts (e.g., threats of extirpation of sensitive species) are already apparent at road densities on the order of 0.6 km per square km (1 mile per square mile) or less. Therefore, restoration strategies prioritized to reduce road densities in areas of high aquatic resource value from low-to-moderately-low levels to zero-to-low densities (e.g., 1 mile per square mile, lower if attainable) are likely to be most efficient and effective in terms of both economic cost and ecological benefit. By strong inference from these empirical studies of systems and species sensitive to humans' environmental impact, with limited exceptions, investments that only reduce high road density to moderate road density are unlikely to produce any but small incremental improvements in abundance, and will not result in robust populations of sensitive species."*

The existing road density in the Green Ridge project area is well above the 2-miles/square mile NOAA (1996) threshold for watersheds to be considered "properly functioning". NOAA (1996) notes: properly functioning: 2 miles/sq mile; at risk 2-3 mi/sq mi; not properly functioning >3mi/sq mi.

We have similar concerns for other aquatic species within the project area such as Redband trout, the Zigzag Darner, and to the caddisfly *Rhyacophila Chandleri.* The Green Ridge FEA dismisses potential impacts to these species similarly to how it dismisses potential impacts to Bull trout in the analyses. For example, the FEA suggests that there will be 'No Effect' from project actions on Redband trout.

For example, for the Redband trout effects analysis, the FEA (pg. 280) states "*[t]he project would not change stream temperature, instream wood, or sediment delivered to these streams. Since no measurable change in stream shade, sediment, or instream wood would result from the project, there are no direct effects to redband trout steelhead or their habitat.*" The DEA goes on to state that "*[n]o cumulative effects are expected that would detrimentally affect redband trout, because no direct or indirect effects are expected to result from the project."* However, the FEA has failed to adequately consider or avoid potential negative effects from logging and road-related actions in the Green Ridge project (see discussion above about potential effects to water quality, stream habitats, and riparian forests).

The FEA (pg. 279) discusses the uniqueness of some of the Redband trout populations within the project area, as well as the lack of baseline spawning and use data, and the possibility of historic steelhead use. Genetically unique populations of Redband trout should be high priorities for protection, and true drivers of water quality impairment (such as high road densities) should be addressed. The USFS is inappropriately focusing on speculative outcomes based on logging, rather than proven measures to aid fish recovery and protection. *"The redband trout population in Fly Creek and Six Creek is unique because it has been genetically isolated from the rest of the Deschutes River population due to the streams intermittent nature before it connects to LBC. No records of fish stocking in Fly Creek or Six Creek are known to exist which indicates this redband trout population may be genetically isolated with little to no hatchery introgression. It is unknown if steelhead historically used Fly Creek. Reach 4, the 1.6 mile section of Fly Creek from Prairie Farm Creek to Six Creek is most likely the main spawning and rearing area for this redband trout population with old redds and fry observed during the (Dachtler) 1998 survey. The amounts of spawning, timing, and high use areas are unknown because no surveys have been conducted. Single pass electrofishing surveys of selected habitat units in Fly Creek captured 78 redband trout that ranged from 2.7 to 8.9 inches (Dachtler 1998)."*

Native trout and salmonids also evolved with wildfire and other disturbances in the PNW and-- provided their populations are not too fragmented and impacted by logging and roads-- recover fairly quickly from wildfire. For example, the USFS proposed Forest Plan Revision (2014) vol 2. pg 60 noted: **"***Redband trout and bull trout have been shown to recolonize severely burned drainages within two years, provided the drainages were physically accessible (i.e., no culvert barriers, and provided that other fish in unburned areas were close enough to discover and move back into the recently burned habitat."* Logging and roads pose greater threats to forests, aquatic habitats, and imperiled fish than wildfire. The ecological risks of wildfire are overstated in the FEA, with little to no recognition that these forests evolved with mixed severity wildfire (including high severity fire) and rely on wildfire for many ecosystem processes.

For example, the FEA notes that the *"[c]ombined vegetation treatment from the Lower Fly Creek project and the proposed Green Ridge project could treat up to 56% of the Lower Fly Creek subwatershed."* However, rather than take a hard look at the potential negative impacts to water quality and wildlife habitat likely to result from such widespread logging, the FEA simply shifts focus to speculative, unproven, and scientifically controversial perceived benefits. The FEA makes the unsubstantiated assumptions that wildfire : *"[c]ombined vegetation treatments would reduce the fire hazard rating which could help reduce the likelihood that much of the vegetation in the Riparian Reserves would be denuded from a wildfire*." However, while the FEA repeatedly discusses, in detail, potential negative effects from wildfire in the FS's effects analyses, such detail is missing from the agency's effects analyses for logging. In addition, positive impacts from recent wildfires may occasionally be acknowledged briefly, but do not seem to be taken into account in the effects determinations for aquatic or terrestrial species or habitats. We also note that impacts due to recreation, while mentioned in the EA, also do not seem to be considered in relation to the increased public access that will be a result of the Green Ridge sale. The FEA (pg. 272): notes that *"following the 2002 Eyerly Fire large wood slightly increased in Street Creek. Outside the project area Spring Creek may be lacking in large wood because the perennial section is located all within the Perry South Campground where fallen trees are likely used as campfire wood."* The FEA also notes, for Mountain Lady Slipper that *"[t]he healthiest population is one that was burned in the Eyerly fire of 2002."* In direct contrast to the overstated wildfire results discussed in the effects analyses of the FEA, the agency admits (emphasis ours) that "*[t]he perennial sections of Street Creek and several intermittent streams in the Street and Spring Creek subwatersheds were burned by the Eyerly Fire in 2002.* ***Ground cover recovered quickly after the fire and more wood has fallen into stream channels since the fire.*** *The Green Ridge Fires (2013 and 2020) and Bridge 99 fire (2014) burned the intermittent portions of the headwaters of Street Creek, Spring Creek, Prairie Farm Creek, and Fly Creek. The effects of past road building and timber harvest activities are present on the landscape and near streams."*

The FS relies inappropriately on BMPs and PDCs to avoid their responsibility to adequately consider and avoid impacts to water quality and stream habitats. Based on repeated conversations with FS staff, it is our understanding that BMP implementation effectiveness is only monitored on a handful of sites per year, and that of those only one or two sites may be timber sales. In addition, these BMP monitoring checks seem to be highly subjective, and include almost entirely qualitative assessments. Please clarify if this is incorrect, and please provide data from the FS's BMP implementation field monitoring surveys on the Deschutes NF. Even if, as the FEA claims, BMP's are *generally* effective, several questions and issues arise. If, for example, BMPs are ~80% effective, then what of the other 20%? Depending on the scale of impacts and the quality of habitat being impacted, 20% is a potentially very substantial percentage for failure to protect water quality and stream habitats. Further, BMPs and PDCs contain overwhelmingly subjective and non-enforceable language.

The FEA (pg. 278) notes that *"[t]wo culverts remain as partial passage barriers on Spring Creek, and one on a small tributary to Spring Creek in the Perry South Campground. No culverts in the project area are fish passage barriers."* While these culverts are apparently not fish passage barriers, how extensive is the partial restricting the movement, and what other

aquatic species might be affected? Culverts and passage barriers should be top priorities for addressing and fixing, rather than logging and more road building.

The DEA and FEA did not provide clear descriptions of exactly what types and intensities of logging would occur within Riparian Reserves. The EAs were so busy trying to downplay the proposed logging that it was difficult to determine, for example, what the silvicultural prescriptions are on the 1,354 acres that will be treated within Riparian Reserves. Similarly, it was difficult to determine the intensity of the logging proposed on the 38 acres of aspen habitat.

Related issues:

We remain concerned about the climate change and carbon-related issues we raised in our DEA comments on the Green Ridge project. Please see BMBP's DEA comments for more detail. Our concerns included issues such as:

(Mildrexler, et al., 2020) state:

• Large-diameter trees store disproportionally massive amounts of carbon and are a major driver of carbon cycle dynamics in forests worldwide.
• We examined the proportion of large-diameter trees on National Forest lands east of the Cascade Mountains crest in Oregon and Washington, their contribution to overall aboveground carbon (AGC) storage, and the potential reduction in carbon stocks resulting from widespread harvest. We analyzed forest inventory data collected on 3,335 plots and found that large trees play a major role in the accumulated carbon stock of these forests. Tree AGC (kg) increases sharply with tree diameter at breast height (DBH; cm) among five dominant tree species. Large trees accounted for 2.0 to 3.7% of all stems (DBH ≥ 1" or 2.54 cm) among five tree species; but held 33 to 46% of the total AGC stored by each species. Pooled across the five dominant species, large trees accounted for 3% of the 636,520 trees occurring on the inventory plots but stored 42% of the total AGC. A recently proposed large-scale vegetation management project that involved widespread harvest of large trees, mostly grand fir, would have removed ~44% of the AGC stored in these large-diameter trees, and released a large amount of carbon dioxide into the atmosphere.

• Given the urgency of keeping additional carbon out of the atmosphere and continuing carbon accumulation from the atmosphere to protect the climate system, it would be prudent to continue protecting ecosystems with large trees for their carbon stores, and also for their co-benefits of habitat for biodiversity, resilience to drought and fire, and microclimate buffering under future climate extremes.

The FS fails to consider how climate change is already, and is expected to be even more in the future, influencing forest ecology. This has vast ramifications as to whether or not the forest in the project area will respond as the FS assumes.

We also remain concerned about the wildfire, insects, and disease issues we raised in our DEA comments.

In addition, we remain concerned about the agency's push to log large trees. The FEA notes that the suggested diameter limit of 21 inches is "arbitrary" (FEA pg. 27). However, we note that in addition to large trees being well-recognized as crucially important for aquatic and terrestrial ecosystems. The 21-inch diameter limit, which was recently gutted by the Trump administration, was a compromise for the Screens implementation. Considerably smaller trees, such as those approximately 14-16" diameter can begin to develop old growth characteristics and provide important habitat for wildlife. However, there are of course a spectrum of needs and tolerances for wildlife and aquatic species. Trees with larger diameters provide habitat for a wider variety of species and are at an even greater deficit. Consequently, the 21" diameter selection was a mid-point compromise along this biologically-based spectrum of habitat needs. Any enforceable quantitative suggestion in rules, contracts, standards, etc. are, to some degree, what one would call "arbitrary". However, this is an extremely disingenuous framing by the FS—particularly given the plethora of evidence showing that large trees are crucially important for aquatic habitats and wildlife. Please see our addendum materials, particularly our spreadsheet and documents on birds and wildlife that rely on large trees, and our comments on management direction for large trees for more information. While we understand that there is no diameter limit under the NWFP, large trees have clear and central importance to these ecosystems. The 21" diameter limit is well-researched and based on the biological needs of species in Eastern Oregon. In addition, these large trees are crucial for storing carbon, and are the most fire-resistant. The FS clearly did not learn from the public outcry surrounding the large trees marked for cutting along popular trails outside of Bend.

BMBP continues to request that logging is dropped in areas outside of plantations. The FS is inappropriately managing for only tree species composition according to their (scientifically controversial and speculative) goals around HRV. Wildfire risk is overstated throughout the FEA, and science that contradicts the agency's rationale for logging is ignored (such as Bradley et al. 2016). Well-documented risks and negative effects to ecosystems and species are understanded. Because of the agency's myopic focus on tree species composition, the FS is ignoring clean water, and stream habitats, and wildlife.

Borax treatment is unnecessary to address a native fungus that plays crucial functions and roles within these ecosystems. It is also likely to be ineffective at 'control' of this native fungus, and is likely to harm ecosystems processes as well as unintended targets. Annosus root rot is doing the work, naturally and for free, that many silvicultural prescriptions are trying to imitate. Dead snags, downed logs, pockets, openings, and heterogenous canopy and forest floor conditions are well-recognized as important for forest health, and are often what the FS says it's trying to accomplish with logging. Rather than potentially creating harm to non-target species, water bodies, or sensitive botanical species, the FS could to simply let forests develop through their necessary and natural processes.

For the above reasons, the FEA does not consider the best available science required by the Healthy Forests Restoration Act, and it fails to take a hard look at the project's impacts, in violation of the National Environmental Policy Act.

Objection resolution requests:

- A full EIS should be conducted for the Green Ridge project, and include adequate analyses of direct, indirect, and cumulative effects;
- We respectfully request that the Forest Service drop all logging of trees >8" in Riparian Reserves, and drop all logging in mixed-conifer forests within Riparian Reserves;
- Particularly given the high road density across the project area, proposed "temporary" roads should be dropped, and all alternatives should include the maximum miles of road decommissioning and closures possible. In order to meet ACS objectives, such as directives for "*minimizing road and landing locations in Riparian Reserves*" and "*minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow*", then all "temporary" roads with stream crossings, riparian reserves, those proposed within high water storage areas, and those on steep slopes above creeks and drainages should be dropped. At a minimum, they should be drastically scaled back;
- We respectfully request that the Forest Service drop all logging within mixed-conifer areas outside of even-aged, homogenous, and young plantations in uplands and Riparian Reserves. This includes dropping all logging, particularly all logging over 8" dbh, within Riparian Reserves; in moist mixed-conifer forests; in Late Successional Reserves; on steep slopes and sensitive soils; in and near meadow complexes; in Northern spotted owl habitat (such as dispersal habitat); in core or source habitat areas for American marten and Pileated woodpeckers; in important habitat for Northern Goshawk and Great grey owls; and in important hiding or thermal cover for deer and elk;
- BMBP continues to request that logging is dropped in areas outside of plantations;
- Prescribed fire should not occur in areas such as very moist forests, particularly within Riparian Reserves, or within source habitat for marten and Pileated woodpeckers, important habitat for species such as Northern goshawk and Northern spotted owls; areas with concentrations of legacy snags and downed wood; and other areas providing high-quality wildlife habitat that may be at risk of destruction or degradation with prescribed fire;
- Please buffer and protect from logging incense cedars, particularly mature and old growth incense cedars and those within clumps;
- We are also concerned about the lack of diameter limits for logging large trees; lack of estimate for the number of large trees that would be logged, felled as "hazards", or cut down in relation to roads or haul or transport corridors; the lack of a cap on the number of large trees proposed for logging; and the inadequate effects analyses related to these issues. Please provide these estimates and caps;
- The FS should drop all proposed logging of large trees. At the very least the FS needs to disclose an estimate and cap for logging of large trees. Please provide an estimate and

a cap of how many large trees and legacy snags may be felled, and the effect of losing those trees for wildlife, water quality, and stream habitats;

- We request that the Forest Service commit to buffering large and old trees and legacy snags so that they do not have to be felled as 'hazard' trees or for skid, haul, and road routes within the Green Ridge project. We also request that the FS buffer all legacy snags, clumps of snags, and clumps of downed wood providing habitat for species such as marten.
- The FS should drop all logging on steep slopes; drop tether-assist, suspension, and partial suspension logging.
- Areas that have experienced wildfire should not be logged, as logging in post-fire forests is overwhelmingly ecologically damaging. Please drop proposed logging in post-fire areas.
- Does the FS have maps, including GIS layers, for recent wildfires? If so, we request copies of those maps/GIS layers.
- Please provide BMBP with the GIS layers with the maps of these sales and the information for: *National Forest FACTS activity data base occurred between 1968 and 2005. These entries include the Six Creek Cull (1968); Green Ridge Salvage (1970); Spring Creek (1973); Big Rattler (1977); Six Creek HOR (1977); Meadow Creek (1980); Big Bench (1980); Six Creek HOR (1981); North Fuel Break HOR (1983); South Fork (1985); Whiskey Spring (1988); Street Creek (1989); Lookout (1990); Castle Rock HOR (1990); Big Bear (2003); Bear Garden (2002); and Eyerly Salvage (2005) sales. Some of the proposed treatment units have had previous mechanical entries from sales and, although most of the past activities do not overlap each other, there are some areas that have seen multiple entries."*
- If the FS has calculated the percentage of the project area, including the plantations, that will have undergone management that preferentially selects for Ponderosa pine, once the Green Ridge project has been implemented, please let us know and share this information with the BMBP and the public.
- We respectfully request that the agency shift gears away from logging in the Green Ridge area to include long-term plans for protecting clean water, mature and old trees, core habitat blocks, and connectivity.

Thank you for considering our objection and objection resolution requests. Please do not hesitate to contact us for any follow-up questions or discussion at 510-715-6238 or paula@bluemountainsbiodiversityproject.org.

Sincerely,

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/s/ Adam Bronstein

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